COUNCIL MEETING AGENDA

Tuesday, July 8, 2025

COUNCIL CHAMBERS – CIVIC SQUARE

All Meetings can be viewed at:
City of Welland website: https://www.welland.ca/Council/LiveStream.asp
YourTV: The meeting will be aired live on Channel 700

Council Information Packages are available on the City of Welland website at https://www.welland.ca/Council/CouncilInformationPackages.asp

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Pages

1. COMMITTEE-OF-THE-WHOLE (IN-CAMERA) - (5:30 P.M.)
   - 1.1 PERSONAL MATTERS ABOUT AN IDENTIFIABLE INDIVIDUAL, INCLUDING MUNICIPAL OR LOCAL BOARD EMPLOYEES:
     1. Human Resources Matter.
   - 1.2 RECEIVING OF ADVICE THAT IS SUBJECT TO SOLICITOR-CLIENT PRIVILEGE, INCLUDING COMMUNICATIONS NECESSARY FOR THAT PURPOSE:
     1. Hunters Pointe Redevelopment Subdivision.
2. ARISE FROM COMMITTEE-OF-THE-WHOLE (IN-CAMERA)
3. OPEN COUNCIL MEETING - 7:00 P.M.
   - 3.1 LAND ACKNOWLEDGEMENT
   - 3.2 NATIONAL ANTHEM
   - 3.3 OPENING REMARKS
   - 3.4 ADDITIONS/DELETIONS TO AGENDA
   - 3.5 ADOPTION OF MINUTES
     1. Regular Council Meeting of June 17, 2025. — 4 - 10
   - 3.6 CALL UPON THE CITY CLERK TO REVIEW COMMITTEE-OF-THE-WHOLE (IN-CAMERA) ITEMS TO BE ADDED TO THE AGENDA BLOCK
   - 3.7 DISCLOSURES OF INTEREST

3.8 COUNCILLORS TO DETERMINE AGENDA ITEMS AND BY-LAWS TO BE REMOVED FROM THE BLOCK FOR DISCUSSION IN COMMITTEE-OF-THE-WHOLE (OPEN)

4. ORAL REPORTS AND DELEGATIONS

4.1 PRESENTATIONS - NIL

4.2 LEGISLATED PUBLIC HEARINGS/MEETINGS - NIL

4.3 DELEGATIONS - (10 minutes maximum per delegation)

1. Jon Braithwaite, CEO, The Hope Centre, Shelly Mousseau, Program Director, Gateway and Jeffrey Sinclair, Manager of Homeless Services, Niagara Region re: Ontario Road Shelter/Homelessness system. Ref. No. 21-30 — 11 - 21

(Background information included in Council members packages).

RECOMMENDATION:

THAT Council receives for information the presentation by Jon Braithwaite, CEO, The Hope Centre, Shelly Mousseau, Program Director, Gateway and Jeffrey Sinclair, Manager of Homeless Services, Niagara Region regarding Ontario Road Shelter/Homelessness system.

4.4 AGENCIES, BOARDS, COMMISSIONS AND COMMITTEE REPORTS - NIL

5. COMMITTEE-OF-THE-WHOLE (OPEN)/AGENDA BLOCK

5.1 Hunters Pointe Redevelopment Subdivision – Request to Remove Condition of Draft Plan of Subdivision Approval for an Overpass. Ref. No. 25-75 — 22 - 331

5.2 2024 Year-End Operating Budget Variance Report and 2024 Capital Progress Report. Ref. No. 25-4 — 332 - 368

5.3 2025 Capital Project Close-Out Report #1. Ref. No. 25-4 — 369 - 374

5.4 Update to Traffic By-law 89-2000. Ref. No. 25-22 — 375 - 390

5.5 Civic Square Revitalization Detailed Design RFP Award. Ref. No. 99-99 — 391 - 412

5.6 Applications for Official Plan Amendment, Zoning By-Law Amendment, and Draft Plan of Subdivision for 210 and 276 Quaker Road. Ref. No. 25-35 — 413 - 491

5.7 Request for Redline Revision to Draft Plan of Common Element Condominium – Warbler Place – 205 Lancaster Drive. Ref. No. 23-105 — 492 - 496

6. NEW BUSINESS - NIL

7. BY-LAWS

7.1 A By-law to amend appointment By-laws 2018-48, 2018-49 and 2018-50. Ref. No. 25-22, 23

7.2 A By-law to provide for the appointment of Deputy Fire Chief(s) to act as Fire Chief during the absence of the Fire Chief for the City of Welland Fire and Emergency Services; and to repeal By-law 2021-70 and By-law 2022-19. Ref. No. 25-15

7.3 A By-law to authorize signing authority on behalf of the City of Welland; and to repeal By-laws 2013-82 and 2016-178. Ref. No. 25-4

7.4 A By-law to exempt certain lands from Part-Lot Control - Block 7, Plan 59M-528, Parts 1 to 8 (inclusive), 59R-18367, (953, 957, 961, 967 Clare Avenue), City of Welland. Ref. No. 25-84

7.5 A By-law to exempt certain lands from Part-Lot Control - Block 14, Plan 59M-528, Parts 1 to 3 (inclusive), 59R-18335, (79, 83, Harvest Oak Drive), City of Welland. Ref. No. 25-85

7.6 A By-law to exempt certain lands from Part-Lot Control - Block 15, Plan 59M-528, Parts 1 to 4 (inclusive), 59R-18337, (67, 75 Harvest Oak Drive), City of Welland. Ref. No. 25-85

8. NOTICES OF MOTION

8.1 COUNCILLOR MATTERS DISCUSSED WITH STAFF FOR REPORTING PURPOSES - (For the purpose of informing the public on a matter that has been discussed with staff since the previous Council Meeting)

8.2 NOTICES OF MOTION (PREVIOUSLY SUBMITTED FOR DISCUSSION)

1. (Councillor Chiocchio) 497 - 497
City of Welland staff report back to Council with costs of installing large roadway markings indicating school crossing zone as well as with mid road signage indicating speed. Staff to concentrate on high traffic school zones and for the report to come back prior to the September 2025 school year, and take an example of the Town of Pelham as they have school markings zones. Ref. No. 25-22

8.3 CALL FOR NOTICES OF MOTION (TO BE INTRODUCED AT THE NEXT SCHEDULED COUNCIL MEETING)

9. CORPORATION REPORTS

9.1 MAYOR'S REPORT

9.2 COUNCILLORS WARD REPORT/ACTIVITIES - (2 minutes per Councillor)

9.3 CHIEF ADMINISTRATIVE OFFICER'S REPORT

10. CONFIRMATORY BY-LAW

10.1 A By-law to adopt, ratify and confirm proceedings of the Council of the Corporation of the City of Welland at its meeting held on the 8th day of July, 2025.

11. ADJOURNMENT

CITY OF
Welland

MINUTES OF THE

JUNE 17, 2025 COUNCIL MEETING

CIVIC SQUARE, COUNCIL CHAMBERS
60 EAST MAIN STREET

Council met in Committee-of-the-Whole closed to the public at 5:31 p.m. and in open session at 7:02 p.m. on the above date.

His Worship Mayor Frank Campion in the Chair.

Members Present:

Councillors J. Chiocchio, T. DiMarco (virtual at 5:47 p.m.- 9:47 p.m., the Councillor was removed from the meeting due to using inappropriate language), B. Fokkens (virtual until 9:15 p.m.), M.A. Grimaldi, J. Lee, D. McLeod (5:37 p.m.), A. Moote, C. Richard, S. Setaram, G. Speck (virtual), and L. Van Vliet (until 9:15 p.m.).

Members of Staff and Others Present:

Chief Administrative Officer, R. Axiak
Director of Legislative Services/City Clerk, T. Stephens
Director of Community Services, J. Ruddell
Director of Infrastructure Services, SM. Millar
Director of Planning and Development Services, G. Munday
Director of Strategic Initiatives and Economic Development, L. DeChellis
Manager of Budgets & Financial Servies/Deputy Treasurer, A. Vuksan Scott
Supervisor of Festivals & Events, E. Carl (5:31 p.m. - 7:02 p.m.)
Manager of Business and Community Services, A. Degazio (5:31 p.m. - 7:02 p.m.)
Manager of Transportation, A. Khan (7:15 p.m. - 9:16 p.m.)

2025 - 150
25-25 Moved by Chiocchio and Van Vliet
THAT THE COUNCIL OF THE CITY OF WELLAND meet, with the Mayor as Chair, in Committee-of-the-Whole closed to the public at 5:31p.m. to consider:

- A matter in respect of which a council, board, committee or other body may hold a closed meeting under another Act;
  - Under the Business Corporations Act - Welland Hydro-Electric Holding Corporation.
  - Welland Hydro-Electric Holding Corporation Annual General Meeting - Election and Confirmation of Director.
- Security of the property of the municipality or local board;
  - Property Matter.
- Litigation or potential litigation, including matters before administrative tribunals, affecting the municipality or local board;
  - Update on Facility Tenant Matter.
- A position, plan, procedure, criteria or instruction to be applied to any negotiations carried on or to be carried on by or on behalf of the municipality or local board;
  - Transfer of Gateway Community Improvement Plan Incentives for 200 Buchner Road.

2025 - 151
25-25 Moved by Moote and Grimaldi
THAT THE COUNCIL OF THE CITY OF WELLAND arise from its closed Committee-of-the-Whole meeting at 6:46 p.m. without report.

CARRIED

PRESENTATION

99-49 Kevin Caver, President and CEO , Mario Falvo, Nominating Committee Chair, and Tim Clutterbuck, Chair of Holding Corp., Welland Hydro-Electric Holding Corporation addressed Council regarding its annual general meeting.

DELEGATIONS

25-28 Sue Barnett, Trustee/Chair, District School Board of Niagara addressed Council regarding an update on Welland schools.

25-28 Leslie Monger, Executive Director of Community Living, Community Living Welland Pelham addressed Council regarding an overview of Community Living.

2025 - 152
25-1 Moved by Richard and Lee
THAT THE COUNCIL OF THE CITY OF WELLAND hereby approves and adopts the minutes of the Regular Council Meeting of June 3, 2025, as circulated.

CARRIED

2025 - 153
99-43 Moved by McLeod and Grimaldi
THAT THE COUNCIL OF THE CITY OF WELLAND receives for information the presentation by Kevin Carver, President and CEO, Mario Falvo, Nominating Committee Chair, and Tim Clutterbuck, Chair of Holding Corp., Welland Hydro-Electric Holding Corporation regarding its annual general meeting.

CARRIED

2025 - 154
99-43 Moved by McLeod and Chiocchio
THAT THE COUNCIL OF THE CITY OF WELLAND approves the appointment of the auditors for Welland Hydro.

CARRIED

2025 - 155
99-43 Moved by Richard and Moote
THAT THE COUNCIL OF THE CITY OF WELLAND approves the receipt of the Corporation's audited financial statements.

CARRIED

2025 - 156
99-43 Moved by Chiocchio and Van Vliet
THAT THE COUNCIL OF THE CITY OF WELLAND as recommended by Welland Hydro-Electric Holding Corp. elects Tim Clutterbuck as Director to the board of directors of each of Welland Hydro-Electric Holding Corp., Welland Hydro-Electric System Corp. and Welland Hydro Energy Services Corp. for a three (3) year term.

CARRIED

2025 - 157
99-43 Moved by Moote and Grimaldi
THAT THE COUNCIL OF THE CITY OF WELLAND as recommended by Welland Hydro-Electric Holding Corp. elects David Augustyn as Independent Director to the board of directors of Welland Hydro-Electric System Corp., for a three (3) year term.

CARRIED

2025 - 158
21-30 Moved by DiMarco and Lee
THAT THE COUNCIL OF THE CITY OF WELLAND form a State of Emergency Committee on an ad hoc basis to better address Welland declared state of emergency on mental health, homelessness and addiction; and
THAT Welland City Council focus on recruiting individuals with lived experience with mental health, homelessness and addictions and this be reflected in the call for applications; and further
THAT Welland City Council approach the Niagara Region to request that a Niagara Region staff member who works in the homelessness services also sit on the new committee.

YEAS: Chiocchio, DiMarco, Lee, Richard and Speck

NAYS: Mayor Campion, Grimaldi, McLeod, Moote and Setaram

LOST

2025 - 159
24-90 Moved by McLeod and Setaram
THAT THE COUNCIL OF THE CITY OF WELLAND approves the Neighbourhood Association Policy found in Appendix 1.

…….

2025 - 160
24-90 Moved by Fokkens and Lee
THAT THE COUNCIL OF THE CITY OF WELLAND refers Report CS-2025-20: Neighbourhood Association Policy back to staff.

YEAS: Lee, Speck, Chiocchio, DiMarco, Richard and Fokkens.

NAYS: McLeod, Grimaldi, Setaram, Moote, Van Vliet and Mayor Campion.

LOST

2025 - 161
24-90 Moved by Lee and Setaram
THAT Welland City Council amends changing the hours to 104 hours/2 hours per week for Dain City Recreation.

YEAS: Fokkens, Lee, Richard and Speck.

NAYS: Mayor Campion, Chiocchio, DiMarco, Grimaldi, McLoed, Moote, Setaram and Van Vliet.

LOST

FOLLOWING THE LOST VOTES ON THE AMENDMENTS, THE MAIN MOTION WAS PUT IN ITS ORIGINAL FORM AND …….

YEAS: Mayor Campion, Grimaldi, Lee, McLeod, Moote, Setaram and Van Vliet.

NAYS: Chiocchio, DiMarco, Fokkens Richard and Speck.

CARRIED

2025 - 162
25-6 Moved by Lee and Richard (in block)
THAT THE COUNCIL OF THE CITY OF WELLAND declares June 6, 2025 as "Hope Air Day" in the City of Welland.

CARRIED

2025 - 163
25-6 Moved by Lee and Richard (in block)
THAT THE COUNCIL OF THE CITY OF WELLAND declares July 1, 2025 as "All Canadian Simultaneous Drumming Celebration Day".

CARRIED

2025 - 164
25-22 Moved by Lee and Richard (in block)
THAT THE COUNCIL OF THE CITY OF WELLAND receives the staff review and concludes that the City would not benefit further from the establishment of a Welland School Traffic Safety Action Committee.

CARRIED

2025 - 165
25-28 Moved by Setaram and Lee
THAT THE COUNCIL OF THE CITY OF WELLAND receives for information the presentation by Sue Barnett, Trustee/Chair, District School Board of Niagara regarding an update on Welland school.

CARRIED

2025 - 166
25-28 Moved by Moote and Grimaldi
THAT THE COUNCIL OF THE CITY OF WELLAND receives for information the presentation by Leslie Monger, Executive Director of Community, Community Living Welland Pelham regarding a brief overview of Community Living updates.

CARRIED

2025 - 167
25-51 Moved by Chiocchio and Moote
THAT THE COUNCIL OF THE CITY OF WELLAND approves lands municipally known as, Lot 172 of Subdivision Plan NP951 to be conveyed to Habitat for Humanity Niagara for the construction of a new affordable single-detached dwelling.
THAT Welland City Council directs staff to expense the costs of the service laterals from the Affordable Housing Reserve Fund.

CARRIED

2025 - 168
25-59 Moved by McLeod and Moote
THAT THE COUNCIL OF THE CITY OF WELLAND accepts the tender from 788893 ONTARIO LIMITED o/a Niagara Crack Sealing in the amount of $72,500.00 (plus HST) being the lowest bid received for the 2025 Crack Sealing Program; and further
THAT Welland Council approves the reallocation of $5,000.00 of funding from the 2023 Road Resurfacing project to the 2025 Crack Sealing Program.

CARRIED

2025 - 169
25-78 Moved by Chiocchio and Richard
THAT THE COUNCIL OF THE CITY OF WELLAND reestablish the Community Watch Program in our community by replacing some of the faded community watch signage that is out there now across the city and possibly looking at some kind of community stickers for residents; and
THAT the City provides an educational piece to talk about crime prevention; and further
THAT city staff develop a report for Council's consideration.

YEAS: Chiocchio, DiMarco, Lee, Richard and Speck.

NAYS: Mayor Campion, Grimaldi, McLeod, Moote and Setaram.

LOST

BY-LAWS ARISING FROM COMMITTEE-OF-THE-WHOLE (IN-CAMERA)

Moved by McLeod and Chiocchio
THAT THE COUNCIL OF THE CITY OF WELLAND having given due consideration to the following By-law, as reproduced in this evening's Council Agenda, now read a first, second and third time and pass same, and authorize the Mayor and Clerk to sign and seal same.

24-47
BYL 2025 - 74
A By-law to authorize the purchase of lands from the registered owners of lands municipally described as 432 Ridge Road and 476 Ridge Road, Welland, ON.

YEAS: Mayor Campion, Grimaldi, Lee, McLoed, Moote, Richard and Setaram.

NAYS: Chiocchio, DiMarco and Speck.

CARRIED

BY-LAWS

Moved by Richard and Moote
THAT THE COUNCIL OF THE CITY OF WELLAND having given due consideration to the following By-law, as reproduced in this evening's Council Agenda, now read a first, second and third time and pass same, and authorize the Mayor and Clerk to sign and seal same.

25-1
BYL 2025 - 75
A By-law to adopt, ratify and confirm proceedings of the Council of the Corporation of the City of Welland at its meeting held on the 17th day of June 2025.

CARRIED

Council adjourned at 9:55 p.m.

These Minutes to be approved and adopted by Motion of Council this 8th day of July 2025.

Housing Focused Shelter
Ontario Road, Welland

And How the Regional Homelessness Programs Work Together

The Hope Centre
Gateway (NASO)
Homelessness Services, Niagara Region

Shelter Overview

- Housing Focused Shelter located on Ontario Road
- Funded by Niagara Region, operated by The Hope Centre
- Capacity – 60 people (individuals and couples)- Supports include meals, case management, housing navigation.
- Huge thanks to City of Welland, Niagara Regional Housing and Niagara Region Homelessness services for all working together to not only open this facility, but to have it open in time for clients to have a bed in time for Christmas.

Utilization Data

- 162 Unique guests
- 101 percent Average Daily Occupancy
- 25 guests exited to Housing.
- 68% of housed clients staying housed after 180 days.
- Average length of stay – 29 days
- Common barriers to housing – affordability (Current market one bedroom in Welland is $1500 and up), ID, Mental Health Supports
- Key Partners include: Niagara Region, Niagara Assertive Street Outreach (NASO), REACH Niagara, Positive Living, Return 2 Hope, Niagara Paramedic Outreach, Niagara Regional Police (CORE unit),etc.

Community Impact

- Monthly Community Relations Committee – consisting of area residents, Hope Centre staff, Niagara Regional Police, Niagara Region Staff, Welland City staff and other interested parties.
- Weekly meetings with shelter guests where one of the standing agenda items is the importance of being a good neighbour.
- Attendance at Woodrose Co-op board meetings.
- We have staff outside at both morning and afternoon bell times.
- Presented at Diamond Trail school – in regular contact with both Diamond Trail principal and chair of DSBN. No issues reported.

Homelessness System – working together to support the Welland Community

Prevention program – The Hope Centre

- Eviction Prevention and Re-housing

NASO Niagara Assertive Street Outreach



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- **The Work of NASO** - Supporting Homeless individuals in Welland & Niagara
- Encampments (Mapping Tool and Task Force)
- Working together (Shelters & Housing Options)

HOW do we help?

- 211
- Diversion
- After-hours shelter placement

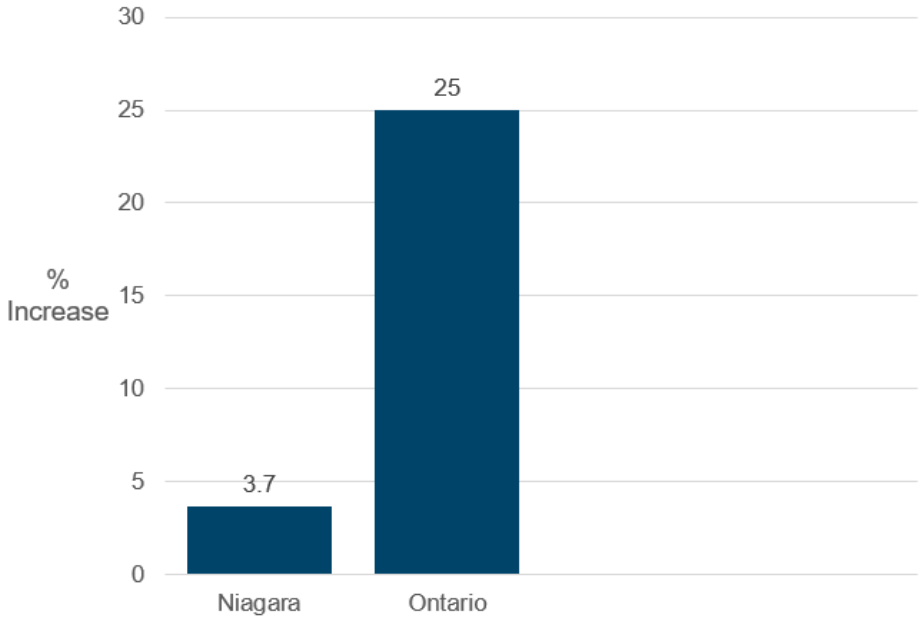




HOUSING OUR HOMELESS

- Housing First
- Permanent Supportive Housing
- Building for the future
- Affordability

Niagara Homeless Increase Compared to Ontario (2022-2024)



Homelessness in Welland June 2025

	May and June 2025	Comments
Homeless	163 people	14% of all people experiencing homelessness in the Niagara region
Chronic Homelessness	99 people	61% of people from Welland experiencing homelessness
Unsheltered Homelessness	35 people	Compared to 20 in May 2024. Trending downward from a high of 63 in October 2024
Encampments	2-5 on any given day	Down from 17-19 in 2024

Why we are seeing success in Welland?

- New spaces at Ontario Road shelter
- Revised NASO Model
- Collaboration (City of Welland, Police, Fire, Homelessness Services, NASO, Hope Centre)
- Welland approach to housing development
- Welland commitment to affordable housing

COUNCIL MEETING

PLANNING AND DEVELOPMENT SERVICES – PLANNING DIVISION

REPORT P&B-2025-31
July 8, 2025

SUBJECT:	**Hunters Pointe Redevelopment Subdivision – Request to Remove Condition of Draft Plan of Subdivision Approval for an Overpass**
AUTHOR:	**Taylor Meadows, CPT, BURPl, RPP, MCIP** **Manager of Development Planning**
APPROVING MANAGER:	**Michael Greenlee, RPP, MCIP** **Manager of Planning**
APPROVING DIRECTOR:	**Grant Munday, B.A.A., RPP, MCIP** **Director of Planning and Development Services**

RECOMMENDATION:

THAT Council denies the request by 2599587 Ontario Ltd. ("**259**") to amend the draft plan conditions of approval for the Hunters Pointe Subdivision by deleting Condition #92, which requires the construction of an overpass.

RELATIONSHIP TO STRATEGIC PLAN

This recommendation is aligned to Council's strategic priority of ensuring "**Liveability**" by creating a sense of belonging while enhancing mobility by improving access to recreation and community events, ensuring adequate housing options, encouraging job growth, and improving ways to efficiently move people throughout the city.

EXECUTIVE SUMMARY:

A request for modification of a draft plan of subdivision condition has been received for the Hunters Pointe Redevelopment Subdivision. The proposal seeks to delete Condition #92 related to the construction of an overpass. Staff have reviewed this proposal and recommend that Council denies the request to delete Condition #92.

BACKGROUND:

On June 9, 2020 the Council of the City of Welland approved a draft plan of subdivision, official plan amendment and zoning by-law amendment for the lands municipally known as 289 Daimler Parkway, subject to conditions of draft plan approval (see Appendix II). At the time of the approval, one condition was added by Council via motion as follows:

> "That an overpass be constructed to the satisfaction of the Ministry of Transportation (MTO), Region of Niagara and the City of Welland, from Hunters Pointe Redevelopment to Oxford Drive, crossing the 406 at the sole expense of the developer; and further, that the overpass permits safe passage of both vehicular and pedestrian traffic, that the developer pay for road upgrades on Oxford Drive [sic] to Atlas Avenue, and that the overpass be completed no later than when the development commences its 600th unit."

Council's decision to adopt the official plan amendment ("**OPA**") and pass the zoning by-law amendment ("**ZBA**") was appealed to the Ontario Land Tribunal (**OLT**") by Highland Residents Association ("**HRA**") and the adjacent developer, 2090572 Ontario Inc. ("**209**"). Following a mediation process, the City entered into Minutes of Settlement with the HRA, 259 and 209 to resolve the appeals and the OLT approved a modified OPA and ZBA with conditions of draft approval on June 13, 2022.

On March 4, 2024 the City received a submission from Davies Howe LLP on behalf of 259 that requested the deletion of Condition #92 related to the construction of an overpass.

Upon receipt of the request to delete Condition #92, staff retained the consulting services of R.V. Anderson Associates Limited ("**R.V.**") to complete a traffic impact study for the lands surrounding Daimler Parkway. R.V. is a multidisciplinary engineering consulting firm that specializes in a range of areas; including, transportation planning. The completed traffic impact study (TIS) is appended to this report for reference. The TIS provided the following conclusion:

> *"If the proposed magnitude of developments is to be implemented by the 2051 horizon, undesirable operating conditions are expected in the form of significant congestion along the Daimler Parkway corridor and queue spillback blocking adjacent intersections. Therefore, it is recommended that an additional non-emergency access be provided for the lands east of Highway 406 to accommodate the development traffic demand. The additional access will add new transportation capacity to the roadway network allowing for diversion of traffic away from the Daimler Parkway corridor thus improving its operation under the future (2051) total traffic scenario. Additionally, there will be surplus capacity within the roadway system to consider the potential for increased densities if desired. This additional route choice will also reduce out of way travel and overall commute time for the traffic heading to the south and west."*

The Minutes of Settlement related to this approval provide that if Council is to consider amending or deleting Condition #92, the City is to provide 259, 209 and the HRA with notice and an opportunity to make delegations. A circulation of the request to modify (delete) draft plan conditions in reference to this file was published in the Welland Tribune on April 15, 2025 and on the City's planning public notices webpage. A public meeting was held on April 29, 2025 at the General Committee meeting of Council.

The public meeting offered the opportunity to interested parties to provide oral submissions related to the request. In addition to counsel for 259, two (2) members of the public participated in addition to the applicant. Comments received included the following:

- Concerns related to the ability to access the area with emergency vehicles;
- Potential for traffic to increase and create congestion; and,
- Request to maintain previous decision.

DISCUSSION:

A request for modification to draft plan of subdivision conditions was received in reference to the proposed deletion of Condition #92 (see Appendix II) of the Hunters Pointe Subdivision.

As a result of this request, staff retained a traffic consultant to complete a Traffic Impact Study ("**TIS**"). The findings of this TIS support the construction of an additional non-emergency access to accommodate traffic to be generated by the Hunters Pointe Subdivision. The TIS suggests that the additional access is necessary to address an increase to transportation capacity which will accommodate the expected development in the area.

The submitted request was circulated for comment to local and external agencies; including, the MTO and Fire Division. It is noted that the MTO and Fire Division are supportive of maintaining the condition related to the construction of an overpass.

Based on the findings of the TIS and the comments provided from commenting agencies, Staff recommend that Council deny the request to remove Condition #92.

FINANCIAL:

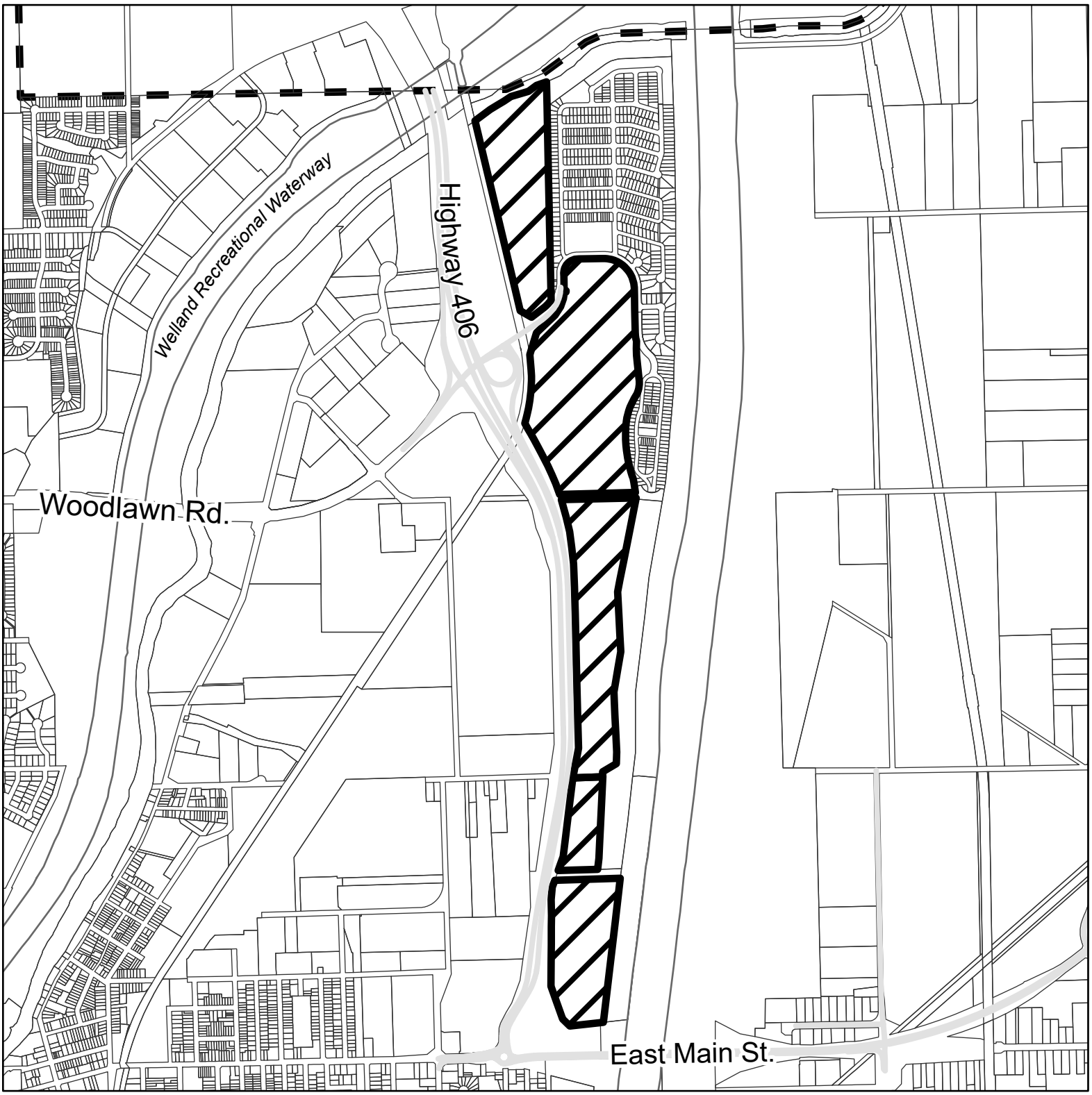
There are no financial implications as a result of this report.

ATTACHMENT:

Appendix I - Key Map
Appendix II - Draft Plan of Subdivision Conditions

Appendix III - Draft Plan of Subdivision
Appendix IV - Consolidated Traffic Impact Study – Developable Lands East of Highway 406
Appendix V - Relevant Correspondence

26T-14-18003



Key Map

N

Subject Lands

Municipal Boundary

CITY OF Welland

Planning & Development Services

Planning Division

1. That the Owner enter into a Subdivision Agreement with the City of Welland that is to be registered on title.
2. That no grading or construction work shall commence until such time as the Subdivision Agreement has been entered into and financial securities are in place.
3. That all development must conform to the City of Welland's 'Municipal Standards', as amended.
4. That all necessary easements required for utility and servicing purposes be granted to the appropriate Authority, free and clear of all encumbrances.
5. That the Owner dedicates to the City, the parklands identified, free and clear of all encumbrances.
6. That the Owner provide a Tree Planting Fee to the City at the time of registration of the plan of subdivision.
7. That the Owner submit an Urban Design Brief to the satisfaction of the City of Welland, which explains how the proposed Plan of Subdivision will comply with the City's Urban Design Guidelines and creates a plan with which all development must comply,
8. That, the Owner submit to the City at the registration of the first phase of the development, a Letter of Credit representing their portion of the cost of constructing the emergency entrance onto Highway 406, as well as the cost of constructing a road connection to the emergency entrance.
9. That the Owner shall be responsible for receiving approval from the Ministry of Transportation for the design of the emergency access shown on Block 758 of the Draft Plan of Subdivision.
10. That the Owner shall be responsible for their portion of the costs associated with the design and construction of the emergency access, as well as the costs of the construction of any temporary connection roads.
11. That the emergency access control gates be equipped with EMTRAC technology for emergency services purposes, the cost of which is to be borne by the Owner.
12. That the Owner implement the recommendations found in the Hunters Pointe Redevelopment Transportation Study Update completed by R. J. Burnside & Associates Ltd, dated February 2019, at their cost.
13. That prior to final approval, the owner shall submit to the Ministry of Transportation for their review and approval, a stormwater management report indicating the intended treatment of the calculated runoff and the impacts of drainage on the Highway 406 right-of-way.

...continued...

14. That prior to final approval, the owner shall submit to the Ministry of Transportation for their review and approval, a traffic impact study indicating the anticipated volumes generated by the subdivision and their impacts on Highway 406/Daimler Parkway/Woodlawn Road interchange.
15. That the Owner be responsible for the costs associated with any required road upgrades outlined in the Traffic Impact Statement, as approved by the City, Region and Ministry of Transportation.
16. That the Owner design and construct the proposed traffic circle at Daimler Parkway/Proposed Intersection, as well as an eastbound right-turn by-pass lane, at their cost.
17. The Owner construct the proposed off-road bicycle and pedestrian trail on Block 769, to the satisfaction of the City and the Ministry of Transportation. All costs associated with the design and construction will be the responsibility of the Owner.
18. That the Owner be responsible for the upgrade and replacement of the existing sanitary sewer infrastructure on Oxford Road, from Brown Road to the Highway 406, to accommodate sanitary sewer flows coming from the golf course redevelopment, to the east of Highway 406. All costs associated with the installation/replacement will be at the sole expense of the Owner.
19. That the Owner upgrade and replace the existing watermain along Oxford Road to accommodate any future needs and looping requirements related to the golf course redevelopment. This would include the connection to the intersection of Brown and Oxford Roads. The City of Welland has identified this watermain in its 2019 Development Charges By-Law. A portion of the watermain replacement will be eligible for a contribution from the City of Welland in accordance with the by-law. All other costs associated with their portion upgrade/replacement will be at the expense of the Owner.
20. That the Owner submit a complete engineering design of the sanitary sewer and watermain connections, including specific details of the subterranean crossing, to the Ministry of Transportation and the City, for works required within the Highway 406 Corridor. The Owner shall be responsible for all associated costs.
21. The Owner shall install the watermain looping under Highway 406. The cost to do such crossing shall be split by the two developing entities including the subject lands (Hunters Pointe Plan of Subdivision) and the South Village Plan of Subdivision (City File 26T-14-18004). The costs to be borne by each shall be calculated on a per area basis each paying for their fair share of the installation and crossing under the Highway 406. The applicant will enter into a front ending agreement with the City, as permitted under the Development Charges Act, to ensure that cost sharing occurs.

...continued...

22. The Owner shall reconstruct Oxford Road to a semi-urban standard, to the satisfaction of the City. All costs associated with the reconstruction will be at the sole expense of the Owner.
23. The Owner shall review servicing options of a gravity sewer lowering, crossing the Highway 406, in place of a sanitary sewage pumping station, considering the sanitary sewers along Daimler Parkway crossing under Highway 406 will need to be enlarged to accommodate the increased flows.
24. If lowering the sanitary sewers is not acceptable or possible, the Owner will be required to construct a sanitary sewage pumping station at their expense, and provide a one-time 'maintenance payment' to the City. The one time payment shall be determined to be 25% of the cost of the pump station construction. The Owner will also be responsible for 100% of the maintenance of the pumping station up until the time of assumption of the entire subdivision, and then required to maintain it for up to a period of five (5) years after assumption.
25. Any sanitary infrastructure required to be installed to accommodate flows from the South Village Plan of Subdivision directed to Oxford Road through the former golf course lands, to enable the golf course property to utilize infrastructure installed for the proposed South Village, shall be at the expense of the Owner (2599587 Ontario Ltd.).
26. All recommendations of the Peer Review performed by GM BluePlan for the Wastewater Peer Review, dated May 5, 2020, be reviewed and incorporated into the final design.
27. All recommendations of the Peer Review performed by WOOD for the Stormwater Peer Review, dated Rev Feb 27, 2020, be reviewed and incorporated into the final design.
28. All recommendations of the Peer Review performed by Associated Engineering (AE) for the water servicing peer review, dated Jan 28, 2020, be reviewed and incorporated into the final design.
29. All costs related to existing and future Peer Reviews shall be paid for by the Owner.
30. The owner shall indicate in the Agreement, in words satisfactory to Bell Canada, that it will grant to Bell Canada any easements that may be required, which may include a blanket easement, for communication/telecommunication infrastructure. In the event of any conflict with existing Bell Canada facilities or easements, the Owner shall be responsible for the relocation of such facilities or easements.

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31. The owner shall ensure all of the Hydro One Networks In technical requirements are met to its satisfaction, and acquire all applicable agreements, and the developer must contact Jim Oriotis, Senior Real Estate Co-ordinator (905)-946-6261 to discuss all aspects of the subdivision design.
32. Prior to Hydro One Networks Inc providing its final approval, the developer must make arrangements satisfactory to Hydro One Networks Inc for any lot grading and drainage. Digital PDF copies of the lot grading and drainage plans (true scale), showing existing and proposed final grades, must be submitted to Hydro One Networks Inc for review and approval. The drawings must identify the transmission corridor, location of towers within the corridor and any proposed uses within the transmission corridor. Drainage must be controlled and directed away from the transmission corridor.
33. Any development in conjunction with the subdivision must not block vehicular access to any Hydro One Networks Inc facilities located on the transmission corridor. During construction, there must be no storage of materials or mounding of earth, snow, or other debris on the transmission corridor.
34. At the developer's expense, temporary fencing must be placed along the transmission corridor prior to construction, and permanent fencing must be erected where subdivision lots directly abut the transmission corridor after construction is completed.
35. The costs of any relocations or revisions to Hydro One Networks Inc facilities which are necessary to accommodate the subdivision will be borne by the developer. The developer will be responsible for restoration of any damages to the transmission corridor or Hydro One Networks Inc facilities thereon resulting from construction of the subdivision.
36. Hydro One Networks Inc's easement rights must be protected.
37. The transmission lines abutting the subject lands operate at either 500 000, 230 000, or 115 000 volts. Section 188 of Regulation 213/91 pursuant to the *Occupational Health and Safety Act*, require that no object be brought closer than 6 metres (20 feet) to an energized 500 kV conductor. The safe vertical distance for 230 kV conductors is 4.5 metres (15 feet), and for 115 kV conductors it is 3 metres (10 feet). It is the developer's responsibility to be aware, and to make all personnel on site aware, that all equipment and personnel must come no closer than the safe vertical distance specified in the *Act*. All parties should also be aware that the conductors can raise and lower without warning, depending on the electrical load placed on the line.

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38. The Owner shall ensure the safety setback of habitable buildings from the railway rights-of-way to be a minimum of 15 metres in conjunction with a safety berm. The safety berm shall be adjoining and parallel to the railway rights-of-way with returns at the ends, 2.0 metres above grade at the property line, with side slopes not steeper than 2.5 to 1.
39. The Owner shall engage a consultant to undertake an analysis of noise. At a minimum, a noise attenuation barrier shall be adjoining and parallel to the railway rights-of-way, having returns at the ends, and a minimum total height of 4.0 metres above top-of-rail. Acoustic fence to be constructed without openings and of a durable material weighing not less than 20 kg. per square metre of surface area. Subject to the review of the noise report, CNR may consider other measures recommended by an approved Noise Consultant.
40. Ground-borne vibration transmission to be evaluated in a report through site testing to determine if dwellings within 75 metres of the railway rights-of-way will be impacted by vibration conditions in excess of 0.14 mm/sec RMS between 4 Hz and 200 Hz. The monitoring system should be capable of measuring frequencies between 4 Hz and 200 Hz, ±3dB with an RMS averaging time constant of 1 second. If in excess, isolation measures will be required to ensure living areas do not exceed 0.14 mm/sec RMS on and above the first floor of the dwelling.
41. The Owner shall install and maintain a chain link fence of minimum 1.83 metre height along the mutual property line with CNR.
42. The following clause is required to be inserted in all development agreements, offers to purchase, and agreements of Purchase and Sale or Lease of each dwelling unit within 300 metres of the railway right-of-way: "Warning: Canada National Railway Company or its assigns or successors in interest has or have a rights-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the railway facilities on such rights-of-way in the future including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). CNR will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid rights-of-way."
43. Any proposed alterations to the existing drainage pattern affecting railway property must receive prior concurrence from the CNR and be substantiated by a drainage report to the satisfaction of the CNR.

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44. The Owner shall through restrictive covenants to be registered on title and all agreements of purchase and sale or lease provide notice to the public that the safety berm, fencing and other vibration isolation measures implemented are not to be tampered with or altered and further that the Owner shall have sole responsibility for and shall maintain these measures to the satisfaction of CN.
45. The Owner shall enter into an Agreement stipulating how CN's concerns will be resolved and will pay CN's reasonable costs in preparing and negotiating the agreement.
46. The Owner shall be required to grant CN an environmental easement for operational noise and vibration emissions, registered against the subject property in favour of CN.
47. That the Owner shall include on all offers of purchase and sale, a statement that advises the prospective purchaser:
    a. That the home/business mail delivery will be from a designated Centralized Mail Box.
    b. That the developers/owners be responsible for officially notifying the purchasers of the exact Centralized Mail Box locations prior to the closing of any home sales.
48. That the Owner further agrees to:
    a. Work with Canada Post to determine and provide temporary suitable Centralized Mail Box locations which may be utilized by Canada Post until the curbs, boulevards and sidewalks are in place in the remainder of the subdivision.
    b. Install a concrete pad in accordance with the requirements of and in locations to be approved by Canada Post to facilitate the placement of Community Mail Boxes.
    c. Identify the pads above on the engineering servicing drawings. Said pads are to be poured at the time of the sidewalk and/or curb installation within each phase of the plan of subdivision.
    d. Determine the location of all centralized mail receiving facilities in co-operation with Canada Post and to indicate the location of the centralized mail facilities on appropriate maps, information boards, and plans. Maps are also to be prominently displayed in the sales office(s) showing specific Centralized Mail Facility locations.
49. Canada Post's multi-unit policy, which requires that the owner/developer provide the centralized mail facility (front loading lockbox assembly or rear-loading mailroom (mandatory for 100 units or more)), at their own expense, will be in effect for buildings and complexes with a common lobby, common indoor, or sheltered space.

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50. That the Developer obtain a Work Permit from the Niagara Peninsula Conservation Authority prior to beginning any site alteration, including restoration work, within 15 metres of watercourse UN-1. In support of the Work Permit, the following information will be required:

    a. A landscape plan demonstrating adequate riparian planting to ensure a naturalized riparian corridor along watercourse UN-1.

    b. Any other information as may be determined at the time a Work Permit application is submitted to the Niagara Peninsula Conservation Authority.

51. That the Developer obtain a Work Permit from the Niagara Peninsula Conservation Authority prior to beginning any site alteration, including restoration work, within 30 metres of the Provincially Significant Wetland (PSW) north of the subject lands. In support of the Work Permit application, the following information will be required:

    a. A landscape plan demonstrating appropriate restoration and enhancement plantings in the PSW buffer.

    b. Any other information as may be determined at the time a Work Permit application is submitted to the Niagara Peninsula Conservation Authority.

52. That the Developer obtain a Work Permit(s) from the Niagara Peninsula Conservation Authority prior to beginning any site alteration, grading within any area regulated by the Niagara Peninsula Conservation Authority, including work on watercourse UN-3.

53. That the O2 zone for Blocks 769, 780, and 786 be amended to prohibit any buildings or structures to the satisfaction of the Niagara Peninsula Conservation Authority.

54. That the Developer submit to the Niagara Peninsula Conservation Authority for review and approval, a landscape plan demonstrating adequate riparian planting to ensure a naturalized riparian corridor along watercourse UN-1, to the satisfaction of the Niagara Peninsula Conservation Authority.

55. That the Developer submit to the Niagara Peninsula Conservation Authority for review and approval, a landscape plan demonstrating appropriate restoration and enhancement plantings in the PSW buffer, to the satisfaction of the Niagara Peninsula Conservation Authority.

...continued...

56. That the Developer submit to the Niagara Peninsula Conservation Authority for review and approval, a stormwater servicing plan showing how flow from UN-3 is being maintained through the subject lands, to the satisfaction of the Niagara Peninsula Conservation Authority.

57. That the Developer submit to the Niagara Peninsula Conservation Authority for review and approval, detailed grading and construction sediment and erosion control plans. The plans will provide limit of work fencing or other similar barrier to watercourse UN-1, the 30 metre buffer to the PSW and the 7.5 metre setback from the physical top of slope to the Welland River valleylands (as identified by the Niagara Peninsula Conservation Authority staff).

58. That the Developer provide a 1.5 metre high chain link fence along the boundary of Block 786, to the satisfaction of the Niagara Peninsula Conservation Authority.

59. That conditions requested by the Niagara Peninsula Conservation Authority be incorporated into the Subdivision Agreement between the Developer and the City of Welland, to the satisfaction of the Niagara Peninsula Conservation Authority. The City of Welland shall circulate the draft Subdivision Agreement to the Niagara Peninsula Conservation Authority for its review and approval.

60. That following the completion of any site remediation, the Owners shall file a Record of Site Condition (RSC) on the Ministry of Environment, Conservation, and Parks [Brownfields] Environmental Site Registry in accordance with Ontario Regulation 153/04, as amended and that the owner provide the Niagara Region and the City with copies of the Environmental Site Assessment and site remediation reports as well as a copy of the Ministry of the Environment's written acknowledgement of the filing of the RSC.

61. That the subdivision agreement between the Owner and the City contain provisions whereby the Owner agrees to implement the approved noise mitigation measures as outlined in the *Noise & Vibration Feasibility Study* (dated November 4, 2019) prepared by Aerocoustics Engineering Ltd.

62. That the following warning clause be included in the Subdivision Agreement and inserted into all Agreements of Purchase and Sale or Lease for each dwelling unit:

    "The lands in the plan of subdivision may be exposed to reduced air quality and/or odour, dust, or vibration impacts from nearby industrial/commercial operations that may interfere with some activities of the owners/tenants who occupy these lands."

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63. That Channel UN-1 and its 30 metre wide buffer/corridor (i.e. portions of Blocks 769, 780, and 786) be zoned Environmental Conservation Area (ECA) or similar zoning which achieves the same level of protection.

64. That the subdivision agreement contain wording wherein the Owner agrees to implement the mitigation measures and recommendations found in Section 7.0 of the EIS, including but not limited to:

    a. That vegetation removals take place between October 1st and March 15th, outside of both the breeding bird nesting period and bat active season; and,

    b. That standard best management construction practices shall be used to mitigate construction dust, noise, and/or exhaust fumes and prevent spills.

65. That a Landscape/Buffer Planting Plan be prepared for Regional staff approval, buy a full member of the Ontario Association of Landscape Architects (OALA), to identify and illustrate the location of additional native trees, shrubs, and groundcover to be planted along the Welland River, within the 30 metre corridor along Drainage Feature UN-1, and along the slopes of Pond 6e and 6g. Only native vegetation that provides for wildlife habitat and improved ecological functions will be supported.

66. That a copy of an active Environmental Compliance Approval (ECA) for Stormwater Management Pond 6e be submitted to the Region.

67. That permanent rear-lot fencing be provided for all lots bordering Channel UN-1 and the Welland River. Rear yard gates will not be permitted to reduce human encroachment and limit movement of pets into the adjacent natural areas.

68. That the Grading Plan be provided for Regional Staff approval.

69. That an Erosion and Sediment Control (ESC) Plan be provided for Regional staff approval. The ESC Plan shall include details for, but not limited to, ESC fencing and other ESC measures, dust suppression and topsoil storage. ESC measures must be monitored regularly to ensure they are functioning properly and promptly fixed if issues are identified.

70. That a Tree Savings Plan be prepared in accordance with the Niagara Region Tree and Forest Conservation By-law (By-law 30-2008) Section 1.36 and provided for Regional staff approval.

71. That a Fish and Wildlife Rescue Plan be provided for Regional staff approval.

72. That a Wetland Restoration Plan be provided for Regional staff approval.

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73. That an Invasive Species Management Plan and implementation strategy be prepared for the subject lands in an effort to enhance the Core Natural Heritage System remaining post-development.

74. That the subdivision agreement contain wording wherein the owner agrees to implement the recommendations of the approved Grading Plan, ESC Plan, Tree Saving Plan, Fish and Wildlife Rescue Plan, Wetland Restoration Plan, and Invasive Species Management Plan.

75. That the Owner obtain all necessary approvals from the Ministry of Environment, Conservation and Parks (MECP) relating to Species at Risk (SAR) on the subject lands and provide Regional staff with a copy of the MECP approval. If required by the MECP, the Owner shall revise the layout of the subdivision in order to conform with the requirements of the *Endangered Species Act.*

76. That the following clauses shall be included in the Subdivision Agreement between the Owner and the City of Welland:

    "Should previously undocumented archaeological resources be discovered on the property during construction activities, construction and alteration of the site shall immediately cease and the owner shall notify the Ministry of Heritage, Sport, Culture and Tourism Industries in London (519-675-6898) and engage a licensed consultant archaeologist to carry out archaeological fieldwork in compliance with Section 48(1) of the Ontario Heritage Act."

    "As on virtually any property in Southern Ontario, it is possible that Aboriginal or Euro-Canadian burials could be present within the development area. In the event that human remains are encountered during construction activities, construction shall immediately cease and the proponent shall notify the Niagara Regional Police, the local coroner, the Ministry of Heritage, Sport, Culture and Tourism Industries (London Office), and the Registrar, Cemeteries Regulation Unit of the Ontario Ministry of Consumer Services in Toronto (416-326-8392)".

77. That prior to final approval for registration of this plan of subdivision, the Owner shall submit design drawings for proposed work along the north end of the Hunters Pointe Golf Course Subdivision plan required to service this development to ensure that there is no conflicts with the Regional forcemain.

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78. That the Owner provides a written acknowledgement to the Niagara Region Planning and Development Services Department stating that draft approval of this subdivision does not include a commitment of servicing allocation by the Niagara Region as servicing allocation will not be assigned until the plan is registered and that any pre-servicing will be at the sole risk and responsibility of the Owner.

79. That the Owner provides a written undertaking to the Niagara Region Planning and Development Services Department stating that all Offers and Agreements of Purchase and Sale or Lease, which may be negotiated prior to registration of this subdivision, shall contain a clause indicating that servicing allocation for the subdivision will not be assigned until the plan is registered, and a similar clause be inserted into the Subdivision Agreement between the Owner and the City.

80. That prior to final approval for registration of this plan of subdivision, the Owner shall submit the design drawings (with calculations) for any proposed municipal sanitary and storm drainage systems required to service this development and obtain Ministry of Environment, Conservation and Parks, Environmental Compliance Approval (ECA) under the Transfer of Review Program.

81. That the Owner provide a detailed servicing study which shall include, overall servicing strategy for the developments in the area, detailed plan and profile drawings and required Regional costs analysis information, to ensure that all development in the area can be serviced by gravity to the trunk sewer or by gravity to the proposed pumping station and this servicing study shall be reviewed and approved by the Regional staff prior to design of a future Regional Pumping Station. This condition is only required if the SPS is intended to be transferred to the Region.

82. That the Owner comply with the Regional Design standards for a pumping station and forcemain, engage Regional staff in the design works and receive Regional review and approval prior to submitting Environmental Compliance Certificates to the MECP for approval. This condition is only required if the SPS is intended to be transferred to the Region.

83. That the Owner transfer the pumping station land block to the Region once the size of the property has been reviewed and approved by Regional staff, the minimum land block required will be 40m x 40m. This condition is only required if the SPS is intended to be transferred to the Region.

...continued...

84. That a noise and odour study be completed for the proposed sewage pumping station and required mitigation measures are completed for the existing and proposed lots surrounding the SPS and that the subdivision agreement contain wording acceptable to the Region wherein the Owner agrees to implement the approved mitigation measures. This condition is only required if the SPS is intended to be transferred to the Region.

85. That the assumption of the Pumping Station and forcemain will not occur until all the Regional conditions and policy conditions are completed, as well as the subdivision has reached 50% of the build-out and Regional staff have reviewed and approved the information provided. This condition is only required if the SPS is intended to be transferred to the Region.

86. That the Owner and the City obtain a connection permit for the proposed new connection to the Regional Trunk Sanitary sewer and removal of the existing connection. This condition is only required if a new connection to the Regional Trunk Sanitary is required.

87. That prior to approval of the final plan or any on-site grading, the Owner shall submit a detailed stormwater management plan for the subdivision and following plans designed and sealed by a qualified professional engineer in accordance with the Ministry of Environment, Conservation and Parks documents entitled Stormwater Management Planning and Design Manual, March 2003 and Stormwater Quality Guidelines for New Development, May 1991, or their successors to the Niagara Region Planning and Development Services Department for review and approval:

    a. Detailed lot grading, servicing, and drainage plans, noting both existing and proposed grades and the means whereby overland flows will be accommodated across the site;

    b. Detailed erosion and sedimentation control plans;

    c. Detailed phasing of construction of the stormwater management facility to coincide with phasing of development of residential lands (internal and external to the subdivision) planned to be serviced by the stormwater management facility.

88. That the Subdivision Agreement between the Owner and the City contain provisions whereby the Owner agrees to implement the approved plan(s) required in accordance with the condition above.

89. That the Owner ensure that all streets and development blocks can provide an access in accordance with the Regional Municipality of Niagara policy and by-laws relating to the curb-side collection of waste and recycling throughout all phases of development. If developed in phases, where a through street is not maintained, the owner shall provide a revised draft plan to reflect temporary turnaround/cul-de-sac with a minimum curb radius of 12.8 metres.

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90. That prior to granting approval for the Final Plan of Subdivision, City of Welland Planning Division will require written notice from the following upon their respective Conditions of Draft Plan Approval have been met satisfactorily:

    Canada Post Conditions: 47, 48, 49

    Region of Niagara Conditions: 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 7, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89

    Niagara Peninsula Conservation Authority Conditions: 50, 51, 52, 53, 54, 55, 56, 57, 58, 59

    Ministry of Transportation: 13, 14, 15

    Bell Canada: 30

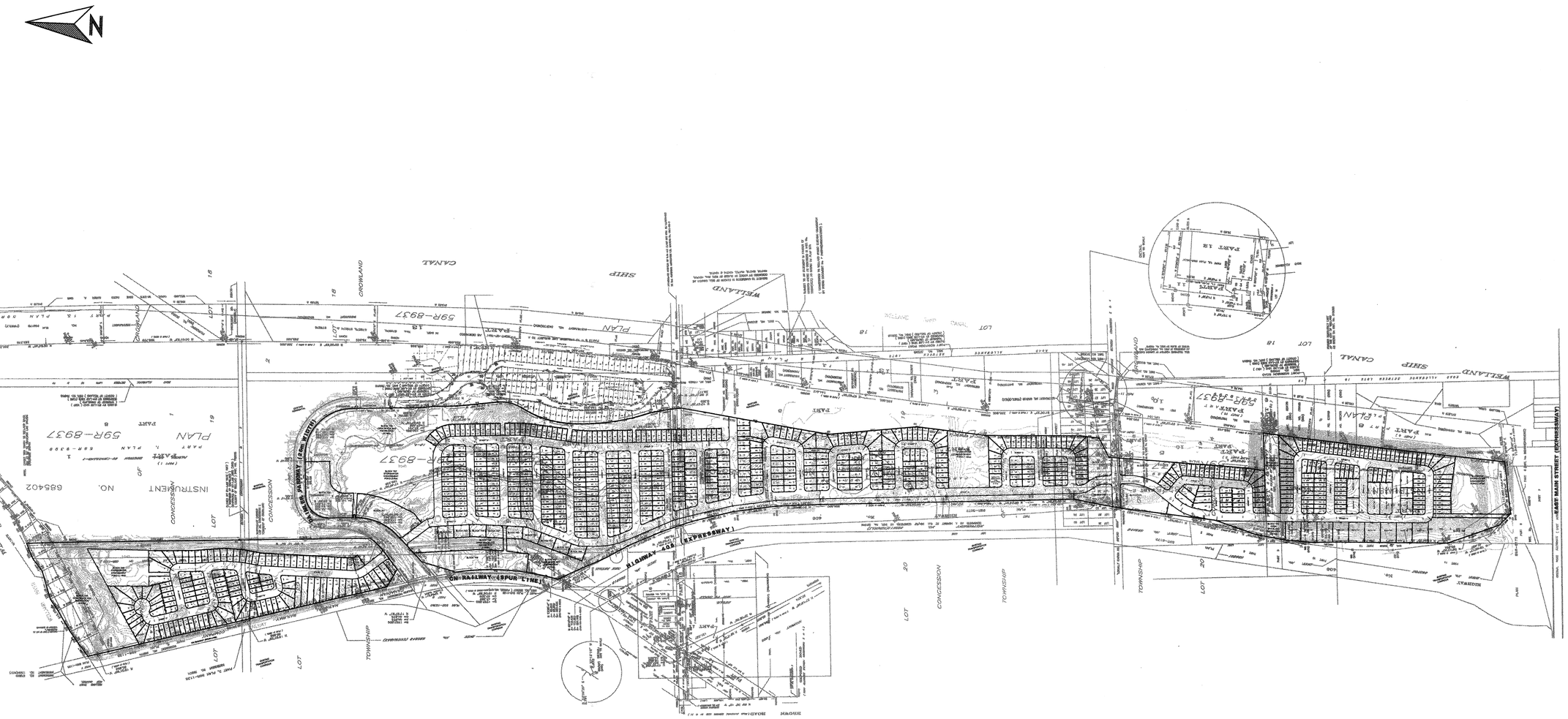
    Hydro One Networks Inc.: 31, 32, 33, 34, 35, 36, 37

    Canadian National Rail/GIO Railway: 38, 39, 40, 41, 42, 43, 44, 45, 46

91. That if Final Approval is not given to this Plan within four (4) years of the approval date, and no extensions have been granted, Draft Approval shall lapse. If the Owner wishes to request extension of Draft Plan Approval, a written request with reasons why the extension is required and the applicable application fee, must be received by the City prior to the lapsing date; and further

THAT THE COUNCIL OF THE CITY OF WELLAND grants its approval conditional on an overpass being constructed to the satisfaction of the Ministry of Transportation (MTO), Region of Niagara and the City of Welland, from Hunters Pointe Redevelopment to Oxford Drive, crossing the 406 at the sole expense of the developer; and further

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CONCESSION 1 (FORMERLY CROWLAND)
CONCESSION 2 (FORMERLY WELLAND)
CN RAILWAY (SPUR LINE)
QEW HIGHWAY 406 (EXPRESSWAY)
EAST MAIN STREET (EXPRESSWAY)
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Consolidated Traffic Impact Study

Developable Lands East of Highway 406

Final

Prepared for:
The City of Welland

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RVA 247526

January 24, 2025

CONSOLIDATED TRAFFIC IMPACT STUDY

DEVELOPABLE LANDS EAST OF HIGHWAY 406

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1.0 Introduction

R.V. Anderson Associates Limited (RVA) was retained by the City of Welland (the "City") to complete a consolidated Traffic Impact Study (TIS) for the lands surrounding Daimler Parkway in northern Welland. The subject lands have existing residential land uses with the current draft plans consisting of primarily residential land uses with some portions of commercial land uses.

The subject area is bounded by Highway 406 to the west, East Main Street to the south, the Welland Canal to the east, and the Welland River to the north. The only vehicular access to these lands is provided through Daimler Parkway, which is a two-lane (one lane in each direction) collector roadway under jurisdiction of the City of Welland. The principal constraint within the existing road network is that Daimler Parkway travels underneath the Highway 406 overpass, which imposes constraints if additional capacity is required along Daimler Parkway. As shown in Figure 1.1, there are four development parcels: two of which (North Village and Central Village) are either under construction or completed, while the other two (Hunters Pointe and South Village) have yet to commence construction.

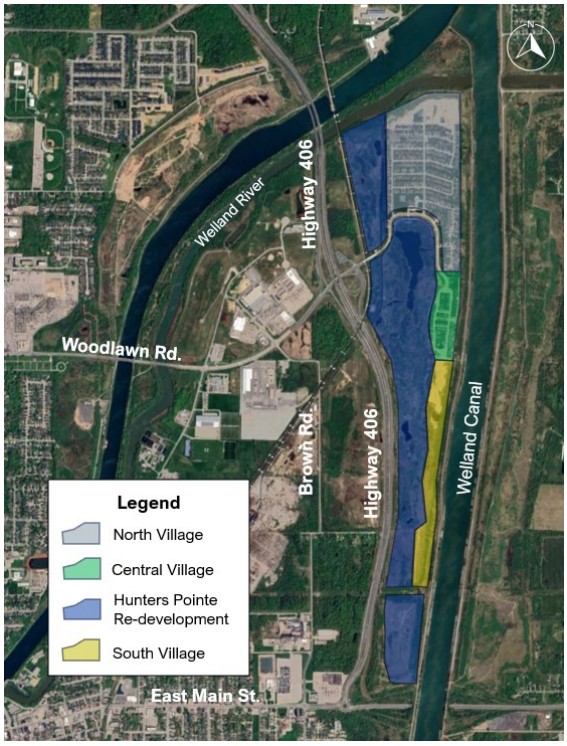


Figure 1.1 – Developable Lands East of Highway 406

The purpose of this study is to evaluate the degree to which the existing roadway network can accommodate new developments in the developable lands east of Highway 406.

1.1 Study Area

The study area encompasses a number of existing intersections along Woodlawn Road and Daimler Parkway. These intersections are as follows:

- Woodlawn Road and Primeway Drive/Brown Road
- Woodlawn Road and the Highway 406 Southbound Interchange
- Daimler Parkway and the Highway 406 Northbound Interchange

In addition, the analysis includes queueing analysis of the existing Gio Rail spur line that is situated approximately 50 metres east of the Daimler Parkway and Highway 406 Northbound Interchange intersection.

2.0 Study Methodology

The study undertakes the following three (3) analyses:

1. Corridor Capacity Analysis: a high-level network planning analysis considering mid-block (between intersections) volumes also called as link volumes against a defined typical roadway lane capacity.
2. Macroscopic Traffic Analysis: Synchro analysis based on deterministic relationships with macroscopic parameters such as peak hour flow, capacity, and speed.
3. Microscopic Traffic Analysis: Simulation analysis based on microscopic parameters such as space, time headway and queues.

These analyses are discussed further in subsequent sections.

2.1 Corridor Capacity Analysis

Given that Daimler Parkway is a City collector road, a corridor capacity of 700 vehicles/hour/lane has been selected, which is consistent with the City planning model for collector roadways. The link volumes for road segments between intersections were extracted from the existing and future traffic volume projections which represent the peak traffic volume at any point along Daimler Parkway, immediately east of the Highway 406 northbound interchange.

The traffic conditions associated with various volume to capacity ratios (V/C) values are briefly described in Table 2.1.

Table 2.1 – Midblock Volume to Capacity Descriptions

V/C	Description
0.60 or less	Uncongested operations; free-flow traffic
0.60 > 0.75	Very light congestion; stable traffic flow
0.75 > 0.85	Mild congestion; some delays and queueing expected
0.85 > 0.95	Moderate congestion; tolerable delays and queueing expected
0.95 > 1.00	Nearing capacity; longer delays and queueing expected
> 1.00	Over capacity; severe delays and queueing expected

For planning purposes, a common practice is to consider mitigation strategies when the volume to capacity ratio exceeds 0.95.

2.2 Intersection Performance Measures

Operational analysis for the study area intersections was completed through a combination of analysis software. Analysis was first undertaken using macroscopic traffic analysis software, Synchro 11, to identify critical movements and potential capacity constraints for individual intersection movements. Following the macroscopic analysis, a queueing analysis was undertaken utilizing microscopic traffic analysis software, PTV Vissim (2022). The intersection movement level of service (LOS) was quantified based on vehicle delays, as per the Highway Capacity Manual (2000) methodologies summarized in Table 2.2.

Table 2.2 – Characteristics of Level of Service at Intersections (HCM 2000)

Level of Service (LOS)	Control Delay (seconds/vehicle)	
	Unsignalized Intersection	Signalized Intersection
A	≤ 10	≤ 10
B	> 10 to 15	> 10 to 20
C	> 15 to 25	> 20 to 35
D	> 25 to 35	> 35 to 55
E	> 35 to 50	> 55 to 80

The study utilizes the analysis parameters outlined in the *Niagara Region Transportation Impact Assessment Guidelines (2023)* with respect to saturation flow rates for individual intersection movements. With respect to mitigation measures, the threshold for critical movements refers to the Ministry of Transportation's *General Guidelines for the Preparation of Traffic Impact Studies (2023)*. The guidelines state that for general movements at signalized intersections, the movement is deemed critical if the V/C ratio is 0.85 or greater and for ramp terminal movements, the movement is deemed critical if the V/C ratio is 0.75 or greater.

The primary concern for this area is the limited capacity along the Daimler Parkway corridor under the Highway 406 bridge. In particular, the analysis is focused on the two (2) Highway 406 interchange ramps since these are situated approximately 185 metres from one another, which may create possibility of queue spillback interfering with adjacent intersection operations including Highway 406 on and off-ramps.

2.2.1 Microscopic Traffic Analysis

Microscopic traffic operations analysis was completed for the study area intersections using the simulation software, PTV Vissim (2022). The model was formulated by completing a desktop review of existing roadway geometry (i.e., number of lanes, lane widths, turning radii, etc.) and traffic controls (i.e., intersection mode of control, posted speeds, etc.).

While the study forecasted traffic volumes for the 2031 and 2051 horizon years, microsimulation analysis was only completed for the ultimate 2051 horizon year, which represents build-out conditions for the Developable Lands. The analysis analyzed three (3) peak hours: the weekday AM (morning) peak hour, the weekday PM (afternoon) peak hour, and the Saturday mid-day peak hour.

3.0 Existing (2024) Traffic Conditions

3.1 Existing (2024) Traffic Volumes

The existing (2024) traffic volumes for the weekday and weekend mid-day peak hours were extracted from turning movement counts (TMCs) collected on various dates between April 2024 and June 2024, as provided by the City of Welland. The on-ramp traffic volumes have been estimated based on arrival patterns of the adjacent intersections. Weekday and weekend peak hours traffic volumes are summarized in Figure 3.1, with the raw counts provided in Appendix 1.

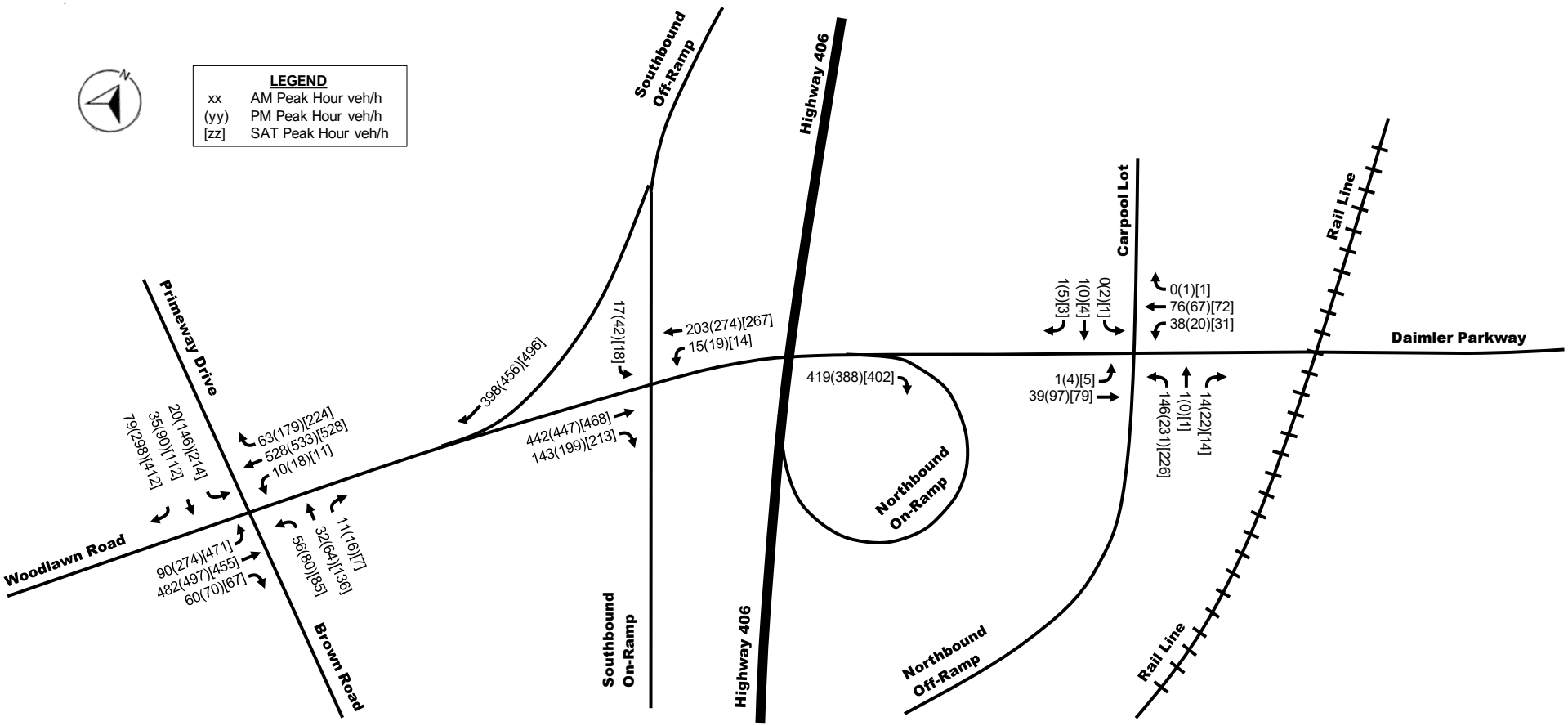


Figure 3.1 – Existing (2024) Traffic Volumes, Weekday and Weekend Mid-Day Peak Hours

3.2 Microscopic Model Calibration

The Vissim model was calibrated with reference to the *Florida Department of Transportation (FDOT) Traffic Analysis Handbook (2021),* which is a widely utilized calibration methodology that is endorsed by PTV Group for model calibration. The calibration exercise consisted of traffic volume calibration for all of the existing intersections, in addition to a field-observed queueing calibration for the Woodlawn Road and Primeway Drive/Brown Road intersection.

The model utilizes the Wiedemann 74 Vehicle Following Model (i.e., driving behaviour for simulated vehicles), which is the general standard for arterial roadway sections. The Wiedemann model is derived from three (3) different parameters—all of which are inversely proportional to the saturation flow rate. The three parameters are as follows:

- Average standstill distance: the average desired distance maintained between stationary vehicles, measured in metres.
- Additive part of safety distance: an additive variable used in the computation of desired safety distance (i.e., the distance maintained between two vehicles travelling in the same lane and direction).
- Multiplicative part of safety distance: a multiplicative variable used in the computation of desired safety distance.

In simpler terms, there are three (3) parameters that impact driver behaviour within the model. For all three (3) parameters, a higher value elicits a more conservative driver behaviour, as the vehicles will maintain a greater distance between one another. In contrast, low values will elicit more aggressive driver behaviour, with modelled vehicles maintaining smaller separation between one another. The default values and suggested ranges for these parameters are summarized in Table 3.1.

Table 3.1 – Default Driving Behaviour Parameters for Vissim Analysis

Wiedemann 74 Calibration Parameter	Default Value	Suggested Range
Average standstill distance (Metres)	2.0m	>1.2m
Additive part of safety distance	2.0	1.0 to 3.5
Multiplicative part of safety distance	3.0	2.0 to 4.5

In terms of how these values impact performance of the model, conservative driving generally results in lower saturation flow rates, which in turn reduces capacity and increases congestion and queueing. Conversely, aggressive driving generally increases saturation flow rates, which increases capacity and alleviates congestion and queueing as more vehicles are cleared within each cycle. However, it should be noted that the Vissim model is stochastic in nature—and therefore, these generalized statements do not always apply and should only be interpreted as a "rule of thumb".

3.2.1 Volume Calibration

The volume calibration was completed by comparing the input volumes (i.e., existing volumes from turning movement counts) with the simulated volumes. The simulated volumes for all movements and all scenarios fell within the desired range of adequate volume calibration. The summary of this calibration can be found in Appendix 2.

3.2.2 Queue Calibration

Vehicle queues at the Woodlawn Road and Primeway Drive/Brown Road intersection were observed during a field visit on Wednesday, November 13th, 2024, and Saturday, November 16th, 2024. The observed queue lengths were then compared to the simulated vehicle queues, with adjustments to the driver behaviour being made to bring the simulated queue lengths within an adequate calibration range. The adjustments to driver behavior are summarized in Table 3.2, and the queue calibration summary can be found in Appendix 3.

Table 3.2 – Calibrated Driver Behaviour Parameters

Period	Movement*	Wiedemann 74 Calibration Parameter		
		Average Standstill Distance	Additive Part of Safety Distance	Multiplicative Part of Safety Distance
AM and SAT Peak Hours	Global Values	1.2m	1.0	2.0
AM Peak Hour	EBL/SBL	2.5m	3.0	4.0
PM Peak Hour	EBT SBT	3.0m 1.3m	3.5 1.0	4.5 2.0
SAT Peak Hour	EBT	1.4m	1.5	2.5

*Where individual movements are listed, they are only associated with the Woodlawn Road and Primeway Drive/Brown Road intersection.

3.2.3 Railway Operations

A spur line operated by GIO Rail is situated approximately 50 metres east of the Daimler Parkway and Highway 406 Northbound Interchange intersection. This spur line was modelled within the Vissim network to quantify operational impacts of train movements on the surrounding road network including intersections.

As per correspondence with a GIO Rail representative in December 2024, the subject spur line encounters approximately one (1) train movement per week, with these trains being approximately 30 cars in length. Gio Rail indicated that these train movements could occur during both the weekday AM and weekday PM peak hours. Therefore, the weekday AM and weekday PM analysis periods both include a "train event" scenario.

The modelled train delay was calculated to be approximately 2:15 (min:sec), utilizing *Transport Canada Grade Crossing Standards/Guidelines (2019)* for clearance times, gate closing times, and gate opening times.

3.2.4 Iterations, Seeding and Peak Hour Factor (PHF)

As per *FDOT Traffic Analysis Handbook* methodology, the model was simulated ten (10) times for each scenario. This approach mitigates the impacts of "randomness" within the model results. Moreover, to eliminate the impacts that model start-up has on analysis results, each iteration was seeded for 15 minutes prior to the first analysis interval.

The model also incorporates the impacts of peak hour factor (PHF). The PHF is an effective method of modelling the "15-minute rush" that regularly occurs within the peak hour. Each analysis period adopted a peak hour factor (PHF) of 0.92, which is a typical PHF value for planning analysis.

3.3 Existing (2024) Traffic Conditions

3.3.1 Corridor Lane Capacity Analysis – Existing (2024) Conditions

Using the existing (2024) volumes presented in Figure 3.1, the total link volumes for Daimler Parkway, east of the Highway 406 Northbound Interchange intersection, have been extracted for link analysis. The resulting corridor capacity is presented in Table 3.3.

Table 3.3 – Corridor Lane Capacity Analysis – Existing (2024) Traffic Conditions

Peak Hour	Direction	Peak Directional Traffic (veh/hr)	Directional Capacity (veh/hr)	V/C Ratio
AM	Eastbound	53	700	0.08
	Westbound	114		0.16
PM	Eastbound	121		0.17
	Westbound	88		0.13
SAT	Eastbound	94		0.13
	Westbound	104		0.15

As shown in Table 3.3, ample corridor capacity exists under existing (2024) conditions, with both directions operating under free-flow conditions during all analysis peak hours of the day.

3.3.2 Summary of Critical Movements at the Interchange Ramps – Existing (2024) Conditions

Under existing (2024) conditions, no critical movements are noted at the Highway 406 interchange ramp intersections. The Synchro output reports for existing (2024) conditions are provided in Appendix 4.

3.3.3 Microsimulation Queueing Analysis – Existing (2024) Conditions

The queue lengths for the ramp terminal intersection movements under existing (2024) traffic conditions are summarized in Table 3.4. The full analysis results for each intersection are provided in Appendix 5.

Table 3.4 – Existing (2024) Traffic Conditions – Vissim Traffic Analysis Queue Results

Scenario	Intersection	Peak Hour	Movement	Queue Length (metres)	Available Storage (metres)
No Train Event	Woodlawn Road and Highway 406 Southbound Interchange	AM	EBTR	11	440
			SBR	0	570
			SBL	9	140
			WBL	0	30
			WBT	0	185
		PM	EBTR	11	440
			SBR	0	570
			SBL	13	140
			WBL	0	30
			WBT	0	185
		SAT	EBTR	13	440
			SBR	0	570
			SBL	10	140
			WBL	0	30
			WBT	0	185
	Daimler Parkway and Highway 406 Northbound Interchange	AM	EBT	0	185
			NBL	24	100
			NBTR	10	530
			WBL	0	80
			WBTR	0	40
		PM	EBT	2	185
			NBL	32	100
			NBTR	11	530
			WBL	0	80
			WBTR	0	40
		SAT	EBT	0	185
			NBL	31	100
			NBTR	10	530
			WBL	0	80
			WBTR	0	40
With Train Event	Woodlawn Road and Highway 406 Southbound Interchange	AM	EBTR	11	440
			SBR	0	570
			SBL	9	140
			WBL	0	30
			WBT	0	185
		PM	EBTR	11	440
			SBR	0	570
			SBL	13	140
			WBL	0	30
			WBT	0	185
	Daimler Parkway and Highway 406 Northbound Interchange	AM	EBT	2	185
			NBL	32	100
			NBTR	11	530
			WBL	0	80
			WBTR	0	40
		PM	EBT	2	185
			NBL	32	100
			NBTR	11	530
			WBL	0	80
			WBTR	0	40
	Rail Crossing	AM	EBT	8	40
			WBT	15	~∞
		PM	EBT	34	40
			WBT	19	~∞

As seen in Table 3.3, the ramp terminal intersection movements are operating well under existing conditions, with all key queue lengths falling within their associated storage length. In the train scenario, the eastbound through movement falls within the available storage length and does not block the adjacent intersection.

4.0 Future Traffic Conditions

4.1 Proposed Development

Future development of the subject lands is comprised of three (3) separate developments: Hunters Pointe, South Village, and the remaining portion of North Village. The Draft Plan land use statistics for these developments have been confirmed with the City planning staff. The trip generation for each of the foregoing developments was estimated utilizing the Institute of Transportation Engineers (ITE) *Trip Generation Manual (11th Edition)*.

The development statistics and corresponding trip generation estimates are summarized in Table 4.1.

Table 4.1 – Trip Generation Summary

Development	Land Use	Magnitude	Peak Hour	Trip Equation	Directional Split (%) (In/Out)	New Trips	
						In	Out
Hunters Pointe	Single-Family Detached Dwelling	735 units	AM	Ln(T) = 0.91Ln(x) + 0.12	25 / 75	115	343
			PM	Ln(T) = 0.94Ln(x) + 0.27	63 / 37	408	240
			SAT	T = 0.86(x) + 9.72	54 / 46	347	295
	Single-Family Attached Dwelling	178 units	AM	T = 0.52(x) - 5.70	25 / 75	22	65
			PM	T = 0.60(x) - 3.93	59 / 41	61	42
			SAT	Ln(T) = 0.82Ln(x) + 0.43	48 / 52	52	56
	Multifamily Housing (Low-Rise)	72 units	AM	T = 0.31(x) + 22.85	24 / 76	11	34
			PM	T = 0.43(x) + 20.55	63 / 37	33	19
			SAT	T = 0.41x	51 / 49**	15	15
	Multifamily Housing (Mid-Rise)	170 units	AM	T = 0.44(x) - 11.61	23 / 77	14	49
			PM	T = 0.39(x) + 0.34	61 / 39	41	26
			SAT	Ln(T) = 1.00(x) - 0.91	51 / 49	35	33
	General Commercial	30,000ft² GFA	AM	Ln(T) = 0.66Ln(x/1000) + 1.84	60 / 40	35	24
			PM	Ln(T) = 0.71Ln(x/1000) + 2.72	50 / 50	85	85
			SAT	6.57(x/1000)	51 / 49	100	97
South Village	Single-Family Detached Dwelling	173 units	AM	Ln(T) = 0.91Ln(x) + 0.12	25 / 75	31	92
			PM	Ln(T) = 0.94Ln(x) + 0.27	63 / 37	105	61
			SAT	T = 0.86(x) + 9.72	54 / 46	86	73
Remainder of North Village (Post-dating TMC data from May 2024)	Single-Family Detached Dwelling	56 units	AM	Ln(T) = 0.91Ln(x) + 0.12	25 / 75	11	33
			PM	Ln(T) = 0.94Ln(x) + 0.27	63 / 37	37	21
			SAT	T = 0.86(x) + 9.72	54 / 46	31	27
	Multifamily Housing (Mid-Rise)	60 units*	AM	T = 0.44(x) - 11.61	23 / 77	3	12
			PM	T = 0.39(x) + 0.34	61 / 39	15	9
			SAT	Ln(T) = 1.00(x) - 0.91	51 / 49	12	12
Total Residential Growth		**1,444 units**	**Total New Residential Trips**		**AM**	**207**	**628**
					PM	**700**	**418**
					SAT	**578**	**511**
Total Commercial Growth		**30,000ft² GFA**	**Total New Commercial Trips**		**AM**	**25**	**16**
					PM	**39**	**39**
					SAT	**70**	**68**
Total New Trips for Developable Lands					**AM**	**232**	**644**
					PM	**739**	**457**
					SAT	**648**	**579**

*The number of units for Block 32 (currently zoned for an apartment building) in North Village is unconfirmed at the time of this study; a unit count of 60 has been assumed for analysis purposes.

**In absence of a directional split for low-rise apartments during the Saturday peak period, the low-rise directional split is set to match the mid-rise apartment directional split for the Saturday peak period.

4.1.1 Trip Distribution and Assignment

The trip distribution was estimated using the Transportation Tomorrow Survey (TTS) database in addition to local area knowledge and reference to the formerly completed TIS studies for the area. The trip distribution percentages are summarized in Table 4.2.

Table 4.2 – Trip Distribution Percentages

Direction (Route)	Residential Distribution	Commercial Distribution
West (Woodlawn Road)	36%	41%
North (Highway 406)	33%	19%
South (Highway 406)	31%	40%

4.2 Trip Assignment

The estimated trip assignment for the Developable Lands is illustrated in Figure 4.1.

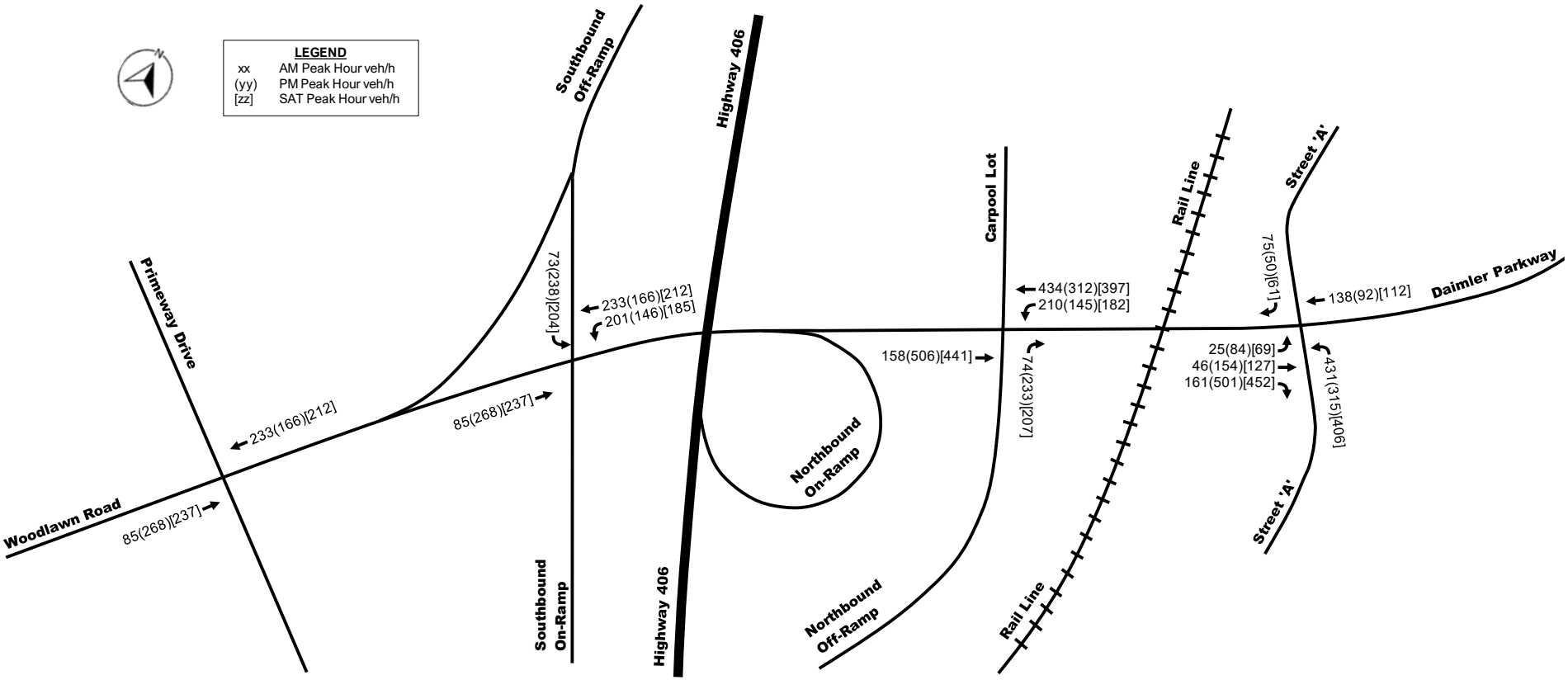


Figure 4.1 – Trip Assignment for the Developable Lands, Weekday and Weekend Mid-day Peak Hours

4.3 Traffic Growth Rate

The annualized growth rate for the area was calculated using EMME model outputs for the 2016 base year, along with the 2031, 2041, and 2051 future horizon years. The comparison considered total ramp volumes from the Woodlawn Road and Highway 406 interchange in the AM and PM peak hours to measure traffic growth in Welland that is not associated with the Developable Lands.

The exercise calculated the 2016 to 2031 annualized growth rate to be in the magnitude of approximately 1%, while the 2031 to 2051 annualized growth rate was in the magnitude of approximately 2%. These two (2) growth rates were applied to all intersection movements to forecast background traffic growth for each horizon year.

4.4 Future (2031) Total Traffic Volumes

The Future (2031) Traffic Volumes consider the 1% annualized growth rate applied to all intersection movements and the trip generation volumes from the three (3) developments. The resulting intersection volumes are illustrated in Figure 4.2.

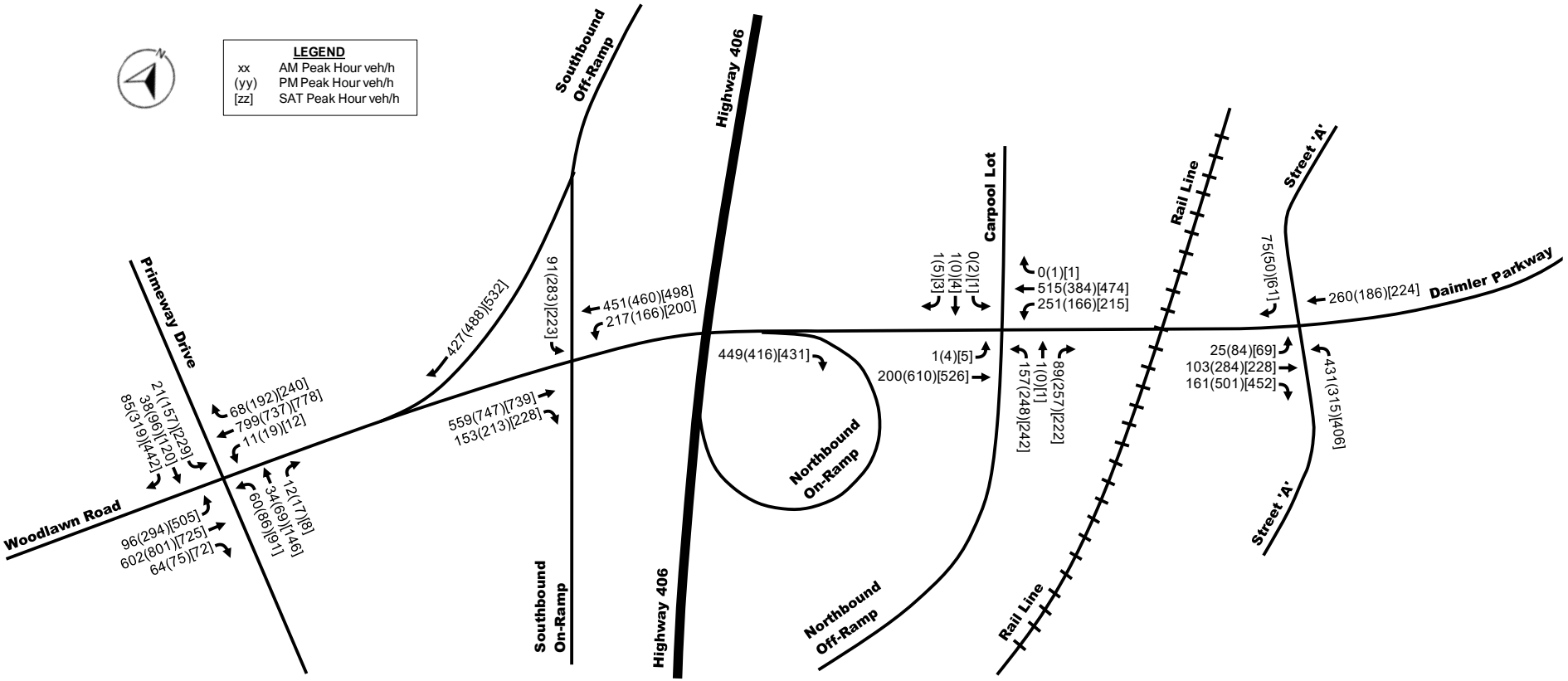


Figure 4.2 – Future (2031) Total Traffic Volumes, Weekday and Weekend Mid-day Peak Hours

4.5 Future (2051) Total Traffic Volumes

Utilizing the 2% annualized growth rate beyond 2031 and the Developable Lands Trip Assignment, the Future (2051) Total Traffic Volumes are summarized in Figure 4.3.

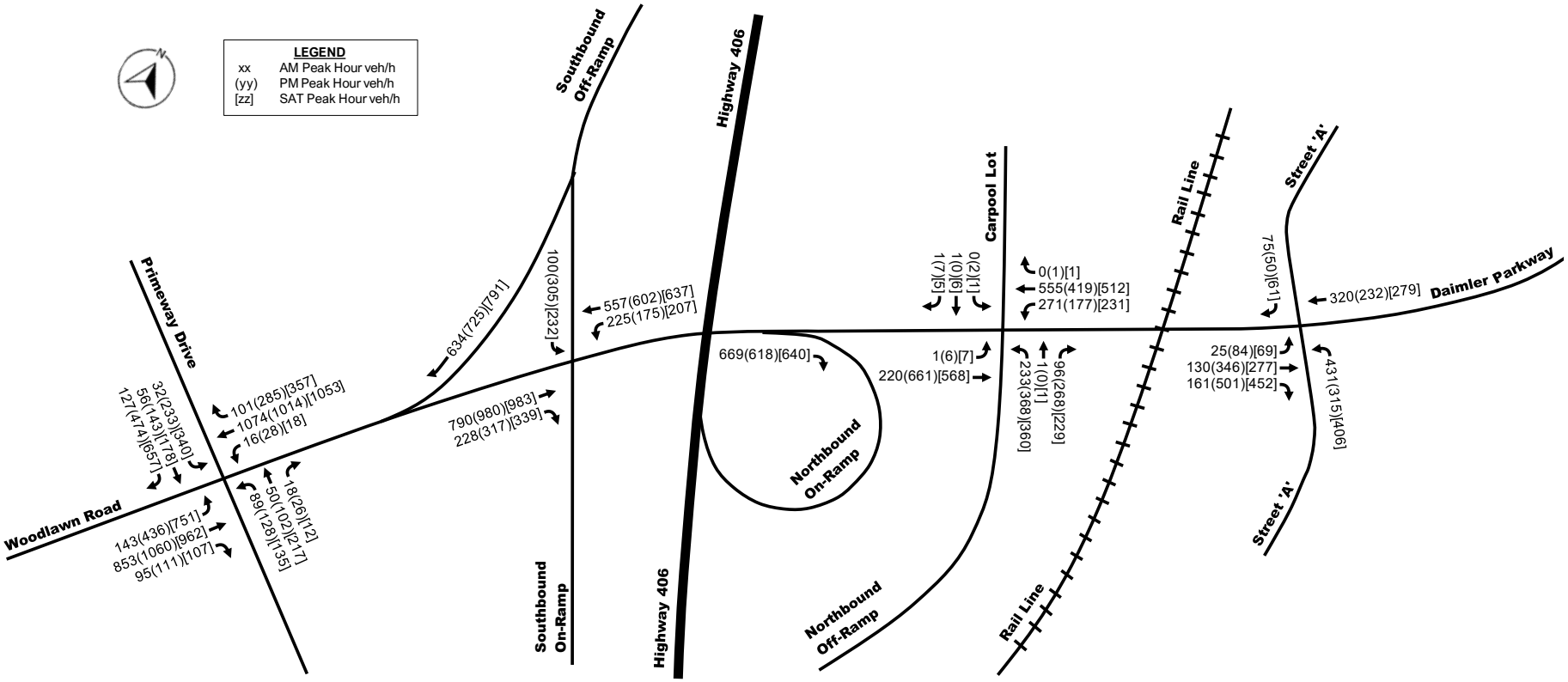


Figure 4.3 – Future (2051) Total Traffic Volumes, Weekday and Weekend Mid-day Peak Hours

4.6 Future (2051) Total Traffic Conditions

Analyses was undertaken utilizing the Future (2051) Total Traffic volumes illustrated in Figure 4.3. Signal timing plans and parameters for both the Highway 406 southbound and northbound interchanges were calculated using the methodologies outlined in the *Ontario Traffic Manual Book 12*. As for network changes, the analyses consider a new intersection that is proposed as part of the Hunters Pointe development, to be located approximately 85 metres east of the rail crossing.

4.6.1 Corridor Capacity Analysis – Future 2051 Conditions

The corridor capacity analysis for Daimler Parkway segment, east of the Highway 406 Northbound Interchange intersection, is summarized in Table 4.3.

Table 4.3 – Corridor Lane Capacity Analysis – Future (2051) Total Traffic Conditions

Peak Hour	Direction	Peak Directional Traffic (veh/hr)	Directional Capacity (veh/hr)	V/C Ratio
AM	Eastbound	316	700	0.45
	Westbound	826		1.18
PM	Eastbound	931		1.33
	Westbound	597		0.81
SAT	Eastbound	798		1.14
	Westbound	744		1.06

At a link level, Daimler Parkway corridor is experiencing capacity constraints under Future (2051) Total Traffic conditions, under all analysis peak hours exceeding capacity along at least one direction during both AM and PM peak hours and along both the directions during Saturday peak mid-day hour. This indicates that midblock congestion is forecasted in the future build-out scenario.

4.6.2 Summary of Critical Movements at the Interchange Ramps – Future 2051 Conditions

The performance measures that were estimated using Synchro for the critical ramp terminal intersection movements under Future (2051) Total Traffic conditions are summarized in Table 4.4. Signal timing optimization has been implemented based on the adjusted volumes. The full Synchro output reports are available in Appendix 6.

Table 4.4 – Summary of Critical Movements at the Highway 406 Interchange Ramps – Future (2051) Total Traffic Conditions

Intersection	Period	Movement	V/C	Delay (seconds)	Level of Service (LOS)	95th Percentile Queue (metres)*
Woodlawn Road and Highway 406 Southbound Interchange	PM	EBTTR SBL	0.85 0.87	30 61	C E	#174 #110
	SAT	EBTTR	**0.90**	34	C	#230
Daimler Parkway and Highway 406 Northbound Interchange	PM	EBT WBL NBL	**0.95** **0.91** **0.95**	36 64 66	D E E	#208 #64 #124
	SAT	EBT NBL	0.85 **0.96**	24 71	C E	m39 #124

*Where "#" is denoted, the 95th percentile volume exceeds capacity, and as such, the queue may be longer than what is estimated. Where "m" is denoted, the queue is metred by an upstream signal.

As shown in Table 4.4, the critical movements at the ramp terminal intersections include the eastbound through movement for both intersections, as well as the ramp-exiting movements. Optimal signal timings can keep these movements at approaching-capacity conditions; however, they still exceed the threshold established in the MTO guidelines. The queueing for each movement cannot be estimated through macroscopic methodology as the 95th percentile volume exceeds capacity.

4.6.3 Microsimulation Queueing Analysis – Future 2051 Conditions

Utilizing the calibration parameters outlined in Section 3.2, microsimulation analysis was completed for the future (2051) horizon year. A summary of analysis results is shown in Table 4.5, and the full results are shown in Appendix 7.

Table 4.5 – Future (2051) Total Traffic Conditions – Microscopic Traffic Analysis Queue Results

Scenario	Intersection	Peak Hour	Movement	Queue Length (metres)	Available Storage (metres)
No Train Event	Woodlawn Road and Highway 406 Southbound Interchange	AM	EBTR	130	440
			SBR	0	570
			SBL	33	140
			WBL	**35**	30
			WBT	68	185
		PM	EBTR	242	440
			SBR	0	570
			SBL	93	140
			WBL	**47**	30
			WBT	132	185
		SAT	EBTR	189	440
			SBR	0	570
			SBL	67	140
			WBL	**39**	30
			WBT	106	185
	Daimler Parkway and Highway 406 Northbound Interchange	AM	EBT	58	185
			NBL	49	100
			NBTR	14	530
			WBL	35	80
			WBTR	**68**	40
		PM	EBT	**192**	185
			NBL	**107**	100
			NBTR	52	530
			WBL	50	80
			WBTR	**68**	40
		SAT	EBT	130	185
			NBL	79	100
			NBTR	26	530
			WBL	49	80
			WBTR	**68**	40
With Train Event	Woodlawn Road and Highway 406 Southbound Interchange	AM	EBTR	131	440
			SBR	0	570
			SBL	33	140
			WBL	**37**	30
			WBT	91	185
		PM	EBTR	245	440
			SBR	0	570
			SBL	125	140
			WBL	**46**	30
			WBT	168	185
	Daimler Parkway and Highway 406 Northbound Interchange	AM	EBT	65	185
			NBL	49	100
			NBTR	17	~530
			WBL	62	80
			WBTR	**69**	40
		PM	EBT	**217**	185
			NBL	**107**	100
			NBTR	98	530
			WBL	58	80
			WBTR	**68**	40
	Rail Crossing	AM	EBT	**60**	40
			WBT	**130**	85*
		PM	EBT	**59**	40
			WBT	**123**	85*

*Storage length of 85 metres has been estimated based on the location of Street 'A' in the Hunters Pointe Draft Plan.

As shown in Table 4.5, the queue spillback at the Daimler Parkway and Highway 406 Northbound Interchange intersection exceeds the available storage length for the eastbound through movement. These results indicate that the queue spillback from the eastbound through movement will spillback into the Highway 406 Southbound Interchange intersection. However, due to the short amount of time that the intersection is blocked, the conflicting ramp movement (southbound left) is still contained within the available storage length.

During train events, the Daimler Parkway and Highway 406 Northbound Interchange Intersection will be blocked by queue spillback at the rail line. Moreover, with the proposed Street 'A' roundabout in the Hunters Pointe Draft plan being approximately 85 metres from the spur line, the new intersection will be impacted by spillback as well. In this scenario, the northbound left movement at the ramp terminal also exceeds the available storage; however, this is largely due to eastbound through vehicles blocking the intersection within the simulation. Additionally, the westbound approach queues of the Highway 406 Northbound Interchange intersection are generally exceeding storage length between the stop-bar and the rail line.

While the analysis focuses on the interchange ramps, analysis was also conducted for the Woodlawn Road and Primeway Drive/Brown Road intersection. This intersection recorded significant queueing and delays in the PM and SAT mid-day peak hours, particularly for the eastbound left-turn movement and southbound movements exiting the plaza. However, the analysis does not consider that traffic may elect to use River Road as the intersection becomes regularly congested, which may result in a volume reduction for the eastbound left-turn and plaza-exiting movements. Therefore, it is recommended that this intersection be monitored as the surrounding area reaches its full build-out scenario to determine if mitigation measures are required.

5.0 Sensitivity Analyses

To evaluate the network's sensitivity to various development densities and potential traffic volume reductions, a set of sensitivity analyses has been completed. This was undertaken to identify how much additional residential density can be accommodated or how much traffic volume can be diverted to another corridor to avoid congested conditions along the Daimler Parkway corridor. Subsequent sections present the following scenarios:

1. Future (2051) Total Traffic volumes with a 10% increase in residential density
    a. With train event
    b. Without train event
2. Future (2051) Total Traffic volumes with a 25% increase in residential density.
    a. With train event
    b. Without train event
3. Future (2051) Total Traffic volumes with a 10% reduction in through traffic along Daimler Parkway.
    a. With train event
    b. Without train event
4. Future (2051) Total Traffic volumes with a 25% reduction in through traffic along Daimler Parkway.
    a. With train event
    b. Without train event

The sensitivity analysis scenarios with residential density increases adopt the same trip distribution patterns as the original analysis, except with greater units counts. In contrast, the traffic volume reduction scenarios represent a sensitivity analysis where an additional non-emergency access to the Developable Lands (i.e., a flyover) is to be considered, and thus only constitute a reduction to the volumes along Daimler Parkway/Woodlawn Road (i.e., trips internal to Welland), not the volumes originating from/destined for Highway 406. The volumes for each of these scenarios are available in Appendix 8.

5.1 Sensitivity Analysis #1: Future (2051) Total Traffic Volumes with 10% Increase in Density

5.1.1 Corridor Capacity Analysis – Future 2051 Traffic Conditions with 10% Increase in Residential Density

The corridor capacity results for the sensitivity analysis are shown in Table 5.1.

Table 5.1 – Corridor Lane Capacity Analysis – Future (2051) Traffic Conditions with 10% Increase in Residential Density

Peak Hour	Direction	Peak Directional Traffic (veh/hr)	Directional Capacity (veh/hr)	V/C Ratio
AM	Eastbound	335	700	0.48
	Westbound	884		**1.26**
PM	Eastbound	996		**1.42**
	Westbound	636		0.91
SAT	Eastbound	852		**1.22**
	Westbound	793		**1.13**

As expected, the capacity constraints that exist under the base Future (2051) Traffic Conditions are amplified with increased density. Based on these results, congestion along Daimler Parkway is forecast under future (2051) traffic conditions.

5.1.2 Summary of Critical Movements at the Interchange Ramps – Future 2051 Conditions with 10% Increase in Residential Density

Based on the Synchro intersection operation analysis, a summary of critical movement operation for the interchange ramps under 10% residential density increase scenario, is provided in Table 5.2, and the full Synchro output reports are provided in Appendix 9.

Table 5.2 – Summary of Critical Movements at the Interchange Ramps – Future (2051) Traffic Conditions with 10% Increase in Residential Density

Intersection	Peak Hour	Movement	V/C	Delay (seconds)	Level of Service (LOS)	95th Percentile Queue (metres)*
Woodlawn Road and Highway 406 Southbound Interchange	PM	EBTTR	0.88	32	C	#182
		WBL	**0.90**	57	E	#m56
		SBL	**0.91**	65	E	#123
	SAT	EBTTR	0.88	32	C	#199
		WBL	**0.91**	57	E	m#66
		SBL	0.82	58	E	#85
Daimler Parkway and Highway 406 Northbound Interchange	PM	EBT	**1.02**	49	D	#220
		WBL	**1.03**	106	F	#78
		NBL	**0.95**	66	E	#124
	SAT	EBT	0.85	24	C	m115
		WBL	0.89	46	D	#70
		NBL	**1.08**	108	**F**	#139

*Where "#" is denoted, the 95th percentile volume exceeds capacity, and as such, the queue may be longer than what is estimated. Where "m" is denoted, the queue is metred by an upstream signal.

As shown in Table 5.2, the capacity constraints for the eastbound through and off-ramp movements persist with increased density. In addition, the westbound left-turn movements begin to face capacity constraints at both the study intersections.

5.1.3 Microsimulation Queueing Analysis – Future 2051 Conditions with 10% Increase in Residential Density

With the application of a 10% increase in residential density, the queueing results for the key movements are summarized in Table 5.3, and the full results are available in Appendix 10.

Table 5.3 – Future (2051) Traffic Conditions with 10% Increase in Residential Density – Microscopic Analysis Queue Results

Scenario	Intersection	Peak Hour	Movement	Queue Length (metres)	Available Storage (metres)
No Train Event	Woodlawn Road and Highway 406 Southbound Interchange	AM	EBTR	129	440
			SBR	0	570
			SBL	35	140
			WBL	**36**	30
			WBT	70	185
		PM	EBTR	264	440
			SBR	0	570
			SBL	118	140
			WBL	**54**	30
			WBT	159	185
		SAT	EBTR	233	440
			SBR	0	570
			SBL	60	140
			WBL	**41**	30
			WBT	105	185
	Daimler Parkway and Highway 406 Northbound Interchange	AM	EBT	64	185
			NBL	47	100
			NBTR	17	530
			WBL	49	80
			WBTR	**70**	40
		PM	EBT	**208**	185
			NBL	**104**	100
			NBTR	66	530
			WBL	57	80
			WBTR	**70**	40
		SAT	EBT	137	185
			NBL	84	100
			NBTR	32	530
			WBL	52	80
			WBTR	**69**	40
With Train Event	Woodlawn Road and Highway 406 Southbound Interchange	AM	EBTR	132	440
			SBR	0	570
			SBL	35	140
			WBL	**39**	30
			WBT	94	185
		PM	EBTR	273	440
			SBR	0	570
			SBL	**205**	140
			WBL	**55**	30
			WBT	176	185
	Daimler Parkway and Highway 406 Northbound Interchange	AM	EBT	64	185
			NBL	51	100
			NBTR	20	530
			WBL	59	80
			WBTR	**70**	40
		PM	EBT	**218**	185
			NBL	**108**	100
			NBTR	102	530
			WBL	62	80
			WBTR	**70**	40
	Rail Crossing	AM	EBT	**57**	40
			WBT	**130**	85*
		PM	EBT	**66**	40
			WBT	**118**	85*

*Storage length of 85 metres has been estimated based on the location of Street 'A' in the Hunters Pointe Draft Plan.

As shown in Table 5.3, a 10% increase in residential density marginally amplifies the critical movements in each peak hour with no train events. For the eastbound through movement at the Daimler Parkway and Highway 406 Interchange intersection, the eastbound queue spillback is extended even further in the PM peak hour (208 metres), with the spillback now travelling beyond the adjacent intersection. Despite this added congestion, the southbound left-turn movement is still captured within its available storage length but is now approaching ramp capacity (118 metres of queue compared to 140 metres of storage length).

During a train event, the added traffic results in the southbound off-ramp exceeding its available storage length in the PM peak hour (205 metres of queue compared to 140 metres of storage length), thereby resulting in significant queueing and blocking of adjacent intersections.

5.2 Sensitivity Analysis #2: Future (2051) Traffic Volumes with 25% Increase in Density

5.2.1 Corridor Capacity Analysis – Future 2051 Conditions with 25% Increase in Residential Density

The corridor capacity results for the sensitivity analysis are shown in Table 5.4.

Table 5.4 – Corridor Lane Capacity Analysis – Future (2051) Traffic Conditions with 25% Increase in Residential Density

Peak Hour	Direction	Peak Directional Traffic (veh/hr)	Directional Capacity (veh/hr)	V/C Ratio
AM	Eastbound	365	700	0.52
	Westbound	971		**1.39**
PM	Eastbound	1091		**1.56**
	Westbound	696		0.99
SAT	Eastbound	935		**1.34**
	Westbound	866		**1.24**

As seen in Table 5.4, a residential density increase of 25% puts almost all directions for all periods at or over capacity. Significant mid-block congestion can be expected under this scenario.

5.2.2 Summary of Critical Movements at the Interchange Ramps – Future 2051 Conditions with 25% Increase in Residential Density

Using Synchro intersection operation analysis, a summary of the critical movement operations for the interchange ramps, under a 25% residential density increase scenario, is provided in Table 5.5, and the full Synchro reports are available in Appendix 11.

Table 5.5 – Summary of Critical Movements at the Interchange Ramps – Future (2051) Traffic Conditions with 25% Increase in Residential Density

Intersection	Period	Movement	V/C	Delay (seconds)	Level of Service (LOS)	95th Percentile Queue (metres)*
Woodlawn Road and Highway 406 Southbound Interchange	PM	EBTTR	**0.94**	40	D	#203
		WBL	**0.95**	83	**F**	#m72
		SBL	**0.94**	70	E	#137
	SAT	EBTTR	**0.92**	36	D	#203
		WBL	**0.95**	64	E	m#71
		SBL	**0.90**	70	E	#110
Daimler Parkway and Highway 406 Northbound Interchange	PM	EBT	**1.11**	83	**F**	#234
		WBL	**1.14**	139	**F**	#89
		NBL	**0.95**	66	E	#124
	SAT	EBT	**0.90**	23	C	m123
		WBL	**1.10**	112	**F**	#99
		NBL	**1.12**	125	**F**	#142

*Where "#" is denoted, the 95th percentile volume exceeds capacity, and as such, the queue may be longer than what is estimated. Where "m" is denoted, the queue is metred by an upstream signal.

As shown in Table 5.5, multiple movements are operating at or over capacity under the 25% residential density increase scenario. The movements that experience capacity constraints include the eastbound movements, the off-ramp movements, and the westbound left-turn movement at each intersection.

5.2.3 Microsimulation Queueing Analysis – Future 2051 Traffic Conditions with 25% Increase in Residential Density

With the application of a 25% increase in residential density, the queueing results for the key movements are summarized in Table 5.6, and the full results are available in Appendix 12.

Table 5.6 – Future (2051) Traffic Conditions with 25% Increase in Residential Density – Microscopic Traffic Analysis Queue Results

Scenario	Intersection	Peak Hour	Movement	Queue Length (metres)	Available Storage (metres)
No Train Event	Woodlawn Road and Highway 406 Southbound Interchange	AM	EBTR	132	440
			SBR	0	570
			SBL	35	140
			WBL	**40**	30
			WBT	82	185
		PM	EBTR	**453**	440
			SBR	0	570
			SBL	**298**	140
			WBL	**54**	30
			WBT	**193**	185
		SAT	EBTR	203	440
			SBR	0	570
			SBL	78	140
			WBL	**54**	30
			WBT	111	185
	Daimler Parkway and Highway 406 Northbound Interchange	AM	EBT	62	185
			NBL	51	100
			NBTR	20	530
			WBL	60	80
			WBTR	69	40
		PM	EBT	**219**	185
			NBL	**122**	100
			NBTR	107	530
			WBL	68	80
			WBTR	70	40
		SAT	EBT	158	185
			NBL	80	100
			NBTR	43	530
			WBL	60	80
			WBTR	70	40
With Train Event	Woodlawn Road and Highway 406 Southbound Interchange	AM	EBTR	130	440
			SBR	0	570
			SBL	34	140
			WBL	**41**	30
			WBT	91	185
		PM	EBTR	**484**	440
			SBR	0	570
			SBL	**368**	140
			WBL	**57**	30
			WBT	**202**	185
	Daimler Parkway and Highway 406 Northbound Interchange	AM	EBT	63	185
			NBL	53	100
			NBTR	20	530
			WBL	62	80
			WBTR	70	40
		PM	EBT	**220**	185
			NBL	**132**	100
			NBTR	131	530
			WBL	68	80
			WBTR	70	40
	Rail Crossing	AM	EBT	**55**	40
			WBT	**147**	85*
		PM	EBT	**75**	40
			WBT	**130**	85*

As shown in Table 5.6, a residential density increase of 25% results in significant queueing and blocking of adjacent intersections in the PM peak hour, regardless of a train event, thereby resulting in operational impacts to all neighbouring intersections.

5.3 Sensitivity Analysis #3: Future (2051) Traffic Volumes with 10% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

This sensitivity analysis considers a new non-emergency access to the Developable Lands, which could result in a 10% decrease to through volumes along Woodlawn Road/Daimler Parkway. The assumption is that a new access would primarily service trips internal to the City of Welland, and that trips to and from the Highway 406 ramps would remain largely uninfluenced.

5.3.1 Corridor Capacity Analysis – Future (2051) Traffic Conditions with 10% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

With a 10% reduction in through volumes along Daimler Parkway, the corridor capacity is summarized in Table 5.7.

Table 5.7 – Corridor Lane Capacity Analysis – Future (2051) Traffic Conditions with 10% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

Peak Hour	Direction	Peak Directional Traffic (veh/hr)	Directional Capacity (veh/hr)	V/C Ratio
AM	Eastbound	294	700	0.42
	Westbound	770		**1.10**
PM	Eastbound	865		**1.24**
	Westbound	555		0.79
SAT	Eastbound	741		**1.06**
	Westbound	693		0.99

Despite the 10% reduction in through volumes, capacity conditions are still forecast under future (2051) traffic conditions. Therefore, congested mid-block operations may persist under this scenario.

5.3.2 Summary of Critical Movements at the Interchange Ramps – Future (2051) Traffic Conditions with 10% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

Table 5.8 presents the critical movement operation results using Synchro at the interchange ramps under a 10% reduction to through volumes along Woodlawn Road/Daimler Parkway. The full Synchro results are available in Appendix 13.

Table 5.8 – Summary of Critical Movements at the Interchange Ramps – Future (2051) Traffic Conditions with 10% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

Intersection	Peak Hour	Movement	V/C	Delay (seconds)	Level of Service (LOS)	95th Percentile Queue (metres)*
Woodlawn Road and Highway 406 Southbound Interchange	PM	EBTTR SBL	0.86 0.80	33 50	C D	#205 90
	SAT	SBL	**0.82**	60	E	#87
Daimler Parkway and Highway 406 Northbound Interchange	PM	EBT NBL	**0.86** **0.95**	26 66	C E	m#92 #124
	SAT	NBL	**0.93**	62	E	#118

*Where "#" is denoted, the 95th percentile volume exceeds capacity, and as such, the queue may be longer than what is estimated. Where "m" is denoted, the queue is metred by an upstream signal.

As shown in Table 5.8, capacity constraints still exist for certain movements under a 10% reduction in through volumes along Woodlawn Road/Daimler Parkway. While these movements still have excess capacity available, they exceed the capacity thresholds outlined in the MTO traffic impact study guidelines.

5.3.3 Microsimulation Queueing Analysis – Future 2051 Conditions with 10% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

The queueing results of Sensitivity Analysis #3 are summarized in Table 5.9, and the full results are available in Appendix 14.

Table 5.9 – Future (2051) Conditions with 10% Reduction to Through Volumes Along Woodlawn Road/Daimler Parkway – Microscopic Traffic Analysis Queue Results

Scenario	Intersection	Peak Hour	Movement	Queue Length (metres)	Available Storage (metres)
No Train Event	Woodlawn Road and Highway 406 Southbound Interchange	AM	EBTR	127	440
			SBR	0	570
			SBL	32	140
			WBL	**38**	30
			WBT	63	185
		PM	EBTR	229	440
			SBR	0	570
			SBL	97	140
			WBL	**46**	30
			WBT	98	185
		SAT	EBTR	175	440
			SBR	0	570
			SBL	68	140
			WBL	**42**	30
			WBT	85	185
	Daimler Parkway and Highway 406 Northbound Interchange	AM	EBT	58	185
			NBL	49	100
			NBTR	15	530
			WBL	40	80
			WBTR	**66**	40
		PM	EBT	158	185
			NBL	100	100
			NBTR	44	530
			WBL	44	80
			WBTR	**69**	40
		SAT	EBT	118	185
			NBL	72	100
			NBTR	33	530
			WBL	42	80
			WBTR	**67**	40
With Train Event	Woodlawn Road and Highway 406 Southbound Interchange	AM	EBTR	126	440
			SBR	0	570
			SBL	34	140
			WBL	**38**	30
			WBT	82	185
		PM	EBTR	228	440
			SBR	0	570
			SBL	116	140
			WBL	**47**	30
			WBT	120	185
	Daimler Parkway and Highway 406 Northbound Interchange	AM	EBT	59	185
			NBL	49	100
			NBTR	16	530
			WBL	61	80
			WBTR	**68**	40
		PM	EBT	**207**	185
			NBL	**103**	100
			NBTR	75	530
			WBL	54	80
			WBTR	**69**	40
	Rail Crossing	AM	EBT	**55**	40
			WBT	**98**	85*
		PM	EBT	**61**	40
			WBT	**89**	85*

As shown in Table 5.9, a 10% reduction in through volume along Woodlawn Road/Daimler Parkway has a notable impact on the eastbound through movement at the northbound Highway 406 interchange. In the "No Train Event" scenario, the eastbound through movement queue length drops from 192 metres to 158 metres, and as a result, no longer spills back into the adjacent intersection.

During a train event, the reduction reduces the eastbound through queue length by approximately 10 metres, but is still spilling back into the adjacent intersection.

5.4 Sensitivity Analysis #4: Future (2051) Traffic Volumes with 25% Decrease to Through Volumes Along Woodlawn Road/Daimler Parkway

The fourth sensitivity analysis considers a 25% decrease to through volumes along Woodlawn Road/Daimler Parkway. Similar to Sensitivity Analysis #3, the assumption is that a new access would primarily service trips internal to the City of Welland, and that trips to and from the Highway 406 ramps would remain largely uninfluenced.

5.4.1 Corridor Lane Capacity Analysis – Future (2051) Traffic Conditions with 25% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

With a 25% reduction in through volumes along Daimler Parkway, the corridor capacity is summarized in Table 5.10.

Table 5.10 – Corridor Lane Capacity Analysis – Future (2051) Traffic Conditions with 25% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

Peak Hour	Direction	Peak Directional Traffic (veh/hr)	Directional Capacity (veh/hr)	V/C Ratio
AM	Eastbound	264	700	0.37
	Westbound	687		0.98
PM	Eastbound	766		**1.09**
	Westbound	492		0.70
SAT	Eastbound	656		0.94
	Westbound	616		0.88

With a 25% reduction in through volumes along Daimler Parkway/Woodlawn Road, majority of movements start to operate within or approaching capacity conditions, barring only the eastbound movement in the PM peak hour. Under this scenario, mid-block congestion is still forecast for the busiest peak hours of the day, albeit to a lesser extent.

5.4.2 Summary of Critical Movements at the Interchange Ramps – Future (2051) Traffic Conditions with 25% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

Table 5.11 presents the critical movements Synchro analysis at the interchange ramps under a 25% reduction to through volumes along Woodlawn Road/Daimler Parkway. The full Synchro reports are provided in Appendix 15.

Table 5.11 – Summary of Critical Movements at the Interchange Ramps – Future (2051) Traffic Conditions with 25% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

Intersection	Peak Hour	Movement	V/C	Delay (seconds)	Level of Service (LOS)	95th Percentile Queue (metres)*
Woodlawn Road and Highway 406 Southbound Interchange	PM	EBT	0.79	29	C	#174
		WBT	0.51	7	A	86
		SBL	0.80	50	D	91
	SAT	EBT	0.80	28	C	#197
		WBT	0.49	6	A	77
		SBL	0.74	50	D	73
Daimler Parkway and Highway 406 Northbound Interchange	PM	EBT	0.77	31	C	m141
		WBT	0.43	18	B	66
		NBL	0.86	47	D	#104
	SAT	EBT	0.71	23	C	m57
		WBT	0.53	20	C	85
		NBL	0.84	45	D	99

*Where "#" is denoted, the 95th percentile volume exceeds capacity, and as such, the queue may be longer than what is estimated. Where "m" is denoted, the queue is metred by an upstream signal.

As shown in Table 5.11, the 25% reduction in through volumes along Woodlawn Road/Daimler Parkway alleviates majority of capacity constraints for the Highway 406 ramp terminal movements, with many of the critical movements that were estimated under base Future (2051) Total Traffic conditions being mitigated. The results indicate that three (3) of left-turn scenarios will still exceed their V/C threshold of 0.75; however, the green time re-allocation brings them closer to their desired standard.

5.4.3 Microsimulation Queueing Analysis – Future 2051 Conditions with 25% Reduction to Through Volumes along Woodlawn Road/Daimler Parkway

The queueing impacts of the 25% reduction to through volumes along Woodlawn Road/Daimler Parkway are summarized in Table 5.12, and the full results are available in Appendix 16.

Table 5.12 – Future (2051) Conditions with 25% Reduction to Through Volumes Along Woodlawn Road/Daimler Parkway – Microscopic Traffic Analysis Queue Results

Scenario	Intersection	Peak Hour	Movement	Queue Length (metres)	Available Storage (metres)
No Train Event	Woodlawn Road and Highway 406 Southbound Interchange	AM	EBTR	136	440
			SBR	0	570
			SBL	33	140
			WBL	**33**	30
			WBT	52	185
		PM	EBTR	175	440
			SBR	0	570
			SBL	91	140
			WBL	**46**	30
			WBT	101	185
		SAT	EBTR	173	440
			SBR	0	570
			SBL	64	140
			WBL	**41**	30
			WBT	80	185
	Daimler Parkway and Highway 406 Northbound Interchange	AM	EBT	51	185
			NBL	46	100
			NBTR	15	530
			WBL	41	80
			WBTR	**60**	40
		PM	EBT	153	185
			NBL	98	100
			NBTR	49	530
			WBL	44	80
			WBTR	**54**	40
		SAT	EBT	97	185
			NBL	72	100
			NBTR	30	530
			WBL	39	80
			WBTR	**61**	40
With Train Event	Woodlawn Road and Highway 406 Southbound Interchange	AM	EBTR	135	440
			SBR	0	570
			SBL	33	140
			WBL	**33**	30
			WBT	61	185
		PM	EBTR	176	440
			SBR	0	570
			SBL	108	140
			WBL	**45**	30
			WBT	101	185
	Daimler Parkway and Highway 406 Northbound Interchange	AM	EBT	56	185
			NBL	46	100
			NBTR	15	530
			WBL	55	80
			WBTR	**63**	40
		PM	EBT	**206**	185
			NBL	98	100
			NBTR	84	530
			WBL	48	80
			WBTR	**55**	40
	Rail Crossing	AM	EBT	**57**	40
			WBT	**90**	85*
		PM	EBT	**59**	40
			WBT	72	85*

As shown in Table 5.12, the 25% reduction results almost all movements operating within their available storage length under the "No Train Event" scenario. The only movement that is exceeding its storage capacity is the westbound left-turn movement at the Highway 406 Southbound off-ramp, which is exceeding its capacity by approximately three (3) vehicles in the PM peak hour and approximately two (2) vehicles in the Saturday peak hour.

Under the train event scenario, the eastbound through movement at the northbound interchange intersection is still spilling back into the southbound interchange intersection. However, similar to the base Future (2051) Total scenario and Sensitivity Analysis #3 scenario, the off-ramp storage is still contained within its storage length accommodation.

6.0 Summary of Analysis Conclusions

The findings of the Consolidated Traffic Study are summarized as follows:

- The traffic analysis was completed utilizing three sets of methodology: a corridor capacity analysis, macroscopic traffic analysis (Synchro 11), and microscopic traffic analysis (PTV Vissim). The macroscopic analysis conformed to the Niagara Region and Ministry of Transportation (MTO) guidelines for traffic impact studies. The Vissim model was calibrated as per the Florida Department of Transportation (FDOT) *Traffic Analysis Handbook (2021)*, which is endorsed by PTV Group for calibration methodology.
- Under existing (2024) conditions, all of the study area intersections are operating satisfactorily; no mitigation measures are required in response to delays or queueing.
- The Developable Lands considered in the future traffic analysis consist of a mix of residential and commercial land uses totalling 1,444 new residential dwelling units and 30,000ft2 of commercial gross floor area (GFA) . These lands are comprised of a portion of the North Village (under construction) and the future Hunter Pointe and South Village developments.
- The trip generation for the Developable lands was estimated utilizing the Institute of Transportation Engineers (ITE) *Trip Generation Manual (11th Edition)*. The trip generation was estimated to be 876 trips in the AM peak hour (232 in and 644 out), 1,196 trips in the PM peak hour (739 in and 457 out), and 1,227 trips in the Saturday peak hour (648 in and 570 out).
- The growth rate for the analysis was derived from Region of Niagara's EMME model plots from the 2016 base year, along with the future 2031, 2041, and 2051 horizon years. The growth rate was derived based on total ramp volume traffic that is not associated with the Developable Lands. The calculated growth rates were in the general magnitude of 1% per annum from 2024 to 2031, and 2% per annum from 2031 to 2051.
- A spur railway line operated by Gio Rail traverses Daimler Parkway, is located approximately 50 metres east of the Highway 406 Northbound Interchange intersection. Consultation with Gio Rail indicates that train movements generally occur weekly and can transpire during both the weekday AM and PM peak hour, with train lengths of approximately 30 cars. Therefore, each set of analyses

considers two (2) scenarios: a "With Train Event" scenario and a "No Train Event" scenario.

- The corridor capacity analysis and macroscopic traffic analysis using Synchro indicate that significant congestion is forecasted under Future (2051) Total Traffic Conditions, with capacity constraints forecasted at the link level in addition to individual intersection movements.
- Utilizing the methodology outlined in the report, the microsimulation analysis was completed for the ultimate Future (2051) horizon year. The results indicate that the estimated queues for the eastbound through and westbound left turn movements under the Highway 406 bridge will exceed their available storage length in the PM peak hour, regardless of a train event. The eastbound through movement queues spill back into the adjacent ramp intersection and result in blockages and lengthen queue on the Highway 406 off-ramp.
- In the "With Train Event" scenario for the 2051 horizon year, Damlier Parkway continues to experience queue spillback into Highway 406 Southbound off-ramp terminal intersection, and in addition the westbound and eastbound traffic queues from the rail crossing will spill back through the proposed new roundabout at Street A and Highway 406 Northbound off-ramp intersection, respectively.
- To evaluate the road network's resilience, four (4) sets of sensitivity analyses were completed for the study area. The sensitivity analyses include:
    1. 10% increase to residential density in the Developable Lands
    2. 25% increase to residential density in the Developable Lands
    3. 10% decrease to the through volumes along Woodlawn Road/Daimler Parkway
    4. 25% decrease to the through volumes along Woodlawn Road/Daimler Parkway
- For Sensitivity Analysis #1, the critical movements at both the highway 406 ramps worsened relative to the base future (2051) total scenario and traffic spillback through these intersections continues to impact the off ramps operations with the southbound and northbound off-ramp left turn queue lengths approaching and exceeding available storage, respectively During train events result roadway operations worsened critical movements relating in increased blockages and congestion.

- For Sensitivity Analysis #2, the 25% increase in residential density results in significant increase network congestion, with or without train events. This scenario results in left turn queue lengths at the Highway 406 off-ramps which would exceed the available left turn storage capacity. Specifically for the southbound off ramp the left turn queue blocks the free flow right turn channelize lane and creates a scenario where the maximum ramp queue could extend beyond the ramp bull nose. Additionally eastbound through traffic queues at the same intersection spillback into the Woodlawn Road and Primeway Drive/Brown Road intersection.

- The corridor capacity analysis and macroscopic traffic analysis for both sensitivity # 1 and #2 using Synchro indicates that significant delays and capacity constraints are forecasted at the link level in addition to individual intersection movements.

- For Sensitivity Analysis #3, the 10% reduction to through volumes along Woodlawn Road/Daimler Parkway mitigates the queue spillback into the Highway 406 interchange intersections during the "No Train Event" scenario. Only the westbound left-turn movement at the Highway 406 Southbound off-ramp intersection exceeds its available storage. In the "With Train Event" scenario, the eastbound queues are forecast to spillback through the Highway 406 Southbound interchange intersection create blockages and delays. However, based on the capacity analysis methodology, constraints are still forecast at the link level and for individual intersection movements under this scenario. While queue spillback is expected to be improved, significant congestion is still forecasted within the network.

- For Sensitivity Analysis #4, the results are comparable to Sensitivity Analysis #3, with the 25% reduction mitigating queue spill into adjacent intersections. in the "No Train Event" scenario. Even with the 25% reduction, the "With Train Event" scenario still realizes queue spillback into the southbound off-ramp intersection. In this scenario, the capacity constraints are significantly improved but not entirely alleviated at both the ramp terminal intersections. The remaining critical movements include the left turns from both off ramps which are still above the desired MTO traffic impact study guidelines.

Based on the analysis completed, it is concluded that with the proposed new development in the lands east of Highway 406 (primarily South Village and Hunters Pointe), the existing Woodlawn Road/Daimler Parkway corridor will experience peak hour congestion and queueing resulting in undesirable operating conditions by 2051.

The sensitivity analysis shows a 10% reduction in through volumes (this represents a reduction of approximately 215 units assuming the same distribution of land uses) along Woodlawn Road/Daimler Parkway mitigates some of the roadway queueing concerns that are present under the base future (2051) total scenario, albeit the Highway 406 ramp intersections are still forecast to operate with critical movements and high levels of delay.

The sensitivity analysis for a 25% reduction in through volumes along Woodlawn Road/Daimler Parkway (this represents a reduction of approximately 549 units assuming the same distribution of land uses), mitigates the roadway queueing concerns that are present under the base future (2051) total scenario. The operational analysis indicated that all the Highway 406 ramp intersections will operate at good levels of service with only the left turn movements at both off ramps still exceeding the desired MTO traffic impact study guideline.

If the proposed magnitude of developments is to be implemented by the 2051 horizon, undesirable operating conditions are expected in the form of significant congestion along the Daimler Parkway corridor and queue spillback blocking adjacent intersections. Therefore, it is recommended that an additional non-emergency access be provided for the lands east of Highway 406 to accommodate the development traffic demand. The additional access will add new transportation capacity to the roadway network allowing for diversion of traffic away from the Daimler Parkway corridor thus improving its operation under the future (2051) total traffic scenario. Additionally, there will be surplus capacity within the roadway system to consider the potential for increased densities if desired. This additional route choice will also reduce out of way travel and overall commute time for the traffic heading to the south and west.

APPENDIX 1

Turning Movement Counts (TMCs)



Woodlawn Rd @ Brown Rd / Primeway Dr

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 7:45:00
To: 8:45:00

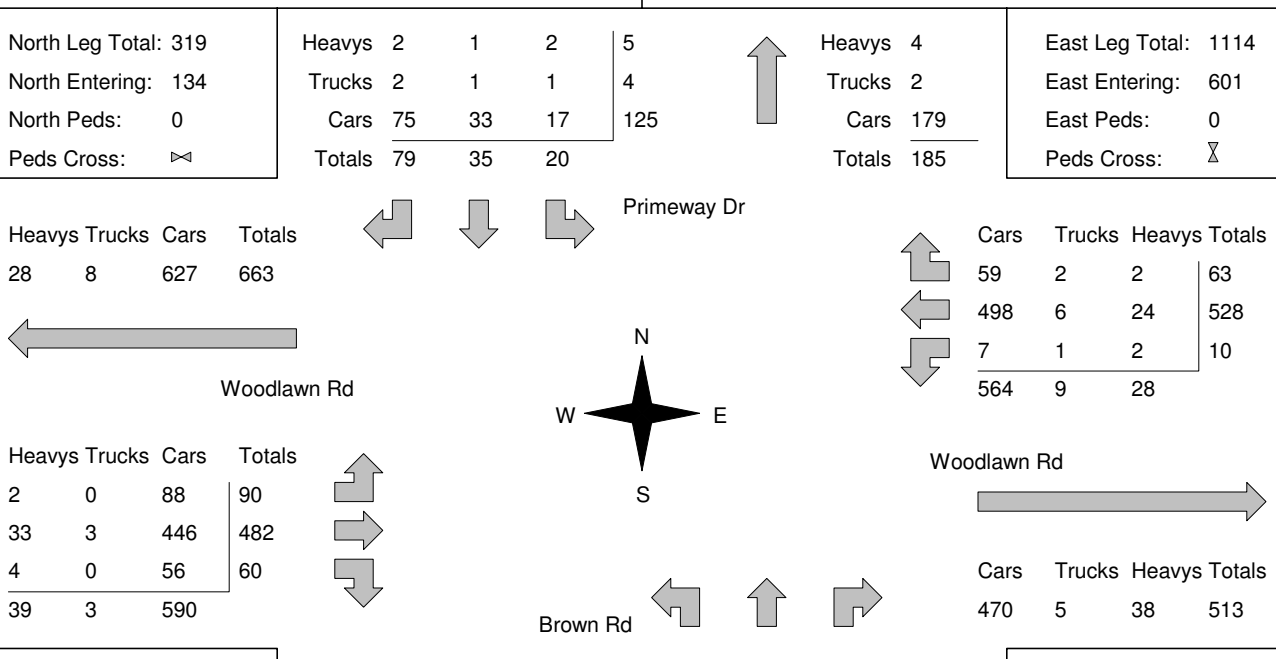
Municipality: Welland
Site #: 0000000004
Intersection: Woodlawn Rd & Brown Rd
TFR File #: 4
Count date: 23-Apr-2024

Weather conditions:
Cloudy/Dry

Person(s) who counted:
Pyramid Traffic Inc

**** Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E



Comments

Woodlawn Rd @ Brown Rd / Primeway Dr

Mid-day Peak Diagram

Specified Period
From: 11:00:00
To: 14:00:00

One Hour Peak
From: 11:30:00
To: 12:30:00

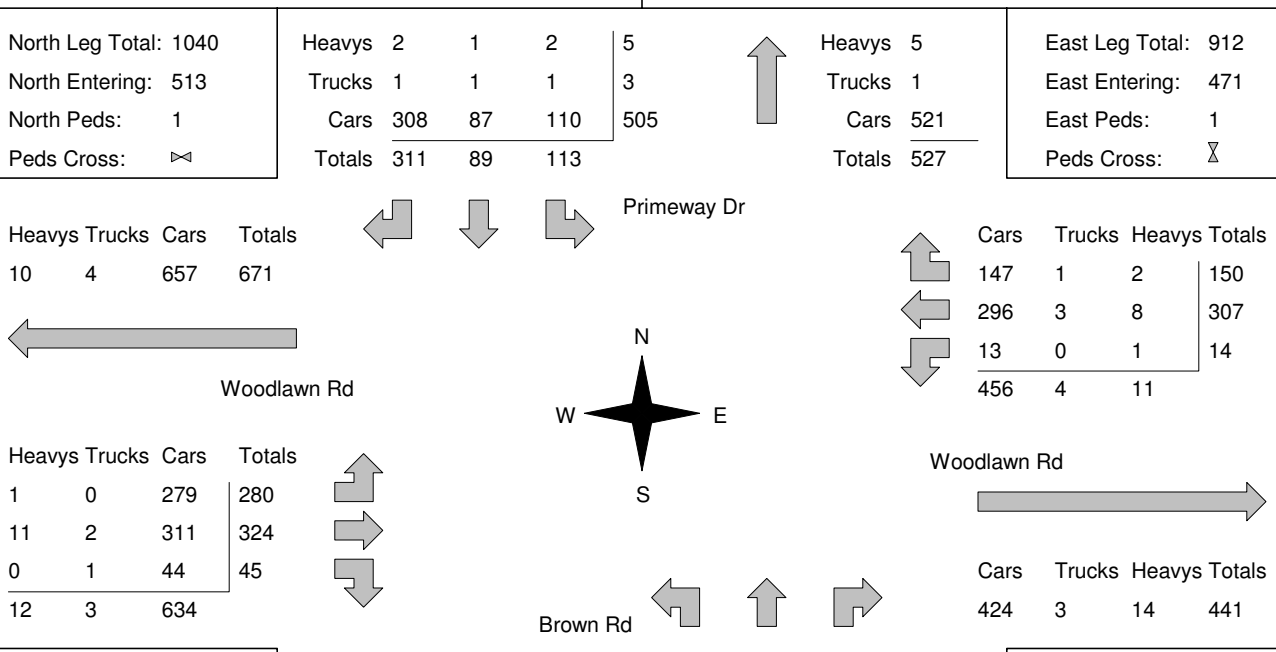
Municipality: Welland
Site #: 0000000004
Intersection: Woodlawn Rd & Brown Rd
TFR File #: 4
Count date: 23-Apr-2024

Weather conditions:
Cloudy/Dry

Person(s) who counted:
Pyramid Traffic Inc

**** Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E



Comments

Woodlawn Rd @ Brown Rd / Primeway Dr

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

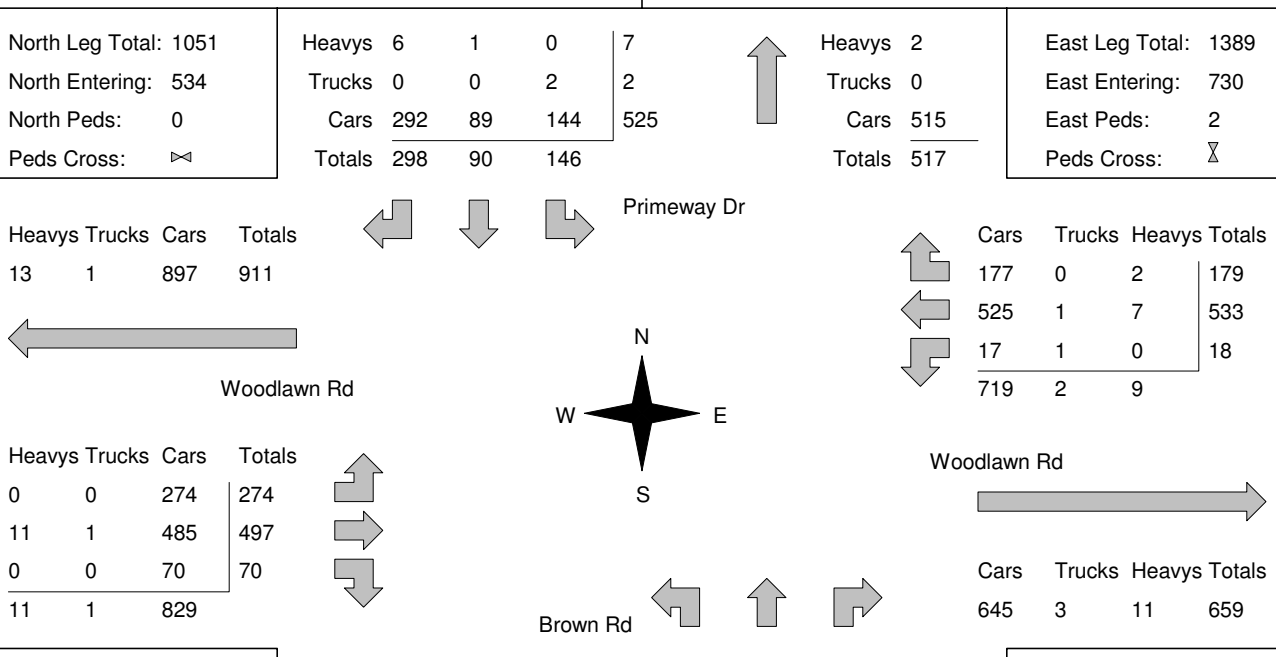
Municipality: Welland
Site #: 0000000004
Intersection: Woodlawn Rd & Brown Rd
TFR File #: 4
Count date: 23-Apr-2024

Weather conditions:
Cloudy/Dry

Person(s) who counted:
Pyramid Traffic Inc

**** Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E



Comments

Woodlawn Rd @ Brown Rd / Primeway Dr

Total Count Diagram

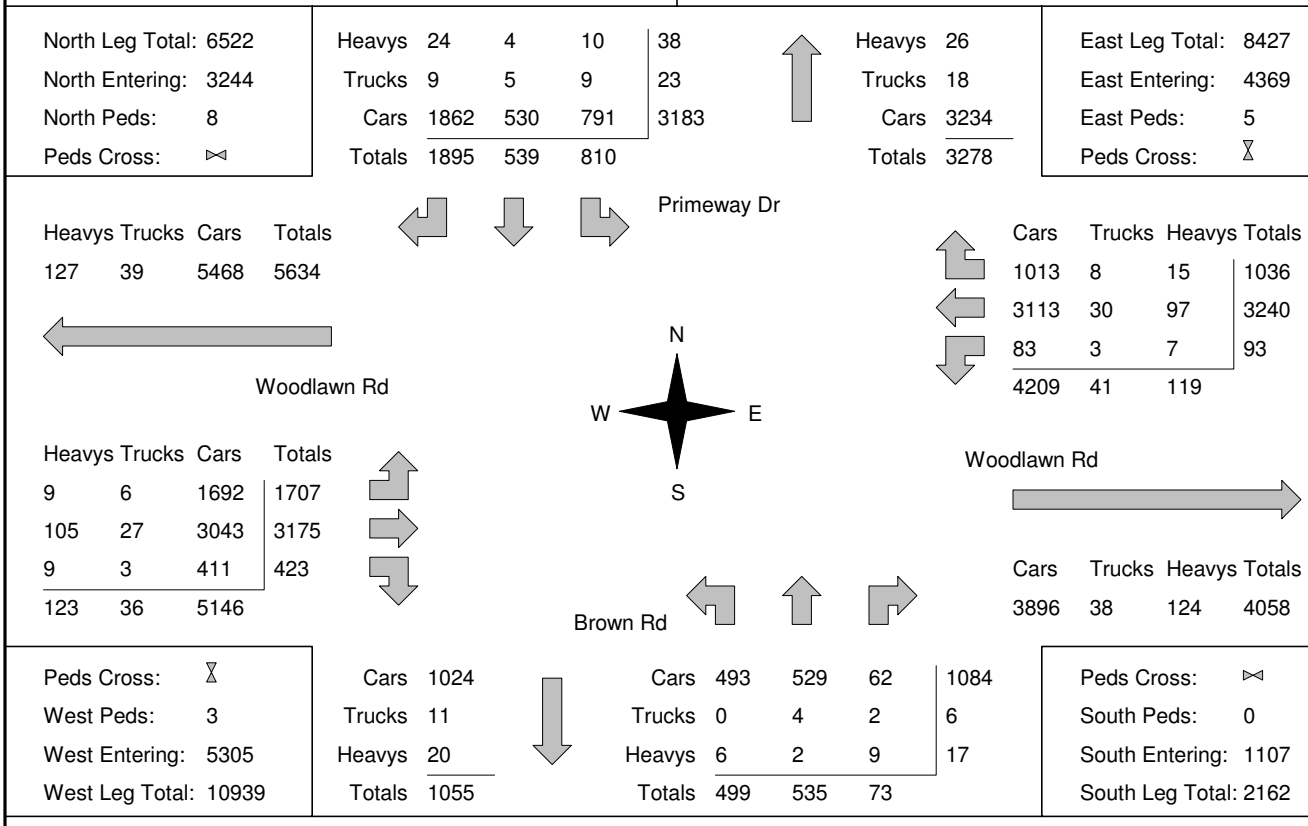
Municipality: Welland
Site #: 0000000004
Intersection: Woodlawn Rd & Brown Rd
TFR File #: 4
Count date: 23-Apr-2024

Weather conditions:
Cloudy/Dry

Person(s) who counted:
Pyramid Traffic Inc

**** Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E



Comments

Woodlawn Rd @ Hwy 406 SB Off Ramp

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 7:45:00
To: 8:45:00

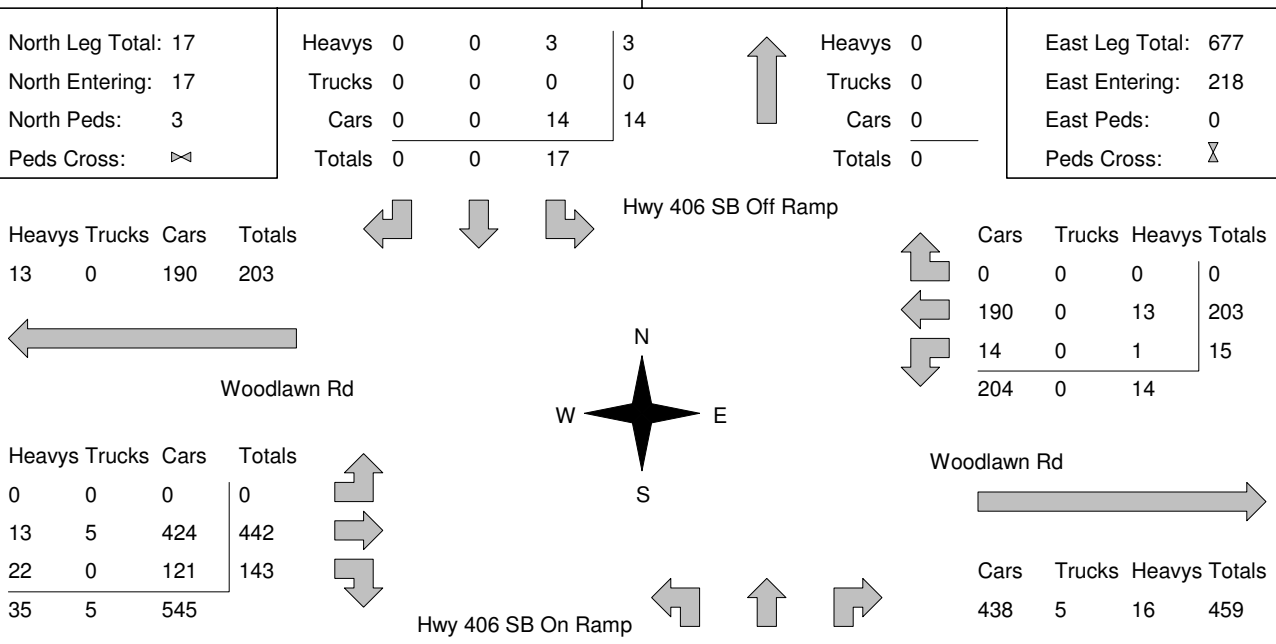
Municipality: Welland
Site #: 0000000001
Intersection: Woodlawn Rd & Hwy 406 SB Off Ra
TFR File #: 1
Count date: 29-May-2024

Weather conditions:
Clear/Dry

Person(s) who counted:
Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E



Comments

Woodlawn Rd @ Hwy 406 SB Off Ramp

Mid-day Peak Diagram

Specified Period
From: 11:00:00
To: 14:00:00

One Hour Peak
From: 12:00:00
To: 13:00:00

Municipality: Welland
Site #: 0000000001
Intersection: Woodlawn Rd & Hwy 406 SB Off Ra
TFR File #: 1
Count date: 29-May-2024

Weather conditions:
Clear/Dry

Person(s) who counted:
Pyramid Traffic Inc

**** Non-Signalized Intersection ****

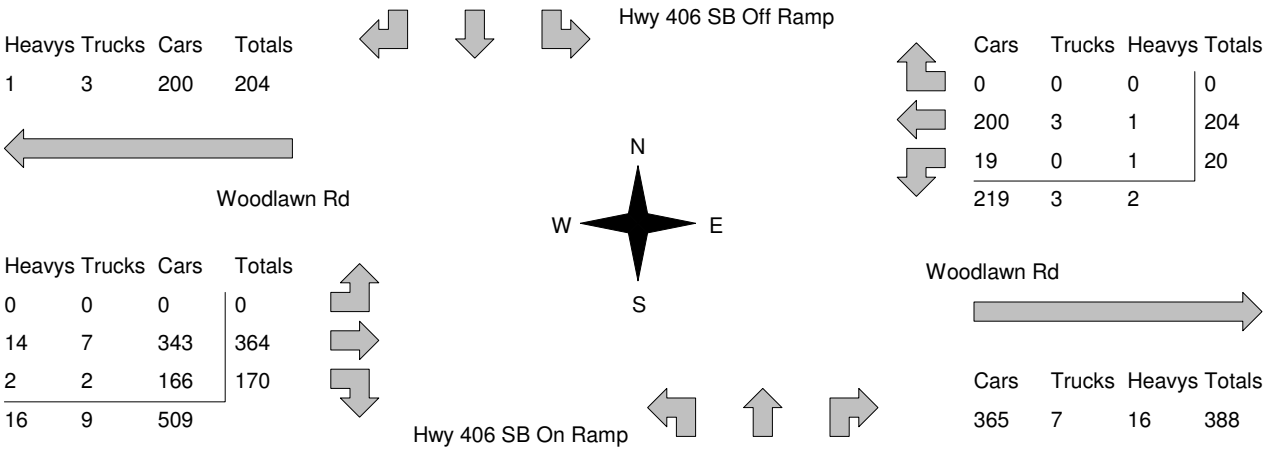
Major Road: Woodlawn Rd runs W/E

North Leg Total: 24
North Entering: 24
North Peds: 6
Peds Cross: ⋈

Heavys	0	0	2	2
Trucks	0	0	0	0
Cars	0	0	22	22
Totals	0	0	24	

Heavys	0
Trucks	0
Cars	0
Totals	0

East Leg Total: 612
East Entering: 224
East Peds: 0
Peds Cross: ⧖



Peds Cross: ⧖
West Peds: 0
West Entering: 534
West Leg Total: 738

Cars	185			
Trucks	2			
Heavys	3			
Totals	190			

Cars	0	0	0	0
Trucks	0	0	0	0
Heavys	0	0	0	0
Totals	0	0	0	

Peds Cross: ⋈
South Peds: 0
South Entering: 0
South Leg Total: 190

Comments

Woodlawn Rd @ Hwy 406 SB Off Ramp

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 15:45:00
To: 16:45:00

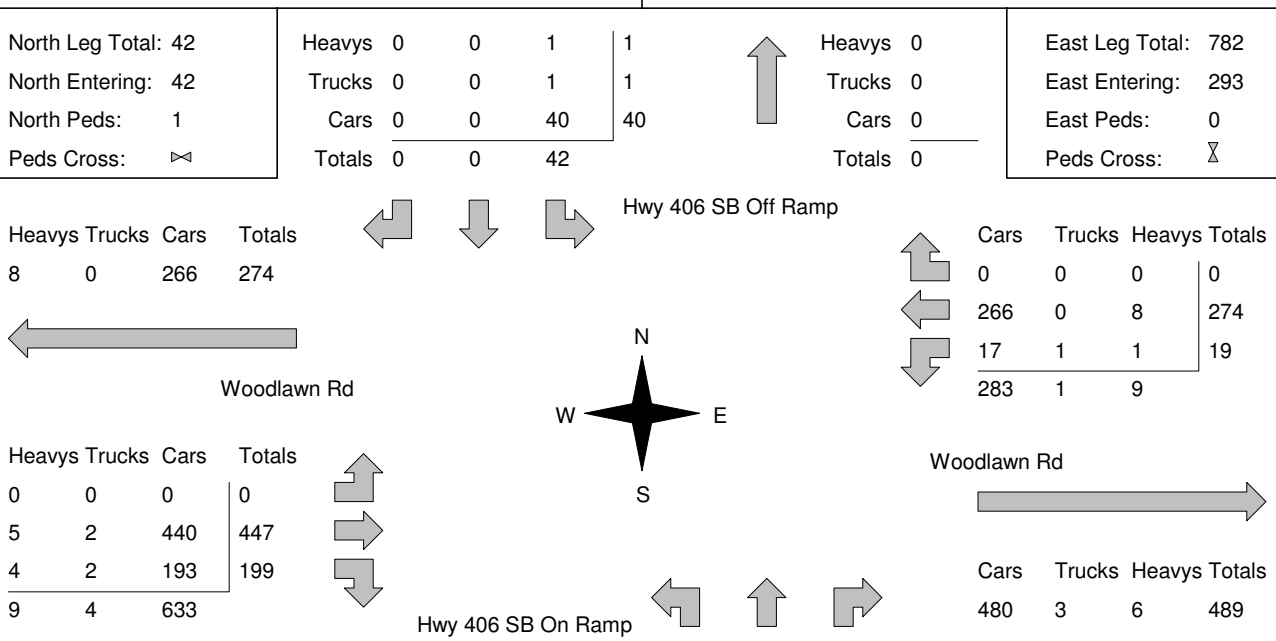
Municipality: Welland
Site #: 0000000001
Intersection: Woodlawn Rd & Hwy 406 SB Off Ra
TFR File #: 1
Count date: 29-May-2024

Weather conditions:
Clear/Dry

Person(s) who counted:
Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E



Comments

Woodlawn Rd @ Hwy 406 SB Off Ramp

Total Count Diagram

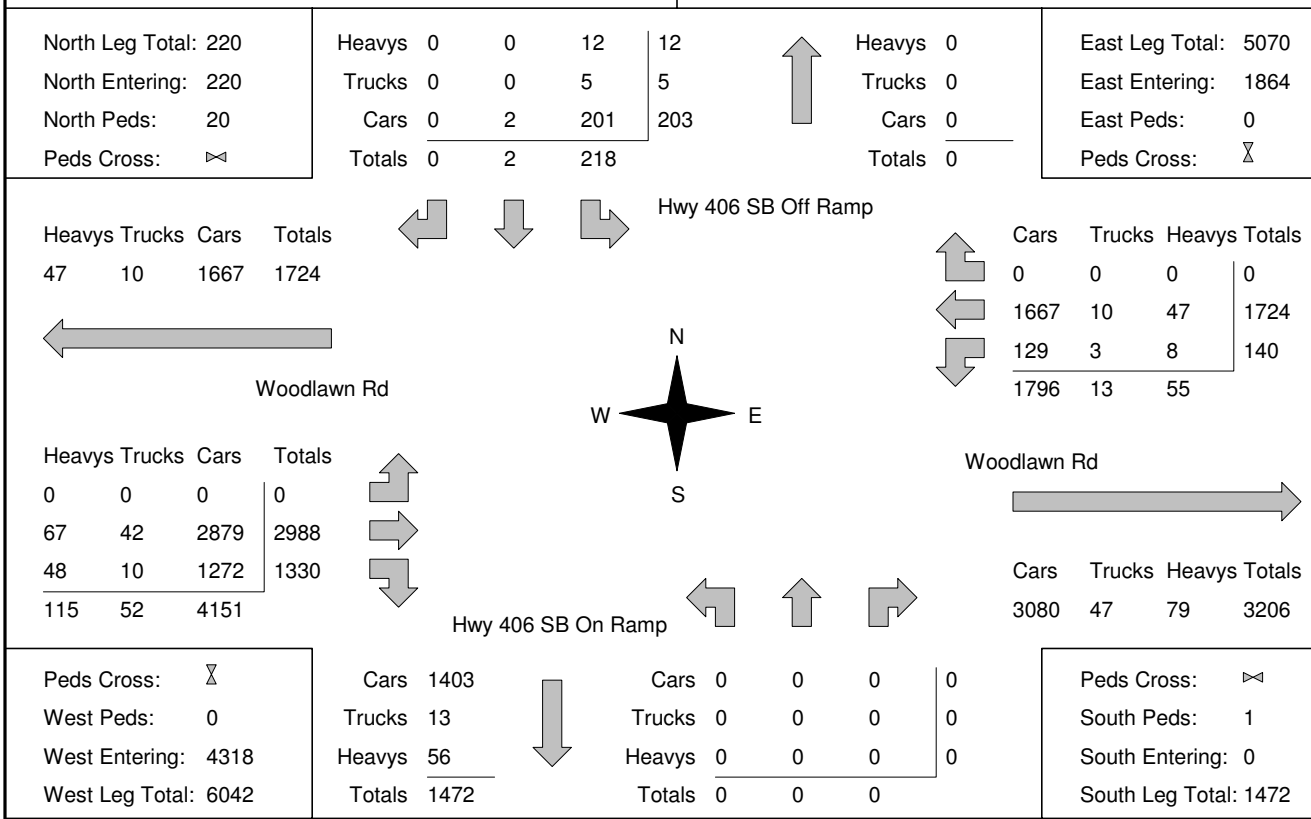
Municipality: Welland
Site #: 0000000001
Intersection: Woodlawn Rd & Hwy 406 SB Off Ra
TFR File #: 1
Count date: 29-May-2024

Weather conditions:
Clear/Dry

Person(s) who counted:
Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E



Comments

Woodlawn Rd @ Hwy 406 NB Off Ramp

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 8:00:00
To: 9:00:00

Municipality: Welland
Site #: 0000000002
Intersection: Woodlawn Rd & Hwy 406 NB Off Ra
TFR File #: 2
Count date: 29-May-2024

Weather conditions:
Clear/Dry

Person(s) who counted:
Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E

North Leg Total: 4
North Entering: 2
North Peds: 2
Peds Cross: ⋈

Heavys	0	0	0	0
Trucks	0	0	0	0
Cars	1	1	0	2
Totals	1	1	0	

Heavys	0
Trucks	0
Cars	2
Totals	2

East Leg Total: 167
East Entering: 114
East Peds: 0
Peds Cross: ⧖

Car Pool

Heavys	Trucks	Cars	Totals
7	0	216	223

Cars	Trucks	Heavys	Totals
0	0	0	0
75	0	1	76
35	1	2	38
110	1	3	

Woodlawn Rd

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Heavys	Trucks	Cars	Totals
0	0	1	1
6	0	33	39
0	0	0	0
6	0	34	

Woodlawn Rd

Cars	Trucks	Heavys	Totals
45	0	8	53

Hwy 406 NB Off Ramp

Peds Cross: ⧖
West Peds: 0
West Entering: 40
West Leg Total: 263

Cars	36
Trucks	1
Heavys	2
Totals	39

Cars	140	1	12	153
Trucks	0	0	0	0
Heavys	6	0	2	8
Totals	146	1	14	

Peds Cross: ⋈
South Peds: 0
South Entering: 161
South Leg Total: 200

Comments

Woodlawn Rd @ Hwy 406 NB Off Ramp

Mid-day Peak Diagram

Specified Period
From: 11:00:00
To: 14:00:00

One Hour Peak
From: 13:00:00
To: 14:00:00

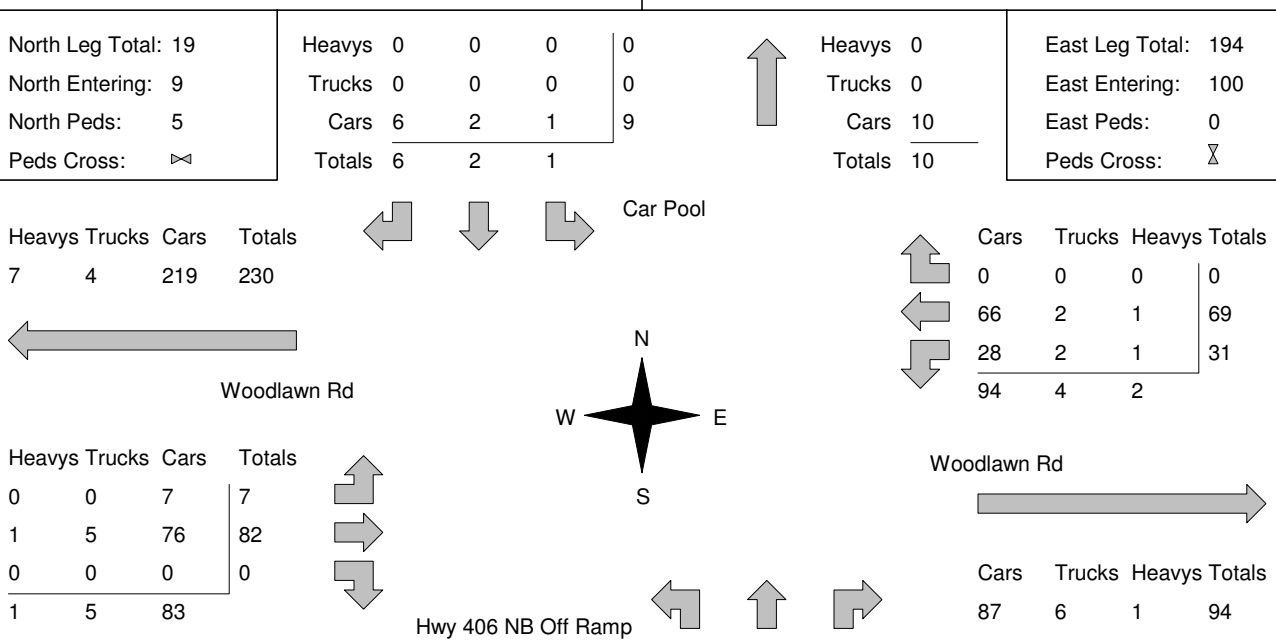
Municipality: Welland
Site #: 0000000002
Intersection: Woodlawn Rd & Hwy 406 NB Off Ra
TFR File #: 2
Count date: 29-May-2024

Weather conditions:
Clear/Dry

Person(s) who counted:
Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E



Comments

Woodlawn Rd @ Hwy 406 NB Off Ramp

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 15:15:00
To: 16:15:00

Municipality: Welland
Site #: 0000000002
Intersection: Woodlawn Rd & Hwy 406 NB Off Ra
TFR File #: 2
Count date: 29-May-2024

Weather conditions:
Clear/Dry

Person(s) who counted:
Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E

North Leg Total: 12
North Entering: 7
North Peds: 2
Peds Cross: ⋈

Heavys	0	0	0	0
Trucks	0	0	0	0
Cars	5	0	2	7
Totals	5	0	2	

Heavys	0
Trucks	0
Cars	5
Totals	5

East Leg Total: 209
East Entering: 88
East Peds: 0
Peds Cross: ⧖

Car Pool

Heavys	Trucks	Cars	Totals
11	1	291	303

Cars	Trucks	Heavys	Totals
1	0	0	1
63	1	3	67
18	1	1	20
82	2	4	

Woodlawn Rd

N
W E
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Heavys	Trucks	Cars	Totals
0	0	4	4
3	1	93	97
0	0	0	0
3	1	97	

Woodlawn Rd

Cars	Trucks	Heavys	Totals
116	1	4	121

Hwy 406 NB Off Ramp

Peds Cross: ⧖
West Peds: 0
West Entering: 101
West Leg Total: 404

Cars	18			
Trucks	1			
Heavys	1			
Totals	20			

Cars	223	0	21	244
Trucks	0	0	0	0
Heavys	8	0	1	9
Totals	231	0	22	

Peds Cross: ⋈
South Peds: 0
South Entering: 253
South Leg Total: 273

Comments

Woodlawn Rd @ Hwy 406 NB Off Ramp

Total Count Diagram

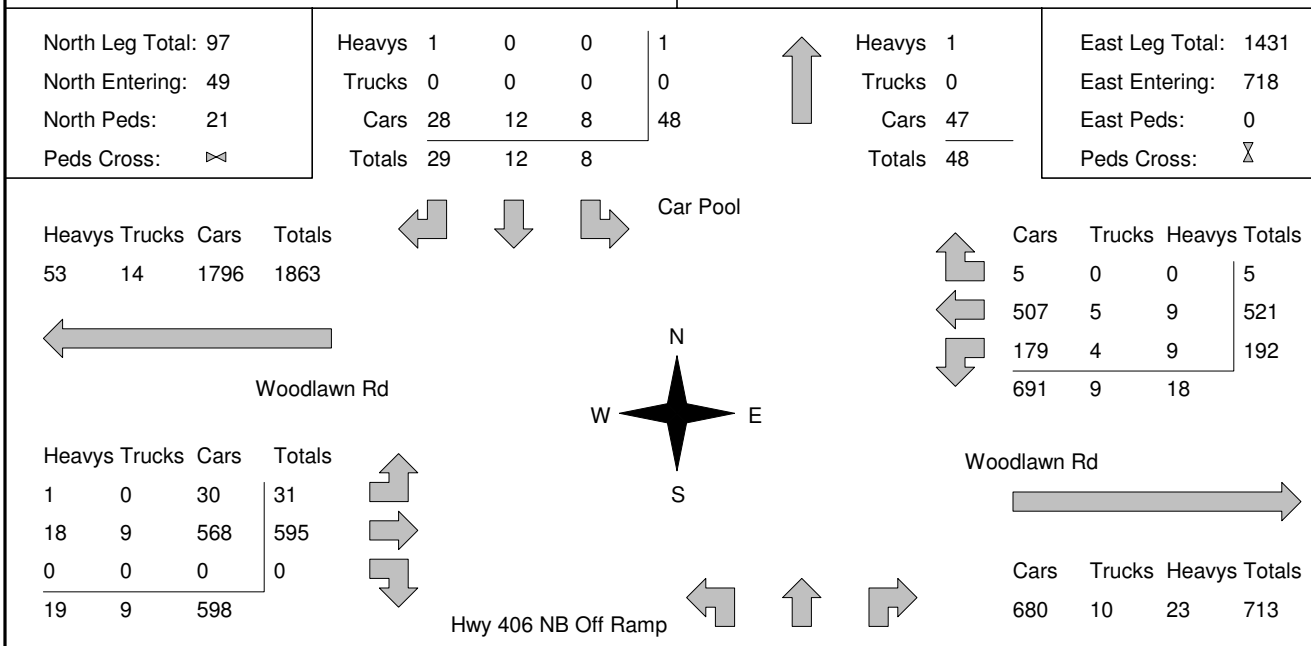
Municipality: Welland
Site #: 0000000002
Intersection: Woodlawn Rd & Hwy 406 NB Off Ra
TFR File #: 2
Count date: 29-May-2024

Weather conditions:
Clear/Dry

Person(s) who counted:
Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E



Comments

Woodlawn Rd @ Primeway Dr

Mid-day Peak Diagram

Specified Period
From: 10:00:00
To: 14:00:00

One Hour Peak
From: 10:45:00
To: 11:45:00

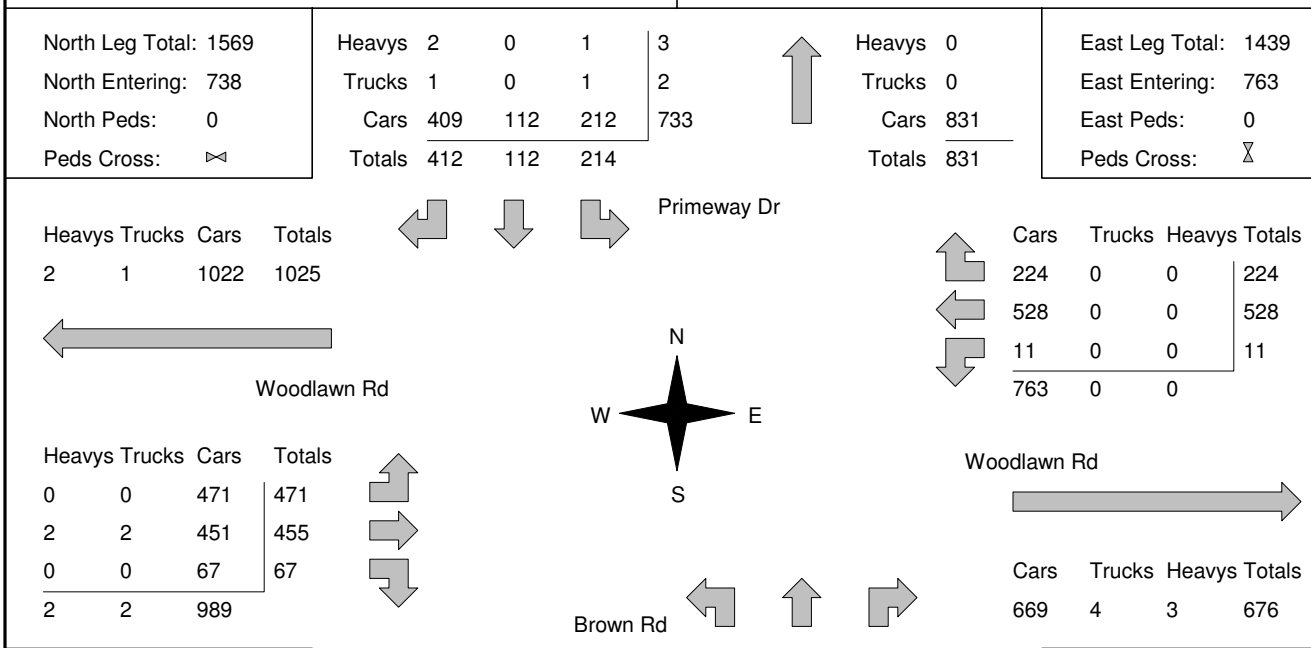
Municipality: Welland
Site #: 0000000001
Intersection: Woodlawn Rd & Primeway Dr
TFR File #: 1
Count date: 15-Jun-2024

Weather conditions:
Clear/Dry

Person(s) who counted:
Pyramid Traffic Inc

**** Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E



Comments

Woodlawn Rd @ Primeway Dr

Total Count Diagram

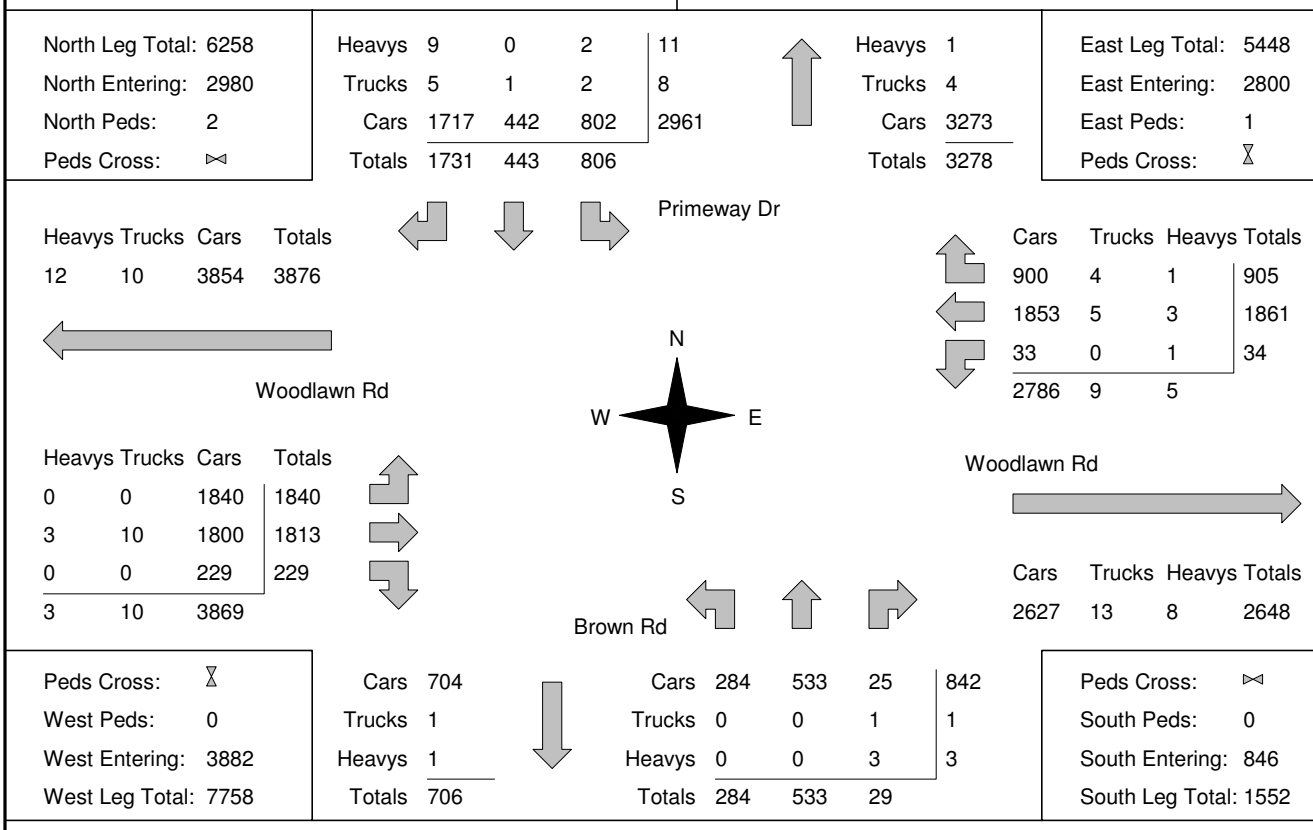
Municipality: Welland
Site #: 0000000001
Intersection: Woodlawn Rd & Primeway Dr
TFR File #: 1
Count date: 15-Jun-2024

Weather conditions:
Clear/Dry

Person(s) who counted:
Pyramid Traffic Inc

**** Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E



Comments

Woodlawn Rd @ Hwy 406 SB Off Ramp

Mid-day Peak Diagram

Specified Period
From: 10:00:00
To: 14:00:00

One Hour Peak
From: 10:45:00
To: 11:45:00

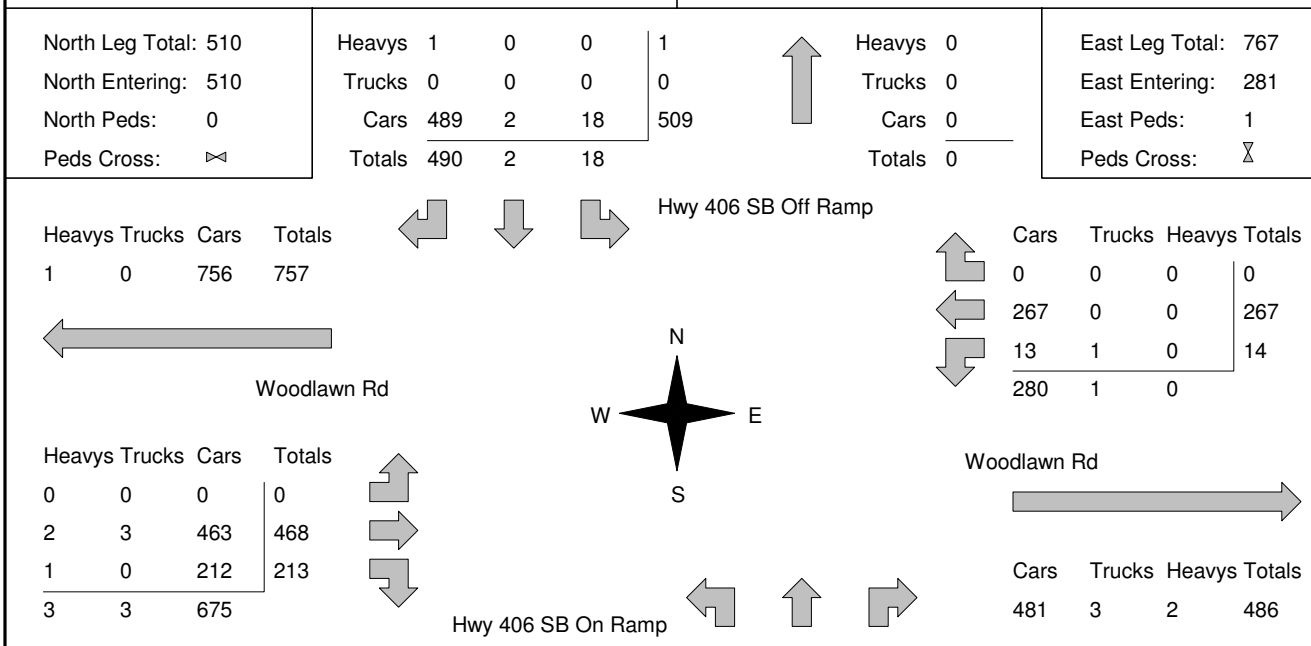
Municipality: Welland
Site #: 0000000002
Intersection: Woodlawn Rd & Hwy 406 SB Ramp
TFR File #: 2
Count date: 15-Jun-2024

Weather conditions:
Clear/Dry

Person(s) who counted:
Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E



Comments

Woodlawn Rd @ Hwy 406 SB Off Ramp

Total Count Diagram

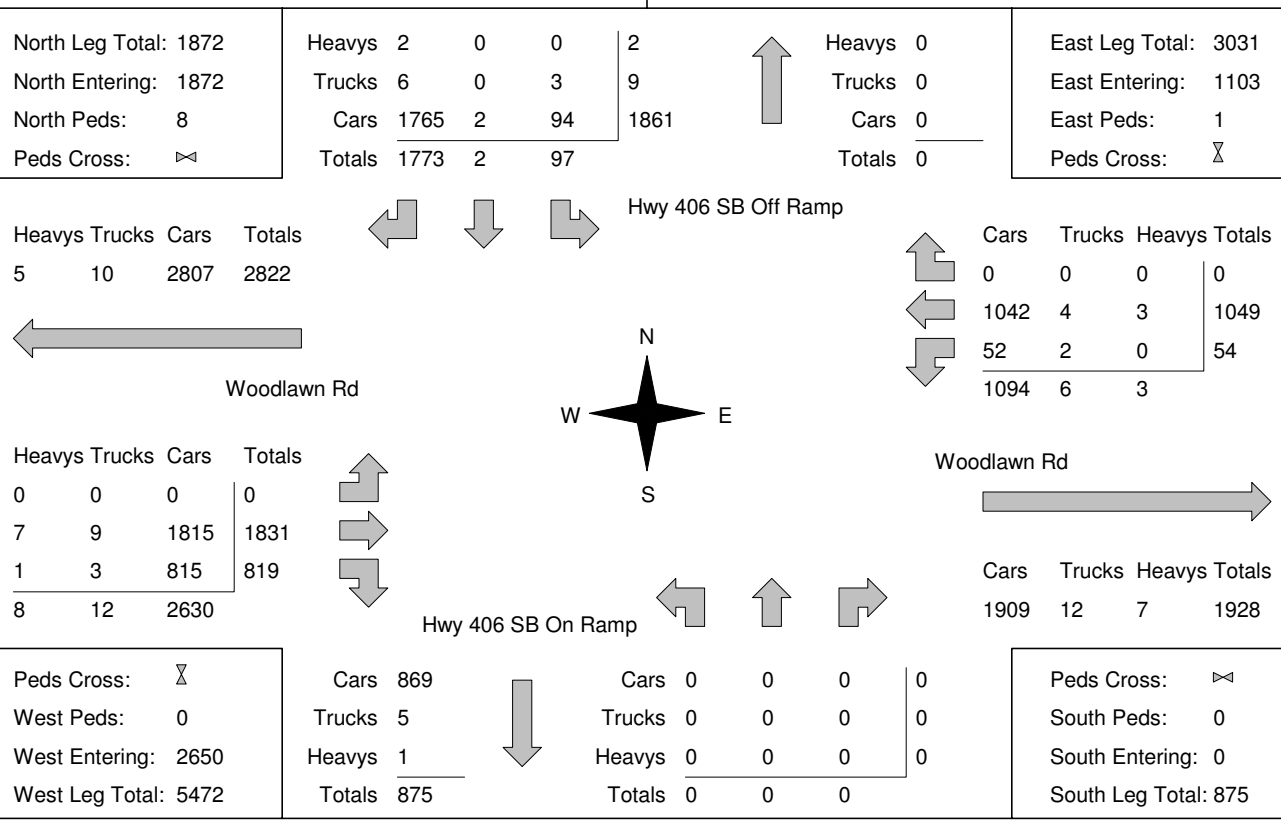
Municipality: Welland
Site #: 0000000002
Intersection: Woodlawn Rd & Hwy 406 SB Ramp
TFR File #: 2
Count date: 15-Jun-2024

Weather conditions:
Clear/Dry

Person(s) who counted:
Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E



Comments

Woodlawn Rd @ Hwy 406 NB Off Ramp

Mid-day Peak Diagram

Specified Period
From: 10:00:00
To: 14:00:00

One Hour Peak
From: 10:30:00
To: 11:30:00

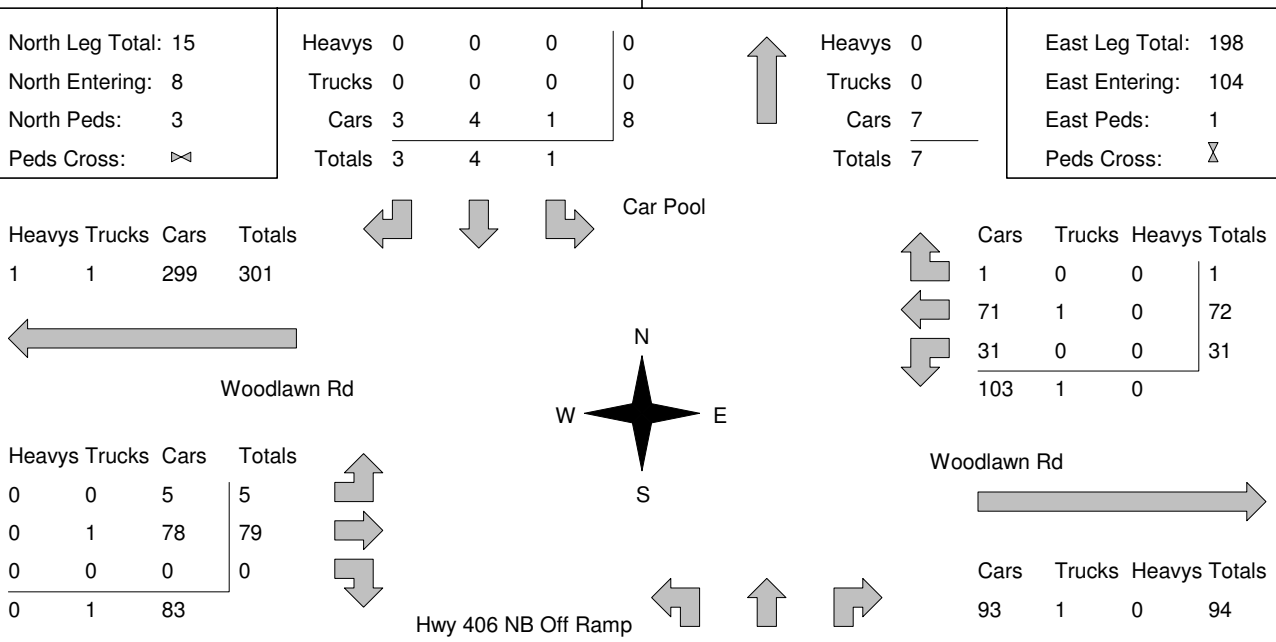
Municipality: Welland
Site #: 0000000003
Intersection: Woodlawn Rd & Hwy 406 NB Off Ra
TFR File #: 3
Count date: 15-Jun-2024

Weather conditions:
Clear/Dry

Person(s) who counted:
Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E



Comments

Woodlawn Rd @ Hwy 406 NB Off Ramp

Total Count Diagram

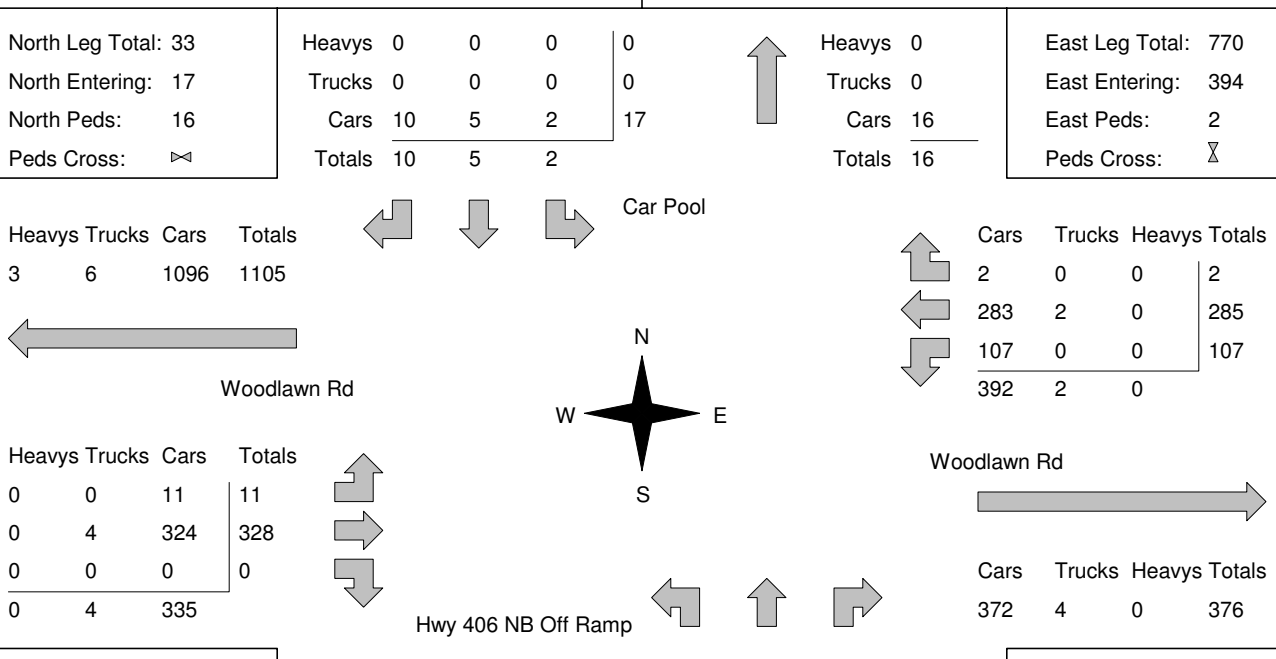
Municipality: Welland
Site #: 0000000003
Intersection: Woodlawn Rd & Hwy 406 NB Off Ra
TFR File #: 3
Count date: 15-Jun-2024

Weather conditions:
Clear/Dry

Person(s) who counted:
Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Woodlawn Rd runs W/E



Comments

APPENDIX 2

Vissim Model Volume Calibration



Existing Conditions Model No Train Volume Calibration										
Period	Intersection			Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph
	No.	Location	Movement	Hourly	Hourly	Volume	Abs. %	Volume	(<5)	(±100)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	90	91	1	1.1%	0.1	Yes	Yes
			EBT	482	487	5	1.0%	0.2	Yes	Yes
			EBR	60	59	-1	1.7%	0.1	Yes	Yes
			NBL	56	61	5	8.2%	0.7	Yes	Yes
			NBT	32	32	0	0.0%	0.0	Yes	Yes
			NBR	11	12	1	8.3%	0.3	Yes	Yes
			SBL	20	22	2	9.1%	0.4	Yes	Yes
			SBT	35	38	3	7.9%	0.5	Yes	Yes
			SBR	79	82	3	3.7%	0.3	Yes	Yes
			WBL	10	9	-1	10.0%	0.3	Yes	Yes
			WBT	528	549	21	3.8%	0.9	Yes	Yes
			WBR	63	68	5	7.4%	0.6	Yes	Yes
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	143	126	-17	11.9%	1.5	Yes	Yes
			EBT	442	394	-48	10.9%	2.3	Yes	Yes
			SBL	17	19	2	10.5%	0.5	Yes	Yes
			WBL	15	15	0	0.0%	0.0	Yes	Yes
			WBT	203	218	15	6.9%	1.0	Yes	Yes
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1	2	1	50.0%	0.8	Yes	Yes
			EBT	39	37	-2	5.1%	0.3	Yes	Yes
			EBR	419	375	-44	10.5%	2.2	Yes	Yes
			NBL	146	154	8	5.2%	0.7	Yes	Yes
			NBT	1	0	-1	100.0%	1.4	Yes	Yes
			NBR	14	16	2	12.5%	0.5	Yes	Yes
			SBL	0	0	0	-	-	-	Yes
			SBT	1	0	-1	100.0%	1.4	Yes	Yes
			SBR	1	2	1	50.0%	0.8	Yes	Yes
			WBL	38	40	2	5.0%	0.3	Yes	Yes
			WBT	76	76	0	0.0%	0.0	Yes	Yes
			WBR	0	0	0	-	-	-	Yes
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	274	279	5	1.8%	0.3	Yes	Yes
			EBT	497	505	8	1.6%	0.4	Yes	Yes
			EBR	70	68	-2	2.9%	0.2	Yes	Yes
			NBL	80	85	5	5.9%	0.6	Yes	Yes
			NBT	64	66	2	3.0%	0.2	Yes	Yes
			NBR	16	18	2	11.1%	0.5	Yes	Yes
			SBL	146	148	2	1.4%	0.2	Yes	Yes
			SBT	90	93	3	3.2%	0.3	Yes	Yes
			SBR	298	295	-3	1.0%	0.2	Yes	Yes
			WBL	18	17	-1	5.6%	0.2	Yes	Yes
			WBT	533	549	16	2.9%	0.7	Yes	Yes
			WBR	179	187	8	4.3%	0.6	Yes	Yes
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	199	211	12	5.7%	0.8	Yes	Yes
			EBT	447	458	11	2.4%	0.5	Yes	Yes
			SBL	42	45	3	6.7%	0.5	Yes	Yes
			WBL	19	19	0	0.0%	0.0	Yes	Yes
			WBT	274	289	15	5.2%	0.9	Yes	Yes
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	4	2	-2	50.0%	1.2	Yes	Yes
			EBT	97	99	2	2.0%	0.2	Yes	Yes
			EBR	388	402	14	3.5%	0.7	Yes	Yes
			NBL	231	236	5	2.1%	0.3	Yes	Yes
			NBT	0	0	0	-	-	-	Yes
			NBR	22	22	0	0.0%	0.0	Yes	Yes
			SBL	2	2	0	0.0%	0.0	Yes	Yes
			SBT	0	0	0	-	-	-	Yes
			SBR	5	5	0	0.0%	0.0	Yes	Yes
			WBL	20	21	1	4.8%	0.2	Yes	Yes
			WBT	67	68	1	1.5%	0.1	Yes	Yes
			WBR	1	1	0	0.0%	0.0	Yes	Yes
SAT Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	471	475	4	0.8%	0.2	Yes	Yes
			EBT	455	459	4	0.9%	0.2	Yes	Yes
			EBR	67	67	0	0.0%	0.0	Yes	Yes
			NBL	85	89	4	4.5%	0.4	Yes	Yes
			NBT	136	141	5	3.5%	0.4	Yes	Yes
			NBR	7	8	1	12.5%	0.4	Yes	Yes
			SBL	214	211	-3	1.4%	0.2	Yes	Yes
			SBT	112	113	1	0.9%	0.1	Yes	Yes
			SBR	412	417	5	1.2%	0.2	Yes	Yes
			WBL	11	11	0	0.0%	0.0	Yes	Yes
			WBT	528	542	14	2.6%	0.6	Yes	Yes
			WBR	224	234	10	4.3%	0.7	Yes	Yes
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	213	217	4	1.8%	0.3	Yes	Yes
			EBT	468	461	-7	1.5%	0.3	Yes	Yes
			SBL	18	19	1	5.3%	0.2	Yes	Yes
			WBL	14	14	0	0.0%	0.0	Yes	Yes
			WBT	267	285	18	6.3%	1.1	Yes	Yes
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	5	3	-2	40.0%	1.0	Yes	Yes
			EBT	79	76	-3	3.8%	0.3	Yes	Yes
			EBR	402	402	0	0.0%	0.0	Yes	Yes
			NBL	226	226	0	0.0%	0.0	Yes	Yes
			NBT	1	0	-1	100.0%	1.4	Yes	Yes
			NBR	14	22	8	36.4%	1.9	Yes	Yes
			SBL	1	1	0	0.0%	0.0	Yes	Yes
			SBT	4	4	0	0.0%	0.0	Yes	Yes
			SBR	3	2	-1	33.3%	0.6	Yes	Yes
			WBL	31	33	2	6.1%	0.4	Yes	Yes
			WBT	71	72	1	1.4%	0.1	Yes	Yes
			WBR	1	1	0	0.0%	0.0	Yes	Yes

Existing Conditions Model With Train Volume Calibration										
Period	Intersection			Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph
	No.	Location	Movement	Hourly	Hourly	Volume	Abs. %	Volume	(<5)	(±100)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	90	91	1	1.1%	0.1	Yes	Yes
			EBT	482	487	5	1.0%	0.2	Yes	Yes
			EBR	60	59	-1	1.7%	0.1	Yes	Yes
			NBL	56	61	5	8.2%	0.7	Yes	Yes
			NBT	32	32	0	0.0%	0.0	Yes	Yes
			NBR	11	12	1	8.3%	0.3	Yes	Yes
			SBL	20	22	2	9.1%	0.4	Yes	Yes
			SBT	35	38	3	7.9%	0.5	Yes	Yes
			SBR	79	82	3	3.7%	0.3	Yes	Yes
			WBL	10	9	-1	10.0%	0.3	Yes	Yes
			WBT	528	549	21	3.8%	0.9	Yes	Yes
			WBR	63	68	5	7.4%	0.6	Yes	Yes
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	143	126	-17	11.9%	1.5	Yes	Yes
			EBT	442	394	-48	10.9%	2.3	Yes	Yes
			SBL	17	19	2	10.5%	0.5	Yes	Yes
			WBL	15	15	0	0.0%	0.0	Yes	Yes
			WBT	203	218	15	6.9%	1.0	Yes	Yes
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1	2	1	50.0%	0.8	Yes	Yes
			EBT	39	37	-2	5.1%	0.3	Yes	Yes
			EBR	419	375	-44	10.5%	2.2	Yes	Yes
			NBL	146	154	8	5.2%	0.7	Yes	Yes
			NBT	1	0	-1	100.0%	1.4	Yes	Yes
			NBR	14	16	2	12.5%	0.5	Yes	Yes
			SBL	0	0	0	-	-	-	Yes
			SBT	1	0	-1	100.0%	1.4	Yes	Yes
			SBR	1	2	1	50.0%	0.8	Yes	Yes
			WBL	38	40	2	5.0%	0.3	Yes	Yes
			WBT	76	76	0	0.0%	0.0	Yes	Yes
			WBR	0	0	0	-	-	-	Yes
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	274	279	5	1.8%	0.3	Yes	Yes
			EBT	497	505	8	1.6%	0.4	Yes	Yes
			EBR	70	68	-2	2.9%	0.2	Yes	Yes
			NBL	80	85	5	5.9%	0.6	Yes	Yes
			NBT	64	66	2	3.0%	0.2	Yes	Yes
			NBR	16	18	2	11.1%	0.5	Yes	Yes
			SBL	146	148	2	1.4%	0.2	Yes	Yes
			SBT	90	93	3	3.2%	0.3	Yes	Yes
			SBR	298	295	-3	1.0%	0.2	Yes	Yes
			WBL	18	17	-1	5.6%	0.2	Yes	Yes
			WBT	533	549	16	2.9%	0.7	Yes	Yes
			WBR	179	187	8	4.3%	0.6	Yes	Yes
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	199	211	12	5.7%	0.8	Yes	Yes
			EBT	447	458	11	2.4%	0.5	Yes	Yes
			SBL	42	45	3	6.7%	0.5	Yes	Yes
			WBL	19	19	0	0.0%	0.0	Yes	Yes
			WBT	274	289	15	5.2%	0.9	Yes	Yes
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	4	2	-2	50.0%	1.2	Yes	Yes
			EBT	97	99	2	2.0%	0.2	Yes	Yes
			EBR	388	402	14	3.5%	0.7	Yes	Yes
			NBL	231	236	5	2.1%	0.3	Yes	Yes
			NBT	0	0	0	-	-	-	Yes
			NBR	22	22	0	0.0%	0.0	Yes	Yes
			SBL	2	2	0	0.0%	0.0	Yes	Yes
			SBT	0	0	0	-	-	-	Yes
			SBR	5	5	0	0.0%	0.0	Yes	Yes
			WBL	20	21	1	4.8%	0.2	Yes	Yes
			WBT	67	68	1	1.5%	0.1	Yes	Yes
			WBR	1	1	0	0.0%	0.0	Yes	Yes

Future Total (2051) Conditions Model No Train Volume Calibration											
Period	Intersection			Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph	700vph<Flow<2700 vph
	No.	Locat on	Movement	Hour y	Hour y	Vo ume	Abs %	Vo ume	(<5)	(±100)	(±15%)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	143	145	2	1.4%	0.2	Yes	Yes	-
			EBT	853	859	6	0.7%	0.2	Yes	-	Yes
			EBR	95	95	0	0.0%	0.0	Yes	Yes	-
			NBL	89	94	5	5.3%	0.5	Yes	Yes	-
			NBT	50	51	1	2.0%	0.1	Yes	Yes	-
			NBR	18	19	1	5.3%	0.2	Yes	Yes	-
			SBL	32	34	2	5.9%	0.3	Yes	Yes	-
			SBT	56	57	1	1.8%	0.1	Yes	Yes	-
			SBR	127	128	1	0.8%	0.1	Yes	Yes	-
			WBL	16	15	-1	6.3%	0.3	Yes	Yes	-
			WBT	1074	1070	-4	0.4%	0.1	Yes	-	Yes
			WBR	101	103	2	1.9%	0.2	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	228	208	-20	8.8%	1.4	Yes	Yes	-
			EBT	790	700	-90	11.4%	3.3	Yes	-	Yes
			SBL	100	99	-1	1.0%	0.1	Yes	Yes	-
			WBL	225	215	-10	4.4%	0.7	Yes	Yes	-
			WBT	557	538	-19	3.4%	0.8	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1	0	-1	100.0%	1.4	Yes	Yes	-
			EBT	220	207	-13	5.9%	0.9	Yes	Yes	-
			EBR	667	595	-72	10.8%	2.9	Yes	Yes	-
			NBL	233	235	2	0.9%	0.1	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	96	101	5	5.0%	0.5	Yes	Yes	-
			SBL	0	2	2	-	-	-	Yes	-
			SBT	1	1	0	0.0%	-	-	Yes	-
			SBR	1	0	-1	100.0%	-	-	Yes	-
			WBL	271	256	-15	5.5%	0.9	Yes	Yes	-
			WBT	555	517	-38	6.8%	1.6	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	24	28	4	14.3%	0.8	Yes	Yes	-
			EBT	98	101	3	3.0%	0.3	Yes	Yes	-
			EBR	163	178	15	8.4%	1.1	Yes	Yes	-
			NBL	437	441	4	0.9%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	70	74	4	5.4%	0.5	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	251	255	4	1.6%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	436	436	0	0.0%	0.0	Yes	Yes	-
			EBT	1060	1064	4	0.4%	0.1	Yes	Yes	Yes
			EBR	111	111	0	0.0%	0.0	Yes	Yes	-
			NBL	128	131	3	2.3%	0.3	Yes	Yes	-
			NBT	102	102	0	0.0%	0.0	Yes	Yes	-
			NBR	26	28	2	7.1%	0.4	Yes	Yes	-
			SBL	233	231	-2	0.9%	0.1	Yes	Yes	-
			SBT	143	145	2	1.4%	0.2	Yes	Yes	-
			SBR	474	483	9	1.9%	0.4	Yes	Yes	-
			WBL	28	25	-3	10.7%	0.6	Yes	Yes	-
			WBT	1014	1011	-3	0.3%	0.1	Yes	-	Yes
			WBR	285	286	1	0.3%	0.1	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	317	326	9	2.8%	0.5	Yes	Yes	-
			EBT	980	995	15	1.5%	0.5	Yes	Yes	-
			SBL	305	312	7	2.2%	0.4	Yes	Yes	-
			WBL	175	169	-6	3.4%	0.5	Yes	Yes	-
			WBT	602	589	-13	2.2%	0.5	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	6	3	-3	50.0%	1.4	Yes	Yes	-
			EBT	661	680	19	2.8%	0.7	Yes	Yes	-
			EBR	618	625	7	1.1%	0.3	Yes	Yes	-
			NBL	368	362	-6	1.6%	0.3	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	268	277	9	3.2%	0.5	Yes	Yes	-
			SBL	2	6	4	66.7%	2.0	Yes	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	7	2	-5	71.4%	2.4	Yes	Yes	-
			WBL	177	164	-13	7.3%	1.0	Yes	Yes	-
			WBT	419	388	-31	7.4%	1.5	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	79	91	12	13.2%	1.3	Yes	Yes	-
			EBT	278	307	29	9.4%	1.7	Yes	Yes	-
			EBR	503	561	58	10.3%	2.5	Yes	Yes	-
			NBL	319	321	2	0.6%	0.1	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	47	48	1	2.1%	0.1	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	179	183	4	2.2%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
SAT Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	751	714	-37	4.9%	1.4	Yes	-	Yes
			EBT	962	924	-38	4.0%	1.2	Yes	-	Yes
			EBR	107	108	1	0.9%	0.1	Yes	Yes	-
			NBL	135	141	6	4.3%	0.5	Yes	Yes	-
			NBT	217	218	1	0.5%	0.1	Yes	Yes	-
			NBR	12	12	0	0.0%	0.0	Yes	Yes	-
			SBL	340	324	-16	4.7%	0.9	Yes	Yes	-
			SBT	178	181	3	1.7%	0.2	Yes	Yes	-
			SBR	657	650	-7	1.1%	0.3	Yes	Yes	-
			WBL	18	17	-1	5.6%	0.2	Yes	Yes	-
			WBT	1053	1049	-4	0.4%	0.1	Yes	-	Yes
			WBR	357	362	5	1.4%	0.3	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	339	325	-14	4.1%	0.8	Yes	Yes	-
			EBT	983	929	-54	5.5%	1.7	Yes	-	Yes
			SBL	232	236	4	1.7%	0.3	Yes	Yes	-
			WBL	207	204	-3	1.4%	0.2	Yes	Yes	-
			WBT	637	639	2	0.3%	0.1	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	7	4	-3	42.9%	1.3	Yes	Yes	-
			EBT	568	560	-8	1.4%	0.3	Yes	Yes	-
			EBR	640	602	-38	5.9%	1.5	Yes	Yes	-
			NBL	360	358	-2	0.6%	0.1	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	229	235	6	2.6%	0.4	Yes	Yes	-
			SBL	1	1	0	0.0%	0.0	Yes	Yes	-
			SBT	6	6	0	0.0%	0.0	Yes	Yes	-
			SBR	5	5	0	0.0%	0.0	Yes	Yes	-
			WBL	231	217	-14	6.1%	0.9	Yes	Yes	-
			WBT	512	479	-33	6.4%	1.5	Yes	Yes	-
			WBR	1	1	0	0.0%	0.0	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	65	71	6	8.5%	0.7	Yes	Yes	-
			EBT	223	220	-3	1.3%	0.2	Yes	Yes	-
			EBR	454	490	36	7.3%	1.7	Yes	Yes	-
			NBL	411	413	2	0.5%	0.1	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	56	64	8	12.5%	1.0	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	216	234	18	7.7%	1.2	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-

Future Total (2051) Conditions Model With Train Volume Calibration											
Period	Intersection			Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph	700vph<Flow<2700 vph
	No.	Locat on	Movement	Hour y	Hour y	Vo ume	Abs %	Vo ume	(<5)	(±100)	(±15%)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	143	145	2	1.4%	0.2	Yes	Yes	-
			EBT	853	859	6	0.7%	0.2	Yes	-	Yes
			EBR	95	95	0	0.0%	0.0	Yes	Yes	-
			NBL	89	94	5	5.3%	0.5	Yes	Yes	-
			NBT	50	51	1	2.0%	0.1	Yes	Yes	-
			NBR	18	19	1	5.3%	0.2	Yes	Yes	-
			SBL	32	34	2	5.9%	0.3	Yes	Yes	-
			SBT	56	57	1	1.8%	0.1	Yes	Yes	-
			SBR	127	128	1	0.8%	0.1	Yes	Yes	-
			WBL	16	15	-1	6.3%	0.3	Yes	Yes	-
			WBT	1074	1070	-4	0.4%	0.1	Yes	-	Yes
			WBR	101	103	2	1.9%	0.2	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	228	209	-19	8.3%	1.3	Yes	Yes	-
			EBT	790	701	-89	11.3%	3.3	Yes	-	Yes
			SBL	100	100	0	0.0%	0.0	Yes	Yes	-
			WBL	225	216	-9	4.0%	0.6	Yes	Yes	-
			WBT	557	539	-18	3.2%	0.8	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1	0	-1	100.0%	1.4	Yes	Yes	-
			EBT	220	207	-13	5.9%	0.9	Yes	Yes	-
			EBR	667	595	-72	10.8%	2.9	Yes	Yes	-
			NBL	233	236	3	1.3%	0.2	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	96	101	5	5.0%	0.5	Yes	Yes	-
			SBL	0	2	2	-	-	-	Yes	-
			SBT	1	1	0	0.0%	-	-	Yes	-
			SBR	1	0	-1	100.0%	-	-	Yes	-
			WBL	271	255	-16	5.9%	1.0	Yes	Yes	-
			WBT	555	516	-39	7.0%	1.7	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	24	28	4	14.3%	0.8	Yes	Yes	-
			EBT	98	102	4	3.9%	0.4	Yes	Yes	-
			EBR	163	178	15	8.4%	1.1	Yes	Yes	-
			NBL	437	441	4	0.9%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	70	74	4	5.4%	0.5	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	251	255	4	1.6%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	436	434	-2	0.5%	0.1	Yes	Yes	-
			EBT	1060	1059	-1	0.1%	0.0	Yes	-	Yes
			EBR	111	111	0	0.0%	0.0	Yes	Yes	-
			NBL	128	132	4	3.0%	0.4	Yes	Yes	-
			NBT	102	102	0	0.0%	0.0	Yes	Yes	-
			NBR	26	28	2	7.1%	0.4	Yes	Yes	-
			SBL	233	232	-1	0.4%	0.1	Yes	Yes	-
			SBT	143	145	2	1.4%	0.2	Yes	Yes	-
			SBR	474	485	11	2.3%	0.5	Yes	Yes	-
			WBL	28	26	-2	7.1%	0.4	Yes	Yes	-
			WBT	1014	1009	-5	0.5%	0.2	Yes	-	Yes
			WBR	285	285	0	0.0%	0.0	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	317	326	9	2.8%	0.5	Yes	Yes	-
			EBT	980	997	17	1.7%	0.5	Yes	-	Yes
			SBL	305	311	6	1.9%	0.3	Yes	Yes	-
			WBL	175	169	-6	3.4%	0.5	Yes	Yes	-
			WBT	602	589	-13	2.2%	0.5	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	6	3	-3	50.0%	1.4	Yes	Yes	-
			EBT	661	680	19	2.8%	0.7	Yes	Yes	-
			EBR	618	626	8	1.3%	0.3	Yes	Yes	-
			NBL	368	361	-7	1.9%	0.4	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	268	276	8	2.9%	0.5	Yes	Yes	-
			SBL	2	6	4	66.7%	2.0	Yes	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	7	2	-5	71.4%	2.4	Yes	Yes	-
			WBL	177	164	-13	7.3%	1.0	Yes	Yes	-
			WBT	419	389	-30	7.2%	1.5	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	79	91	12	13.2%	1.3	Yes	Yes	-
			EBT	278	307	29	9.4%	1.7	Yes	Yes	-
			EBR	503	560	57	10.2%	2.5	Yes	Yes	-
			NBL	319	322	3	0.9%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	47	48	1	2.1%	0.1	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	179	183	4	2.2%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-

Future Total (2051) Conditions Model Increased Residential Density (+10%) No Train Volume Calibration											
Period	Intersection			Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph	700vph<Flow<2700 vph
	No.	Locat on	Movement	Hour y	Hour y	Vo ume	Abs %	Vo ume	(<5)	(±100)	(±15%)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	143	146	3	2.1%	0.2	Yes	Yes	-
			EBT	859	868	9	1.0%	0.3	Yes	-	Yes
			EBR	95	96	1	1.0%	0.1	Yes	Yes	-
			NBL	89	94	5	5.3%	0.5	Yes	Yes	-
			NBT	50	51	1	2.0%	0.1	Yes	Yes	-
			NBR	18	19	1	5.3%	0.2	Yes	Yes	-
			SBL	32	34	2	5.9%	0.3	Yes	Yes	-
			SBT	56	57	1	1.8%	0.1	Yes	Yes	-
			SBR	127	128	1	0.8%	0.1	Yes	Yes	-
			WBL	16	15	-1	6.3%	0.3	Yes	Yes	-
			WBT	1095	1092	-3	0.3%	0.1	Yes	-	Yes
			WBR	101	103	2	1.9%	0.2	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	228	184	-44	19.3%	3.1	Yes	Yes	-
			EBT	796	732	-64	8.0%	2.3	Yes	-	Yes
			SBL	107	108	1	0.9%	0.1	Yes	Yes	-
			WBL	243	232	-11	4.5%	0.7	Yes	Yes	-
			WBT	578	559	-19	3.3%	0.8	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1	0	-1	100.0%	1.4	Yes	Yes	-
			EBT	233	207	-26	11.2%	1.8	Yes	Yes	-
			EBR	667	634	-33	4.9%	1.3	Yes	Yes	-
			NBL	233	234	1	0.4%	0.1	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	102	107	5	4.7%	0.5	Yes	Yes	-
			SBL	0	2	2	-	-	-	Yes	-
			SBT	1	1	0	0.0%	-	-	Yes	-
			SBR	1	0	-1	100.0%	-	-	Yes	-
			WBL	290	272	-18	6.2%	1.1	Yes	Yes	-
			WBT	594	556	-38	6.4%	1.6	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	27	30	3	10.0%	0.6	Yes	Yes	-
			EBT	103	102	-1	1.0%	0.1	Yes	Yes	-
			EBR	174	182	8	4.4%	0.6	Yes	Yes	-
			NBL	469	473	4	0.8%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	82	84	2	2.4%	0.2	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	265	270	5	1.9%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	436	436	0	0.0%	0.0	Yes	Yes	-
			EBT	1084	1086	2	0.2%	0.1	Yes	-	Yes
			EBR	111	111	0	0.0%	0.0	Yes	Yes	-
			NBL	128	131	3	2.3%	0.3	Yes	Yes	-
			NBT	102	102	0	0.0%	0.0	Yes	Yes	-
			NBR	26	28	2	7.1%	0.4	Yes	Yes	-
			SBL	233	230	-3	1.3%	0.2	Yes	Yes	-
			SBT	143	145	2	1.4%	0.2	Yes	Yes	-
			SBR	474	484	10	2.1%	0.5	Yes	Yes	-
			WBL	28	26	-2	7.1%	0.4	Yes	Yes	-
			WBT	1029	1025	-4	0.4%	0.1	Yes	-	Yes
			WBR	285	288	3	1.0%	0.2	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	317	328	11	3.4%	0.6	Yes	Yes	-
			EBT	1003	1019	16	1.6%	0.5	Yes	Yes	-
			SBL	305	334	29	8.7%	1.6	Yes	Yes	-
			WBL	186	181	-5	2.7%	0.4	Yes	Yes	-
			WBT	617	608	-9	1.5%	0.4	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	6	3	-3	50.0%	1.4	Yes	Yes	-
			EBT	706	726	20	2.8%	0.7	Yes	Yes	-
			EBR	618	625	7	1.1%	0.3	Yes	Yes	-
			NBL	368	363	-5	1.4%	0.3	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	288	295	7	2.4%	0.4	Yes	Yes	-
			SBL	2	6	4	66.7%	2.0	Yes	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	7	2	-5	71.4%	2.4	Yes	Yes	-
			WBL	190	175	-15	7.9%	1.1	Yes	Yes	-
			WBT	445	418	-27	6.1%	1.3	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	92	106	14	13.2%	1.4	Yes	Yes	-
			EBT	289	316	27	8.5%	1.6	Yes	Yes	-
			EBR	544	604	60	9.9%	2.5	Yes	Yes	-
			NBL	341	347	6	1.7%	0.3	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	55	56	1	1.8%	0.1	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	189	193	4	2.1%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
SAT Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	751	716	-35	4.7%	1.3	Yes	Yes	Yes
			EBT	981	925	-56	5.7%	1.8	Yes	Yes	Yes
			EBR	107	107	0	0.0%	0.0	Yes	Yes	-
			NBL	135	142	7	4.9%	0.6	Yes	Yes	-
			NBT	217	220	3	1.4%	0.2	Yes	Yes	-
			NBR	12	12	0	0.0%	0.0	Yes	Yes	-
			SBL	340	321	-19	5.6%	1.0	Yes	Yes	-
			SBT	178	180	2	1.1%	0.1	Yes	Yes	-
			SBR	657	649	-8	1.2%	0.3	Yes	Yes	-
			WBL	18	17	-1	5.6%	0.2	Yes	Yes	-
			WBT	1071	1078	7	0.6%	0.2	Yes	-	Yes
			WBR	357	373	16	4.3%	0.8	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	339	327	-12	3.5%	0.7	Yes	Yes	-
			EBT	1003	936	-67	6.7%	2.2	Yes	-	Yes
			SBL	250	242	-8	3.2%	0.5	Yes	Yes	-
			WBL	223	213	-10	4.5%	0.7	Yes	Yes	-
			WBT	655	669	14	2.1%	0.5	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	7	4	-3	42.9%	1.3	Yes	Yes	-
			EBT	605	566	-39	6.4%	1.6	Yes	Yes	-
			EBR	640	608	-32	5.0%	1.3	Yes	Yes	-
			NBL	360	365	5	1.4%	0.3	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	246	243	-3	1.2%	0.2	Yes	Yes	-
			SBL	1	1	0	0.0%	0.0	Yes	Yes	-
			SBT	6	6	0	0.0%	0.0	Yes	Yes	-
			SBR	5	5	0	0.0%	0.0	Yes	Yes	-
			WBL	247	232	-15	6.1%	1.0	Yes	Yes	-
			WBT	545	509	-36	6.6%	1.6	Yes	Yes	-
			WBR	1	1	0	0.0%	0.0	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	76	72	-4	5.3%	0.5	Yes	Yes	-
			EBT	233	228	-5	2.1%	0.3	Yes	Yes	-
			EBR	487	498	11	2.2%	0.5	Yes	Yes	-
			NBL	438	442	4	0.9%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	67	70	3	4.3%	0.4	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	227	238	11	4.6%	0.7	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-

Future Total (2051) Conditions Model Increased Residential Density (+10%) With Train Volume Calibration											
Period	Intersection			Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph	700vph<Flow<2700 vph
	No.	Locat on	Movement	Hour y	Hour y	Vo ume	Abs %	Vo ume	(<5)	(±100)	(±15%)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	143	146	3	2.1%	0.2	Yes	Yes	-
			EBT	859	868	9	1.0%	0.3	Yes	-	Yes
			EBR	95	96	1	1.0%	0.1	Yes	Yes	-
			NBL	89	94	5	5.3%	0.5	Yes	Yes	-
			NBT	50	51	1	2.0%	0.1	Yes	Yes	-
			NBR	18	19	1	5.3%	0.2	Yes	Yes	-
			SBL	32	34	2	5.9%	0.3	Yes	Yes	-
			SBT	56	57	1	1.8%	0.1	Yes	Yes	-
			SBR	127	128	1	0.8%	0.1	Yes	Yes	-
			WBL	16	15	-1	6.3%	0.3	Yes	Yes	-
			WBT	1095	1091	-4	0.4%	0.1	Yes	-	Yes
			WBR	101	103	2	1.9%	0.2	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	228	184	-44	19.3%	3.1	Yes	Yes	-
			EBT	796	733	-63	7.9%	2.3	Yes	-	Yes
			SBL	107	108	1	0.9%	0.1	Yes	Yes	-
			WBL	243	232	-11	4.5%	0.7	Yes	Yes	-
			WBT	578	558	-20	3.5%	0.8	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1	0	-1	100.0%	1.4	Yes	Yes	-
			EBT	233	206	-27	11.6%	1.8	Yes	Yes	-
			EBR	667	634	-33	4.9%	1.3	Yes	Yes	-
			NBL	233	234	1	0.4%	0.1	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	102	107	5	4.7%	0.5	Yes	Yes	-
			SBL	0	2	2	-	-	-	Yes	-
			SBT	1	1	0	0.0%	-	-	Yes	-
			SBR	1	0	-1	100.0%	-	-	Yes	-
			WBL	290	272	-18	6.2%	1.1	Yes	Yes	-
			WBT	594	556	-38	6.4%	1.6	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	27	30	3	10.0%	0.6	Yes	Yes	-
			EBT	103	102	-1	1.0%	0.1	Yes	Yes	-
			EBR	174	181	7	3.9%	0.5	Yes	Yes	-
			NBL	469	473	4	0.8%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	82	84	2	2.4%	0.2	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	265	270	5	1.9%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	436	434	-2	0.5%	0.1	Yes	Yes	-
			EBT	1084	1084	0	0.0%	0.0	Yes	-	Yes
			EBR	111	111	0	0.0%	0.0	Yes	Yes	-
			NBL	128	132	4	3.0%	0.4	Yes	Yes	-
			NBT	102	101	-1	1.0%	0.1	Yes	Yes	-
			NBR	26	28	2	7.1%	0.4	Yes	Yes	-
			SBL	233	232	-1	0.4%	0.1	Yes	Yes	-
			SBT	143	145	2	1.4%	0.2	Yes	Yes	-
			SBR	474	483	9	1.9%	0.4	Yes	Yes	-
			WBL	28	26	-2	7.1%	0.4	Yes	Yes	-
			WBT	1029	1027	-2	0.2%	0.1	Yes	-	Yes
			WBR	285	288	3	1.0%	0.2	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	317	326	9	2.8%	0.5	Yes	Yes	-
			EBT	1003	1014	11	1.1%	0.3	Yes	Yes	-
			SBL	305	334	29	8.7%	1.6	Yes	Yes	-
			WBL	186	181	-5	2.7%	0.4	Yes	Yes	-
			WBT	617	607	-10	1.6%	0.4	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	6	3	-3	50.0%	1.4	Yes	Yes	-
			EBT	706	724	18	2.5%	0.7	Yes	-	Yes
			EBR	618	623	5	0.8%	0.2	Yes	Yes	-
			NBL	368	363	-5	1.4%	0.3	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	288	295	7	2.4%	0.4	Yes	Yes	-
			SBL	2	6	4	66.7%	2.0	Yes	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	7	2	-5	71.4%	2.4	Yes	Yes	-
			WBL	190	175	-15	7.9%	1.1	Yes	Yes	-
			WBT	445	418	-27	6.1%	1.3	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	92	106	14	13.2%	1.4	Yes	Yes	-
			EBT	289	315	26	8.3%	1.5	Yes	Yes	-
			EBR	544	604	60	9.9%	2.5	Yes	Yes	-
			NBL	341	346	5	1.4%	0.3	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	55	56	1	1.8%	0.1	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	189	192	3	1.6%	0.2	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-

Future Total (2051) Conditions Model Increased Residential Density (+25%) No Train Volume Calibration											
Period	Intersection			Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph	700vph<Flow<2700 vph
	No.	Locat on	Movement	Hour y	Hour y	Vo ume	Abs %	Vo ume	(<5)	(±100)	(±15%)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	143	144	1	0.7%	0.1	Yes	Yes	-
			EBT	870	879	9	1.0%	0.3	Yes	-	Yes
			EBR	95	96	1	1.0%	0.1	Yes	Yes	-
			NBL	89	93	4	4.3%	0.4	Yes	Yes	-
			NBT	50	51	1	2.0%	0.1	Yes	Yes	-
			NBR	18	19	1	5.3%	0.2	Yes	Yes	-
			SBL	32	34	2	5.9%	0.3	Yes	Yes	-
			SBT	56	57	1	1.8%	0.1	Yes	Yes	-
			SBR	127	128	1	0.8%	0.1	Yes	Yes	-
			WBL	16	15	-1	6.3%	0.3	Yes	Yes	-
			WBT	1126	1124	-2	0.2%	0.1	Yes	-	Yes
			WBR	101	102	1	1.0%	0.1	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	228	209	-19	8.3%	1.3	Yes	Yes	-
			EBT	807	722	-85	10.5%	3.1	Yes	-	Yes
			SBL	116	116	0	0.0%	0.0	Yes	Yes	-
			WBL	270	256	-14	5.2%	0.9	Yes	Yes	-
			WBT	609	590	-19	3.1%	0.8	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1	0	-1	100.0%	1.4	Yes	Yes	-
			EBT	254	239	-15	5.9%	1.0	Yes	Yes	-
			EBR	667	599	-68	10.2%	2.7	Yes	Yes	-
			NBL	233	234	1	0.4%	0.1	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	111	116	5	4.3%	0.5	Yes	Yes	-
			SBL	0	2	2	-	-	-	Yes	-
			SBT	1	1	0	0.0%	-	-	Yes	-
			SBR	1	0	-1	100.0%	-	-	Yes	-
			WBL	319	301	-18	5.6%	1.0	Yes	Yes	-
			WBT	652	611	-41	6.3%	1.6	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	31	36	5	13.9%	0.9	Yes	Yes	-
			EBT	109	111	2	1.8%	0.2	Yes	Yes	-
			EBR	194	209	15	7.2%	1.1	Yes	Yes	-
			NBL	526	527	1	0.2%	0.0	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	93	96	3	3.1%	0.3	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	284	289	5	1.7%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	436	435	-1	0.2%	0.0	Yes	Yes	-
			EBT	1118	1110	-8	0.7%	0.2	Yes	-	Yes
			EBR	111	112	1	0.9%	0.1	Yes	Yes	-
			NBL	128	131	3	2.3%	0.3	Yes	Yes	-
			NBT	102	101	-1	1.0%	0.1	Yes	Yes	-
			NBR	26	28	2	7.1%	0.4	Yes	Yes	-
			SBL	233	228	-5	2.1%	0.3	Yes	Yes	-
			SBT	143	144	1	0.7%	0.1	Yes	Yes	-
			SBR	474	482	8	1.7%	0.4	Yes	Yes	-
			WBL	28	26	-2	7.1%	0.4	Yes	Yes	-
			WBT	1050	1047	-3	0.3%	0.1	Yes	-	Yes
			WBR	285	288	3	1.0%	0.2	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	317	316	-1	0.3%	0.1	Yes	Yes	-
			EBT	1038	1023	-15	1.4%	0.5	Yes	Yes	-
			SBL	358	367	9	2.5%	0.5	Yes	Yes	-
			WBL	205	197	-8	3.9%	0.6	Yes	Yes	-
			WBT	638	627	-11	1.7%	0.4	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	6	3	-3	50.0%	1.4	Yes	Yes	-
			EBT	771	782	11	1.4%	0.4	Yes	Yes	-
			EBR	618	604	-14	2.3%	0.6	Yes	Yes	-
			NBL	368	360	-8	2.2%	0.4	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	318	327	9	2.8%	0.5	Yes	Yes	-
			SBL	2	6	4	66.7%	2.0	Yes	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	7	2	-5	71.4%	2.4	Yes	Yes	-
			WBL	210	197	-13	6.2%	0.9	Yes	Yes	-
			WBT	485	455	-30	6.2%	1.4	Yes	Yes	-
			WBR	1	1	0	0.0%	0.0	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	103	116	13	11.2%	1.2	Yes	Yes	-
			EBT	310	335	25	7.5%	1.4	Yes	Yes	-
			EBR	607	659	52	7.9%	2.1	Yes	Yes	-
			NBL	380	385	5	1.3%	0.3	Yes	Yes	-
			NBT	0	0	0	-	-	-	-	-
			NBR	0	0	0	-	-	-	-	-
			SBL	0	0	0	-	-	-	-	-
			SBT	0	0	0	-	-	-	-	-
			SBR	62	64	2	3.1%	0.3	Yes	Yes	-
			WBL	0	0	0	-	-	-	-	-
			WBT	202	204	2	1.0%	0.1	Yes	Yes	-
			WBR	0	0	0	-	-	-	-	-
SAT Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	751	707	-44	5.9%	1.6	Yes	-	Yes
			EBT	1011	973	-38	3.8%	1.2	Yes	-	Yes
			EBR	107	107	0	0.0%	0.0	Yes	Yes	-
			NBL	135	142	7	4.9%	0.6	Yes	Yes	-
			NBT	217	220	3	1.4%	0.2	Yes	Yes	-
			NBR	12	12	0	0.0%	0.0	Yes	Yes	-
			SBL	340	323	-17	5.0%	0.9	Yes	Yes	-
			SBT	178	179	1	0.6%	0.1	Yes	Yes	-
			SBR	657	648	-9	1.4%	0.4	Yes	Yes	-
			WBL	18	16	-2	11.1%	0.5	Yes	Yes	-
			WBT	1097	1081	-16	1.5%	0.5	Yes	-	Yes
			WBR	357	362	5	1.4%	0.3	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	339	325	-14	4.1%	0.8	Yes	Yes	-
			EBT	1032	979	-53	5.1%	1.7	Yes	-	Yes
			SBL	277	283	6	2.1%	0.4	Yes	Yes	-
			WBL	245	242	-3	1.2%	0.2	Yes	Yes	-
			WBT	681	679	-2	0.3%	0.1	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	7	4	-3	42.9%	1.3	Yes	Yes	-
			EBT	662	654	-8	1.2%	0.3	Yes	Yes	-
			EBR	640	602	-38	5.9%	1.5	Yes	Yes	-
			NBL	360	354	-6	1.7%	0.3	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	272	281	9	3.2%	0.5	Yes	Yes	-
			SBL	1	1	0	0.0%	0.0	Yes	Yes	-
			SBT	6	6	0	0.0%	0.0	Yes	Yes	-
			SBR	5	5	0	0.0%	0.0	Yes	Yes	-
			WBL	271	258	-13	4.8%	0.8	Yes	Yes	-
			WBT	594	558	-36	6.1%	1.5	Yes	Yes	-
			WBR	1	1	0	0.0%	0.0	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	86	94	8	8.5%	0.8	Yes	Yes	-
			EBT	251	246	-5	2.0%	0.3	Yes	Yes	-
			EBR	542	578	36	6.2%	1.5	Yes	Yes	-
			NBL	486	491	5	1.0%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	76	80	4	5.0%	0.5	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	243	263	20	7.6%	1.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-

Future Total (2051) Conditions Model Increased Residential Density (+25%) With Train Volume Calibration											
Period	Intersection			Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph	700vph<Flow<2700 vph
	No.	Locat on	Movement	Hour y	Hour y	Vo ume	Abs %	Vo ume	(<5)	(±100)	(±15%)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	143	145	2	1.4%	0.2	Yes	Yes	-
			EBT	870	878	8	0.9%	0.3	Yes	-	Yes
			EBR	95	96	1	1.0%	0.1	Yes	Yes	-
			NBL	89	93	4	4.3%	0.4	Yes	Yes	-
			NBT	50	51	1	2.0%	0.1	Yes	Yes	-
			NBR	18	19	1	5.3%	0.2	Yes	Yes	-
			SBL	32	34	2	5.9%	0.3	Yes	Yes	-
			SBT	56	57	1	1.8%	0.1	Yes	Yes	-
			SBR	127	128	1	0.8%	0.1	Yes	Yes	-
			WBL	16	15	-1	6.3%	0.3	Yes	Yes	-
			WBT	1126	1124	-2	0.2%	0.1	Yes	-	Yes
			WBR	101	102	1	1.0%	0.1	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	228	208	-20	8.8%	1.4	Yes	Yes	-
			EBT	807	722	-85	10.5%	3.1	Yes	-	Yes
			SBL	116	115	-1	0.9%	0.1	Yes	Yes	-
			WBL	270	256	-14	5.2%	0.9	Yes	Yes	-
			WBT	609	590	-19	3.1%	0.8	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1	0	-1	100.0%	1.4	Yes	Yes	-
			EBT	254	239	-15	5.9%	1.0	Yes	Yes	-
			EBR	667	599	-68	10.2%	2.7	Yes	Yes	-
			NBL	233	234	1	0.4%	0.1	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	111	116	5	4.3%	0.5	Yes	Yes	-
			SBL	0	2	2	-	-	-	Yes	-
			SBT	1	1	0	0.0%	-	-	Yes	-
			SBR	1	0	-1	100.0%	-	-	Yes	-
			WBL	319	301	-18	5.6%	1.0	Yes	Yes	-
			WBT	652	611	-41	6.3%	1.6	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	31	36	5	13.9%	0.9	Yes	Yes	-
			EBT	109	111	2	1.8%	0.2	Yes	Yes	-
			EBR	194	209	15	7.2%	1.1	Yes	Yes	-
			NBL	526	527	1	0.2%	0.0	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	93	96	3	3.1%	0.3	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	284	288	4	1.4%	0.2	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	436	431	-5	1.1%	0.2	Yes	Yes	-
			EBT	1118	1077	-41	3.7%	1.2	Yes	-	Yes
			EBR	111	108	-3	2.7%	0.3	Yes	Yes	-
			NBL	128	131	3	2.3%	0.3	Yes	Yes	-
			NBT	102	100	-2	2.0%	0.2	Yes	Yes	-
			NBR	26	27	1	3.7%	0.2	Yes	Yes	-
			SBL	233	222	-11	4.7%	0.7	Yes	Yes	-
			SBT	143	142	-1	0.7%	0.1	Yes	Yes	-
			SBR	474	479	5	1.0%	0.2	Yes	Yes	-
			WBL	28	25	-3	10.7%	0.6	Yes	Yes	-
			WBT	1050	1028	-22	2.1%	0.7	Yes	-	Yes
			WBR	285	281	-4	1.4%	0.2	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	317	301	-16	5.0%	0.9	Yes	Yes	-
			EBT	1038	981	-57	5.5%	1.8	Yes	-	Yes
			SBL	358	343	-15	4.2%	0.8	Yes	Yes	-
			WBL	205	197	-8	3.9%	0.6	Yes	Yes	-
			WBT	638	625	-13	2.0%	0.5	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	6	3	-3	50.0%	1.4	Yes	Yes	-
			EBT	771	737	-34	4.4%	1.2	Yes	-	Yes
			EBR	618	578	-40	6.5%	1.6	Yes	Yes	-
			NBL	368	358	-10	2.7%	0.5	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	318	327	9	2.8%	0.5	Yes	Yes	-
			SBL	2	6	4	66.7%	2.0	Yes	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	7	2	-5	71.4%	2.4	Yes	Yes	-
			WBL	210	197	-13	6.2%	0.9	Yes	Yes	-
			WBT	485	456	-29	6.0%	1.3	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	103	111	8	7.2%	0.8	Yes	Yes	-
			EBT	310	322	12	3.7%	0.7	Yes	Yes	-
			EBR	607	636	29	4.6%	1.2	Yes	Yes	-
			NBL	380	383	3	0.8%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	62	64	2	3.1%	0.3	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	202	204	2	1.0%	0.1	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-

Future Total (2051) Conditions Model Bridge Adjustment (10%) No Train Volume Calibration											
Period	Intersection			Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph	700vph<Flow<2700 vph
	No.	Locat on	Movement	Hour y	Hour y	Vo ume	Abs %	Vo ume	(<5)	(±100)	(±15%)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	143	144	1	0.7%	0.1	Yes	Yes	-
			EBT	831	835	4	0.5%	0.1	Yes	-	Yes
			EBR	95	95	0	0.0%	0.0	Yes	Yes	-
			NBL	89	94	5	5.3%	0.5	Yes	Yes	-
			NBT	50	51	1	2.0%	0.1	Yes	Yes	-
			NBR	18	19	1	5.3%	0.2	Yes	Yes	-
			SBL	32	34	2	5.9%	0.3	Yes	Yes	-
			SBT	56	57	1	1.8%	0.1	Yes	Yes	-
			SBR	127	128	1	0.8%	0.1	Yes	Yes	-
			WBL	16	15	-1	6.3%	0.3	Yes	Yes	-
			WBT	1018	1016	-2	0.2%	0.1	Yes	-	Yes
			WBR	101	102	1	1.0%	0.1	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	228	210	-18	7.9%	1.2	Yes	Yes	-
			EBT	768	682	-86	11.2%	3.2	Yes	-	Yes
			SBL	100	99	-1	1.0%	0.1	Yes	Yes	-
			WBL	225	217	-8	3.6%	0.5	Yes	Yes	-
			WBT	501	486	-15	3.0%	0.7	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1	0	-1	100.0%	1.4	Yes	Yes	-
			EBT	198	188	-10	5.1%	0.7	Yes	Yes	-
			EBR	667	594	-73	10.9%	2.9	Yes	Yes	-
			NBL	233	236	3	1.3%	0.2	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	96	100	4	4.0%	0.4	Yes	Yes	-
			SBL	0	2	2	-	-	-	Yes	-
			SBT	1	1	0	0.0%	0.0	Yes	Yes	-
			SBR	1	0	-1	100.0%	1.4	Yes	Yes	-
			WBL	271	252	-19	7.0%	1.2	Yes	Yes	-
			WBT	499	463	-36	7.2%	1.6	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	25	30	5	16.7%	1.0	Yes	Yes	-
			EBT	99	107	8	7.5%	0.8	Yes	Yes	-
			EBR	139	152	13	8.6%	1.1	Yes	Yes	-
			NBL	375	381	6	1.6%	0.3	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	75	79	4	5.1%	0.5	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	252	256	4	1.6%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	436	437	1	0.2%	0.0	Yes	Yes	-
			EBT	994	996	2	0.2%	0.1	Yes	-	Yes
			EBR	111	111	0	0.0%	0.0	Yes	Yes	-
			NBL	128	132	4	3.0%	0.4	Yes	Yes	-
			NBT	102	102	0	0.0%	0.0	Yes	Yes	-
			NBR	26	28	2	7.1%	0.4	Yes	Yes	-
			SBL	233	230	-3	1.3%	0.2	Yes	Yes	-
			SBT	143	145	2	1.4%	0.2	Yes	Yes	-
			SBR	474	484	10	2.1%	0.5	Yes	Yes	-
			WBL	28	27	-1	3.6%	0.2	Yes	Yes	-
			WBT	972	968	-4	0.4%	0.1	Yes	-	Yes
			WBR	285	287	2	0.7%	0.1	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	317	324	7	2.2%	0.4	Yes	Yes	-
			EBT	914	930	16	1.7%	0.5	Yes	-	Yes
			SBL	305	313	8	2.6%	0.5	Yes	Yes	-
			WBL	175	168	-7	4.0%	0.5	Yes	Yes	-
			WBT	560	545	-15	2.7%	0.6	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	6	3	-3	50.0%	1.4	Yes	Yes	-
			EBT	595	608	13	2.1%	0.5	Yes	Yes	-
			EBR	618	632	14	2.2%	0.6	Yes	Yes	-
			NBL	368	362	-6	1.6%	0.3	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	268	277	9	3.2%	0.5	Yes	Yes	-
			SBL	2	6	4	66.7%	2.0	Yes	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	7	2	-5	71.4%	2.4	Yes	Yes	-
			WBL	177	164	-13	7.3%	1.0	Yes	Yes	-
			WBT	377	347	-30	8.0%	1.6	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	84	98	14	14.3%	1.5	Yes	Yes	-
			EBT	275	305	30	9.8%	1.8	Yes	Yes	-
			EBR	435	484	49	10.1%	2.3	Yes	Yes	-
			NBL	273	277	4	1.4%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	50	51	1	2.0%	0.1	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	180	184	4	2.2%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
SAT Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	751	727	-24	3.2%	0.9	Yes	-	Yes
			EBT	905	878	-27	3.0%	0.9	Yes	-	Yes
			EBR	107	107	0	0.0%	0.0	Yes	Yes	-
			NBL	135	142	7	4.9%	0.6	Yes	Yes	-
			NBT	217	220	3	1.4%	0.2	Yes	Yes	-
			NBR	12	12	0	0.0%	0.0	Yes	Yes	-
			SBL	340	321	-19	5.6%	1.0	Yes	Yes	-
			SBT	178	176	-2	1.1%	0.2	Yes	Yes	-
			SBR	657	643	-14	2.1%	0.5	Yes	Yes	-
			WBL	18	16	-2	11.1%	0.5	Yes	Yes	-
			WBT	1002	989	-13	1.3%	0.4	Yes	-	Yes
			WBR	357	361	4	1.1%	0.2	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	339	328	-11	3.2%	0.6	Yes	Yes	-
			EBT	926	881	-45	4.9%	1.5	Yes	-	Yes
			SBL	232	235	3	1.3%	0.2	Yes	Yes	-
			WBL	207	207	0	0.0%	0.0	Yes	Yes	-
			WBT	586	587	1	0.2%	0.0	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	7	4	-3	42.9%	1.3	Yes	Yes	-
			EBT	511	505	-6	1.2%	0.3	Yes	Yes	-
			EBR	640	609	-31	4.8%	1.2	Yes	Yes	-
			NBL	360	356	-4	1.1%	0.2	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	229	235	6	2.6%	0.4	Yes	Yes	-
			SBL	1	1	0	0.0%	0.0	Yes	Yes	-
			SBT	6	6	0	0.0%	0.0	Yes	Yes	-
			SBR	5	5	0	0.0%	0.0	Yes	Yes	-
			WBL	231	214	-17	7.4%	1.1	Yes	Yes	-
			WBT	461	431	-30	6.5%	1.4	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	69	78	9	11.5%	1.0	Yes	Yes	-
			EBT	221	219	-2	0.9%	0.1	Yes	Yes	-
			EBR	395	432	37	8.6%	1.8	Yes	Yes	-
			NBL	355	361	6	1.7%	0.3	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	61	64	3	4.7%	0.4	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	216	233	17	7.3%	1.1	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-

Future Total (2051) Conditions Model Bridge Adjustment (10%) With Train Volume Calibration											
Period	Intersection			Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph	700vph<Flow<2700 vph
	No.	Locat on	Movement	Hour y	Hour y	Vo ume	Abs %	Vo ume	(<5)	(±100)	(±15%)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	143	144	1	0.7%	0.1	Yes	Yes	-
			EBT	831	835	4	0.5%	0.1	Yes	-	Yes
			EBR	95	95	0	0.0%	0.0	Yes	Yes	-
			NBL	89	94	5	5.3%	0.5	Yes	Yes	-
			NBT	50	51	1	2.0%	0.1	Yes	Yes	-
			NBR	18	19	1	5.3%	0.2	Yes	Yes	-
			SBL	32	34	2	5.9%	0.3	Yes	Yes	-
			SBT	56	57	1	1.8%	0.1	Yes	Yes	-
			SBR	127	128	1	0.8%	0.1	Yes	Yes	-
			WBL	16	15	-1	6.3%	0.3	Yes	Yes	-
			WBT	1018	1017	-1	0.1%	0.0	Yes	-	Yes
			WBR	101	102	1	1.0%	0.1	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	228	210	-18	7.9%	1.2	Yes	Yes	-
			EBT	768	681	-87	11.3%	3.2	Yes	-	Yes
			SBL	100	99	-1	1.0%	0.1	Yes	Yes	-
			WBL	225	217	-8	3.6%	0.5	Yes	Yes	-
			WBT	501	487	-14	2.8%	0.6	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1	0	-1	100.0%	1.4	Yes	Yes	-
			EBT	198	188	-10	5.1%	0.7	Yes	Yes	-
			EBR	667	593	-74	11.1%	2.9	Yes	Yes	-
			NBL	233	236	3	1.3%	0.2	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	96	101	5	5.0%	0.5	Yes	Yes	-
			SBL	0	2	2	-	-	-	Yes	-
			SBT	1	1	0	0.0%	-	-	Yes	-
			SBR	1	0	-1	100.0%	-	-	Yes	-
			WBL	271	252	-19	7.0%	1.2	Yes	Yes	-
			WBT	499	463	-36	7.2%	1.6	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	25	29	4	13.8%	0.8	Yes	Yes	-
			EBT	99	107	8	7.5%	0.8	Yes	Yes	-
			EBR	139	152	13	8.6%	1.1	Yes	Yes	-
			NBL	375	380	5	1.3%	0.3	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	75	79	4	5.1%	0.5	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	252	256	4	1.6%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	436	437	1	0.2%	0.0	Yes	Yes	-
			EBT	994	998	4	0.4%	0.1	Yes	-	Yes
			EBR	111	111	0	0.0%	0.0	Yes	Yes	-
			NBL	128	131	3	2.3%	0.3	Yes	Yes	-
			NBT	102	102	0	0.0%	0.0	Yes	Yes	-
			NBR	26	28	2	7.1%	0.4	Yes	Yes	-
			SBL	233	230	-3	1.3%	0.2	Yes	Yes	-
			SBT	143	145	2	1.4%	0.2	Yes	Yes	-
			SBR	474	484	10	2.1%	0.5	Yes	Yes	-
			WBL	28	26	-2	7.1%	0.4	Yes	Yes	-
			WBT	972	968	-4	0.4%	0.1	Yes	-	Yes
			WBR	285	287	2	0.7%	0.1	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	317	324	7	2.2%	0.4	Yes	Yes	-
			EBT	914	930	16	1.7%	0.5	Yes	Yes	-
			SBL	305	312	7	2.2%	0.4	Yes	Yes	-
			WBL	175	168	-7	4.0%	0.5	Yes	Yes	-
			WBT	560	548	-12	2.1%	0.5	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	6	3	-3	50.0%	1.4	Yes	Yes	-
			EBT	595	608	13	2.1%	0.5	Yes	Yes	-
			EBR	618	630	12	1.9%	0.5	Yes	Yes	-
			NBL	368	362	-6	1.6%	0.3	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	268	276	8	2.9%	0.5	Yes	Yes	-
			SBL	2	6	4	66.7%	2.0	Yes	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	7	2	-5	71.4%	2.4	Yes	Yes	-
			WBL	177	164	-13	7.3%	1.0	Yes	Yes	-
			WBT	377	347	-30	8.0%	1.6	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	84	98	14	14.3%	1.5	Yes	Yes	-
			EBT	275	306	31	10.1%	1.8	Yes	Yes	-
			EBR	435	485	50	10.3%	2.3	Yes	Yes	-
			NBL	273	277	4	1.4%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	50	51	1	2.0%	0.1	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	180	184	4	2.2%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-

Future Total (2051) Conditions Model Bridge Adjustment (25%) No Train Volume Calibration											
Period	Intersection			Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph	700vph<Flow<2700 vph
	No.	Location	Movement	Hour y	Hour y	Volume	Abs %	Volume	(<5)	(±100)	(±15%)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	143	145	2	1.4%	0.2	Yes	Yes	-
			EBT	798	802	4	0.5%	0.1	Yes	-	Yes
			EBR	95	94	-1	1.1%	0.1	Yes	Yes	-
			NBL	89	94	5	5.3%	0.5	Yes	Yes	-
			NBT	50	51	1	2.0%	0.1	Yes	Yes	-
			NBR	18	19	1	5.3%	0.2	Yes	Yes	-
			SBL	32	34	2	5.9%	0.3	Yes	Yes	-
			SBT	56	57	1	1.8%	0.1	Yes	Yes	-
			SBR	127	128	1	0.8%	0.1	Yes	Yes	-
			WBL	16	14	-2	12.5%	0.5	Yes	Yes	-
			WBT	935	931	-4	0.4%	0.1	Yes	-	Yes
			WBR	101	102	1	1.0%	0.1	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	228	207	-21	9.2%	1.4	Yes	Yes	-
			EBT	735	648	-87	11.8%	3.3	Yes	-	Yes
			SBL	100	100	0	0.0%	0.0	Yes	Yes	-
			WBL	225	208	-17	7.6%	1.2	Yes	Yes	-
			WBT	418	401	-17	4.1%	0.8	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1	0	-1	100.0%	1.4	Yes	Yes	-
			EBT	165	158	-7	4.2%	0.6	Yes	Yes	-
			EBR	667	592	-75	11.2%	3.0	Yes	Yes	-
			NBL	233	235	2	0.9%	0.1	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	96	101	5	5.0%	0.5	Yes	Yes	-
			SBL	0	2	2	-	-	-	Yes	-
			SBT	1	1	0	0.0%	-	-	Yes	-
			SBR	1	0	-1	100.0%	-	-	Yes	-
			WBL	271	241	-30	11.1%	1.9	Yes	Yes	-
			WBT	416	371	-45	10.8%	2.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	25	30	5	16.7%	1.0	Yes	Yes	-
			EBT	99	109	10	9.2%	1.0	Yes	Yes	-
			EBR	106	120	14	11.7%	1.3	Yes	Yes	-
			NBL	292	297	5	1.7%	0.3	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	75	79	4	5.1%	0.5	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	252	235	-17	6.7%	1.1	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	436	437	1	0.2%	0.0	Yes	Yes	-
			EBT	895	895	0	0.0%	0.0	Yes	-	Yes
			EBR	111	111	0	0.0%	0.0	Yes	Yes	-
			NBL	128	131	3	2.3%	0.3	Yes	Yes	-
			NBT	102	102	0	0.0%	0.0	Yes	Yes	-
			NBR	26	27	1	3.7%	0.2	Yes	Yes	-
			SBL	233	231	-2	0.9%	0.1	Yes	Yes	-
			SBT	143	145	2	1.4%	0.2	Yes	Yes	-
			SBR	474	484	10	2.1%	0.5	Yes	Yes	-
			WBL	28	26	-2	7.1%	0.4	Yes	Yes	-
			WBT	909	908	-1	0.1%	0.0	Yes	-	Yes
			WBR	285	286	1	0.3%	0.1	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	317	301	-16	5.0%	0.9	Yes	Yes	-
			EBT	815	856	41	4.8%	1.4	Yes	Yes	-
			SBL	305	312	7	2.2%	0.4	Yes	Yes	-
			WBL	175	168	-7	4.0%	0.5	Yes	Yes	-
			WBT	497	482	-15	3.0%	0.7	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	6	3	-3	50.0%	1.4	Yes	Yes	-
			EBT	496	586	90	15.4%	3.9	Yes	Yes	-
			EBR	618	578	-40	6.5%	1.6	Yes	Yes	-
			NBL	368	360	-8	2.2%	0.4	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	268	277	9	3.2%	0.5	Yes	Yes	-
			SBL	2	6	4	66.7%	2.0	Yes	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	7	2	-5	71.4%	2.4	Yes	Yes	-
			WBL	177	164	-13	7.3%	1.0	Yes	Yes	-
			WBT	314	284	-30	9.6%	1.7	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	84	108	24	22.2%	2.4	Yes	Yes	-
			EBT	275	338	63	18.6%	3.6	Yes	Yes	-
			EBR	336	419	83	19.8%	4.3	Yes	Yes	-
			NBL	210	213	3	1.4%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	50	51	1	2.0%	0.1	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	180	184	4	2.2%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
SAT Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	751	722	-29	3.9%	1.1	Yes	-	Yes
			EBT	820	863	43	5.0%	1.5	Yes	-	Yes
			EBR	107	104	-3	2.8%	0.3	Yes	Yes	-
			NBL	135	142	7	4.9%	0.6	Yes	Yes	-
			NBT	217	218	1	0.5%	0.1	Yes	Yes	-
			NBR	12	12	0	0.0%	0.0	Yes	Yes	-
			SBL	340	328	-12	3.5%	0.7	Yes	Yes	-
			SBT	178	184	6	3.3%	0.4	Yes	Yes	-
			SBR	657	660	3	0.5%	0.1	Yes	Yes	-
			WBL	18	16	-2	11.1%	0.5	Yes	Yes	-
			WBT	925	965	40	4.1%	1.3	Yes	-	Yes
			WBR	357	348	-9	2.5%	0.5	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	339	351	12	3.4%	0.6	Yes	Yes	-
			EBT	841	850	9	1.1%	0.3	Yes	-	Yes
			SBL	232	237	5	2.1%	0.3	Yes	Yes	-
			WBL	207	192	-15	7.2%	1.1	Yes	Yes	-
			WBT	509	548	39	7.1%	1.7	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	7	2	-5	71.4%	2.4	Yes	Yes	-
			EBT	426	432	6	1.4%	0.3	Yes	Yes	-
			EBR	640	653	13	2.0%	0.5	Yes	Yes	-
			NBL	360	357	-3	0.8%	0.2	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	229	236	7	3.0%	0.5	Yes	Yes	-
			SBL	1	1	0	0.0%	0.0	Yes	Yes	-
			SBT	6	6	0	0.0%	0.0	Yes	Yes	-
			SBR	5	5	0	0.0%	0.0	Yes	Yes	-
			WBL	231	188	-43	18.6%	3.0	Yes	Yes	-
			WBT	384	377	-7	1.8%	0.4	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	69	70	1	1.4%	0.1	Yes	Yes	-
			EBT	221	219	-2	0.9%	0.1	Yes	Yes	-
			EBR	310	390	80	20.5%	4.3	Yes	Yes	-
			NBL	278	282	4	1.4%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	61	64	3	4.7%	0.4	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	216	210	-6	2.8%	0.4	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-

Future Total (2051) Conditions Model Bridge Adjustment (25%) With Train Volume Calibration												
Period	Intersection			Input Volume	Simulated Volume	Difference	Difference	GEH	GEH	Flow <700 vph	700vph<Flow<2700 vph
	No.	Locat on	Movement	Hour y	Hour y	Vo ume	Abs %	Vo ume	(<5)	(±100)	(±15%)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	143	145	2	1.4%	0.2	Yes	Yes	-
			EBT	798	802	4	0.5%	0.1	Yes	-	Yes
			EBR	95	94	-1	1.1%	0.1	Yes	Yes	-
			NBL	89	94	5	5.3%	0.5	Yes	Yes	-
			NBT	50	51	1	2.0%	0.1	Yes	Yes	-
			NBR	18	19	1	5.3%	0.2	Yes	Yes	-
			SBL	32	34	2	5.9%	0.3	Yes	Yes	-
			SBT	56	57	1	1.8%	0.1	Yes	Yes	-
			SBR	127	128	1	0.8%	0.1	Yes	Yes	-
			WBL	16	14	-2	12.5%	0.5	Yes	Yes	-
			WBT	935	932	-3	0.3%	0.1	Yes	-	Yes
			WBR	101	102	1	1.0%	0.1	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	228	207	-21	9.2%	1.4	Yes	Yes	-
			EBT	735	647	-88	12.0%	3.3	Yes	-	Yes
			SBL	100	100	0	0.0%	0.0	Yes	Yes	-
			WBL	225	208	-17	7.6%	1.2	Yes	Yes	-
			WBT	418	401	-17	4.1%	0.8	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1	0	-1	100.0%	1.4	Yes	Yes	-
			EBT	165	158	-7	4.2%	0.6	Yes	Yes	-
			EBR	667	591	-76	11.4%	3.0	Yes	Yes	-
			NBL	233	235	2	0.9%	0.1	Yes	Yes	-
			NBT	1	1	0	0.0%	0.0	Yes	Yes	-
			NBR	96	101	5	5.0%	0.5	Yes	Yes	-
			SBL	0	2	2	-	-	-	Yes	-
			SBT	1	1	0	0.0%	0.0	Yes	Yes	-
			SBR	1	0	-1	100.0%	1.4	Yes	Yes	-
			WBL	271	240	-31	11.4%	1.9	Yes	Yes	-
			WBT	416	371	-45	10.8%	2.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	25	30	5	16.7%	1.0	Yes	Yes	-
			EBT	99	110	11	10.0%	1.1	Yes	Yes	-
			EBR	106	121	15	12.4%	1.4	Yes	Yes	-
			NBL	292	296	4	1.4%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	75	79	4	5.1%	0.5	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	252	235	-17	6.7%	1.1	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	436	437	1	0.2%	0.0	Yes	Yes	-
			EBT	895	896	1	0.1%	0.0	Yes	-	Yes
			EBR	111	111	0	0.0%	0.0	Yes	Yes	-
			NBL	128	131	3	2.3%	0.3	Yes	Yes	-
			NBT	102	102	0	0.0%	0.0	Yes	Yes	-
			NBR	26	27	1	3.7%	0.2	Yes	Yes	-
			SBL	233	230	-3	1.3%	0.2	Yes	Yes	-
			SBT	143	145	2	1.4%	0.2	Yes	Yes	-
			SBR	474	483	9	1.9%	0.4	Yes	Yes	-
			WBL	28	26	-2	7.1%	0.4	Yes	Yes	-
			WBT	909	909	0	0.0%	0.0	Yes	-	Yes
			WBR	285	286	1	0.3%	0.1	Yes	Yes	-
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	317	300	-17	5.4%	1.0	Yes	Yes	-
			EBT	815	858	43	5.0%	1.5	Yes	Yes	-
			SBL	305	311	6	1.9%	0.3	Yes	Yes	-
			WBL	175	168	-7	4.0%	0.5	Yes	Yes	-
			WBT	497	483	-14	2.8%	0.6	Yes	Yes	-
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	6	3	-3	50.0%	1.4	Yes	Yes	-
			EBT	496	584	88	15.1%	3.8	Yes	Yes	-
			EBR	618	579	-39	6.3%	1.6	Yes	Yes	-
			NBL	368	361	-7	1.9%	0.4	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	268	276	8	2.9%	0.5	Yes	Yes	-
			SBL	2	6	4	66.7%	2.0	Yes	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	7	2	-5	71.4%	2.4	Yes	Yes	-
			WBL	177	163	-14	7.9%	1.1	Yes	Yes	-
			WBT	314	284	-30	9.6%	1.7	Yes	Yes	-
			WBR	1	0	-1	100.0%	1.4	Yes	Yes	-
	4	Daimler Parkway and Street 'A' / Street 'B'	EBL	84	107	23	21.5%	2.4	Yes	Yes	-
			EBT	275	337	62	18.4%	3.5	Yes	Yes	-
			EBR	336	419	83	19.8%	4.3	Yes	Yes	-
			NBL	210	213	3	1.4%	0.2	Yes	Yes	-
			NBT	0	0	0	-	-	-	Yes	-
			NBR	0	0	0	-	-	-	Yes	-
			SBL	0	0	0	-	-	-	Yes	-
			SBT	0	0	0	-	-	-	Yes	-
			SBR	50	51	1	2.0%	0.1	Yes	Yes	-
			WBL	0	0	0	-	-	-	Yes	-
			WBT	180	184	4	2.2%	0.3	Yes	Yes	-
			WBR	0	0	0	-	-	-	Yes	-

APPENDIX 3

Vissim Model Queue Calibration



Queue Calibration Existing (2024) Conditions								
Period	Intersection			Observed Max Queue	Simulated Max Queue	Difference	Difference	Within Target
	No.	Location	Movement	Metres	Metres	Metres	Abs. %	(±20%)
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	26	19	7	26.3%	No
			EBTR	33	36	-3	8.5%	Yes
			NBL	20	24	-4	17.9%	Yes
			NBTR	13	20	-7	34.1%	No
			SBL	20	13	7	34.2%	No
			SBT	20	17	2	11.0%	Yes
			SBR	13	14	-1	4.6%	Yes
			WBL	7	9	-3	30.6%	-
			WBT	46	38	7	15.5%	Yes
			WBR	13	13	0	3.3%	Yes
PM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	52	56	-4	6.5%	Yes
			EBTR	52	43	9	17.6%	Yes
			NBL	26	28	-2	8.1%	Yes
			NBTR	26	29	-3	11.8%	Yes
			SBL	39	41	-2	4.9%	Yes
			SBT	26	29	-3	10.9%	Yes
			SBR	33	32	0	1.2%	Yes
			WBL	7	11	-5	43.3%	-
			WBT	56	52	3	6.2%	Yes
			WBR	26	20	6	22.8%	No
SAT Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	65	109	-44	40.4%	No
			EBTR	46	44	1	2.2%	Yes
			NBL	26	30	-4	12.8%	Yes
			NBTR	33	51	-19	36.4%	No
			SBL	39	56	-17	30.8%	No
			SBT	33	43	-10	23.8%	No
			SBR	33	53	-21	38.8%	No
			WBL	7	9	-3	30.6%	-
			WBT	46	65	-19	29.6%	No
			WBR	20	29	-9	32.6%	No

APPENDIX 4

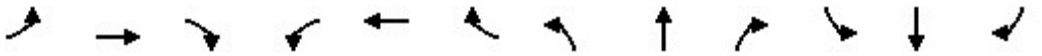
Existing (2024) Traffic Conditions – Synchro Analysis Results



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	39	419	38	76	0	146	1	14	0	1	1
Future Volume (Veh/h)	1	39	419	38	76	0	146	1	14	0	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	42	455	41	83	0	159	1	15	0	1	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	83			42			210	209	42	224	209	83
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	83			42			210	209	42	224	209	83
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			78	100	99	100	100	100
cM capacity (veh/h)	1514			1567			730	670	1029	705	670	976

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	1	42	455	41	83	159	16	0	2
Volume Left	1	0	0	41	0	159	0	0	0
Volume Right	0	0	455	0	0	0	15	0	1
cSH	1514	1700	1700	1567	1700	730	995	1700	794
Volume to Capacity	0.00	0.02	0.27	0.03	0.05	0.22	0.02	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.6	0.0	6.3	0.4	0.0	0.1
Control Delay (s)	7.4	0.0	0.0	7.4	0.0	11.3	8.7	0.0	9.5
Lane LOS	A			A		B	A	A	A
Approach Delay (s)	0.0			2.4		11.1		9.5	
Approach LOS						B		A	

Intersection Summary				
Average Delay	2.8			
Intersection Capacity Utilization	44.8%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	442	143	15	203	0	0	0	0	17	0	398
Future Volume (Veh/h)	0	442	143	15	203	0	0	0	0	17	0	398
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	480	155	16	221	0	0	0	0	18	0	433
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	221			480			810	810	318	493	733	221
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	221			480			810	810	318	493	733	221
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	100	96	100	45
cM capacity (veh/h)	1345			1079			120	308	678	454	341	783

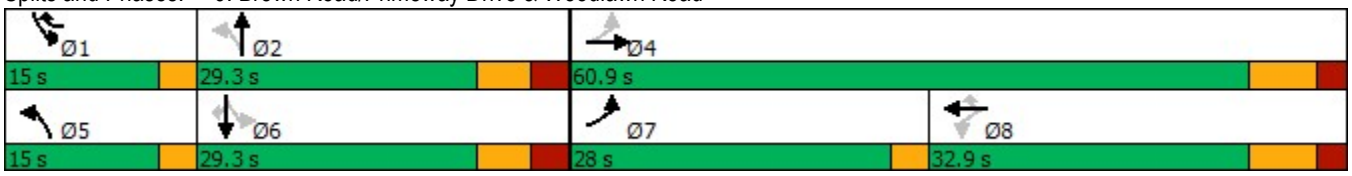
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	320	315	16	221	18	433
Volume Left	0	0	16	0	18	0
Volume Right	0	155	0	0	0	433
cSH	1700	1700	1079	1700	454	783
Volume to Capacity	0.19	0.19	0.01	0.13	0.04	0.55
Queue Length 95th (m)	0.0	0.0	0.3	0.0	0.9	26.2
Control Delay (s)	0.0	0.0	8.4	0.0	13.3	15.1
Lane LOS			A		B	C
Approach Delay (s)	0.0		0.6		15.1	
Approach LOS					C	

Intersection Summary				
Average Delay	5.2			
Intersection Capacity Utilization	45.0%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	90	482	10	528	63	56	32	20	35	79
Future Volume (vph)	90	482	10	528	63	56	32	20	35	79
Turn Type	pm+pt	NA	Perm	NA	pm+ov	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	7	4		8	1	5	2	1	6	
Permitted Phases	4		8		8	2		6		6
Detector Phase	7	4	8	8	1	5	2	1	6	6
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	6.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	17.9	17.9	17.9	9.0	9.0	15.3	9.0	15.3	15.3
Total Split (s)	28.0	60.9	32.9	32.9	15.0	15.0	29.3	15.0	29.3	29.3
Total Split (%)	26.6%	57.9%	31.3%	31.3%	14.3%	14.3%	27.9%	14.3%	27.9%	27.9%
Yellow Time (s)	3.0	5.4	5.4	5.4	3.0	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	0.0	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	3.0	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lead	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	32.9	31.2	22.5	22.5	32.5	17.1	11.3	15.4	10.5	10.5
Actuated g/C Ratio	0.62	0.59	0.42	0.42	0.61	0.32	0.21	0.29	0.20	0.20
v/c Ratio	0.18	0.31	0.04	0.41	0.09	0.15	0.15	0.06	0.11	0.26
Control Delay	7.7	9.6	18.5	19.2	2.7	16.1	22.0	15.6	27.9	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.7	9.6	18.5	19.2	2.7	16.1	22.0	15.6	27.9	6.5
LOS	A	A	B	B	A	B	C	B	C	A
Approach Delay		9.3		17.5			18.7		13.4	
Approach LOS		A		B			B		B	

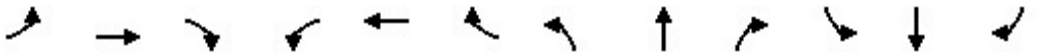
Intersection Summary	
Cycle Length: 105.2	
Actuated Cycle Length: 53	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.41	
Intersection Signal Delay: 13.7	Intersection LOS: B
Intersection Capacity Utilization 54.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 9: Brown Road/Primeway Drive & Woodlawn Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	482	60	10	528	63	56	32	11	20	35	79
Future Volume (vph)	90	482	60	10	528	63	56	32	11	20	35	79
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	3.0	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3217		1486	3271	1234	1486	1431		1486	1722	1234
Flt Permitted	0.37	1.00		0.43	1.00	1.00	0.64	1.00		0.73	1.00	1.00
Satd. Flow (perm)	584	3217		672	3271	1234	1007	1431		1137	1722	1234
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)	98	524	65	11	574	68	61	35	12	22	38	86
RTOR Reduction (vph)	0	9	0	0	0	42	0	11	0	0	0	77
Lane Group Flow (vph)	98	580	0	11	574	26	61	36	0	22	38	9
Turn Type	pm+pt	NA		Perm	NA	pm+ov	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4			8	1	5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	27.5	27.5		17.9	17.9	21.0	10.5	6.6		8.9	5.8	5.8
Effective Green, g (s)	27.5	27.5		17.9	17.9	21.0	10.5	6.6		8.9	5.8	5.8
Actuated g/C Ratio	0.50	0.50		0.32	0.32	0.38	0.19	0.12		0.16	0.10	0.10
Clearance Time (s)	3.0	7.9		7.9	7.9	3.0	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.6	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	397	1596		217	1056	467	224	170		202	180	129
v/s Ratio Prot	0.03	c0.18			c0.18	0.00	c0.02	0.03		0.01	0.02	
v/s Ratio Perm	0.09			0.02		0.02	c0.03			0.01		0.01
v/c Ratio	0.25	0.36		0.05	0.54	0.06	0.27	0.21		0.11	0.21	0.07
Uniform Delay, d1	7.6	8.6		12.9	15.4	10.9	19.0	22.1		19.8	22.7	22.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.3	0.1		0.1	0.5	0.0	0.5	0.5		0.2	0.4	0.2
Delay (s)	7.9	8.7		13.0	15.8	10.9	19.5	22.5		20.0	23.1	22.5
Level of Service	A	A		B	B	B	B	C		B	C	C
Approach Delay (s)		8.6			15.3			20.8			22.3	
Approach LOS		A			B			C			C	

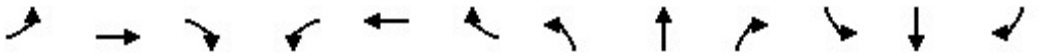
Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	55.4	Sum of lost time (s)	21.2
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	97	388	20	67	1	231	0	22	2	0	5
Future Volume (Veh/h)	4	97	388	20	67	1	231	0	22	2	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	105	422	22	73	1	251	0	24	2	0	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	74			105			235	231	105	254	230	74
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	74			105			235	231	105	254	230	74
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			64	100	97	100	100	99
cM capacity (veh/h)	1526			1486			706	657	949	672	658	988

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	4	105	422	22	74	251	24	2	5
Volume Left	4	0	0	22	0	251	0	2	0
Volume Right	0	0	422	0	1	0	24	0	5
cSH	1526	1700	1700	1486	1700	706	949	672	988
Volume to Capacity	0.00	0.06	0.25	0.01	0.04	0.36	0.03	0.00	0.01
Queue Length 95th (m)	0.1	0.0	0.0	0.3	0.0	12.2	0.6	0.1	0.1
Control Delay (s)	7.4	0.0	0.0	7.5	0.0	12.9	8.9	10.4	8.7
Lane LOS	A			A		B	A	B	A
Approach Delay (s)	0.1			1.7		12.5		9.2	
Approach LOS						B		A	

Intersection Summary				
Average Delay	4.1			
Intersection Capacity Utilization	42.8%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	447	199	19	274	0	0	0	0	42	0	456
Future Volume (Veh/h)	0	447	199	19	274	0	0	0	0	42	0	456
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	486	216	21	298	0	0	0	0	46	0	496
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	298			486			934	934	351	583	826	298
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	298			486			934	934	351	583	826	298
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			100	100	100	88	100	29
cM capacity (veh/h)	1260			1073			63	259	645	390	300	698

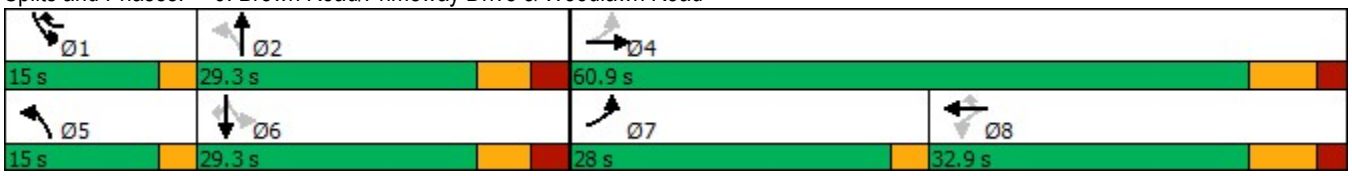
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	324	378	21	298	46	496
Volume Left	0	0	21	0	46	0
Volume Right	0	216	0	0	0	496
cSH	1700	1700	1073	1700	390	698
Volume to Capacity	0.19	0.22	0.02	0.18	0.12	0.71
Queue Length 95th (m)	0.0	0.0	0.5	0.0	3.0	45.3
Control Delay (s)	0.0	0.0	8.4	0.0	15.5	21.8
Lane LOS			A		C	C
Approach Delay (s)	0.0		0.6		21.2	
Approach LOS					C	

Intersection Summary				
Average Delay	7.5			
Intersection Capacity Utilization	53.0%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	274	497	18	533	179	80	64	146	90	298
Future Volume (vph)	274	497	18	533	179	80	64	146	90	298
Turn Type	pm+pt	NA	Perm	NA	pm+ov	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	7	4		8	1	5	2	1	6	
Permitted Phases	4		8		8	2		6		6
Detector Phase	7	4	8	8	1	5	2	1	6	6
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	6.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	17.9	17.9	17.9	9.0	9.0	15.3	9.0	15.3	15.3
Total Split (s)	28.0	60.9	32.9	32.9	15.0	15.0	29.3	15.0	29.3	29.3
Total Split (%)	26.6%	57.9%	31.3%	31.3%	14.3%	14.3%	27.9%	14.3%	27.9%	27.9%
Yellow Time (s)	3.0	5.4	5.4	5.4	3.0	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	0.0	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	3.0	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lead	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	45.3	40.0	17.9	17.9	38.7	20.5	11.3	25.4	12.7	12.7
Actuated g/C Ratio	0.58	0.51	0.23	0.23	0.50	0.26	0.14	0.33	0.16	0.16
v/c Ratio	0.59	0.37	0.13	0.77	0.28	0.26	0.40	0.43	0.35	0.69
Control Delay	15.1	12.4	31.2	38.1	3.8	22.4	37.1	25.0	37.4	12.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.1	12.4	31.2	38.1	3.8	22.4	37.1	25.0	37.4	12.7
LOS	B	B	C	D	A	C	D	C	D	B
Approach Delay		13.3		29.5			29.8		20.2	
Approach LOS		B		C			C		C	

Intersection Summary		
Cycle Length: 105.2		
Actuated Cycle Length: 78.1		
Natural Cycle: 60		
Control Type: Actuated-Uncoordinated		
Maximum v/c Ratio: 0.77		
Intersection Signal Delay: 21.3	Intersection LOS: C	
Intersection Capacity Utilization 65.2%	ICU Level of Service C	
Analysis Period (min) 15		

Splits and Phases: 9: Brown Road/Primeway Drive & Woodlawn Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	274	497	70	18	533	179	80	64	16	146	90	298
Future Volume (vph)	274	497	70	18	533	179	80	64	16	146	90	298
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	3.0	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3211		1486	3271	1234	1486	1445		1486	1722	1234
Flt Permitted	0.28	1.00		0.42	1.00	1.00	0.69	1.00		0.52	1.00	1.00
Satd. Flow (perm)	437	3211		655	3271	1234	1085	1445		813	1722	1234
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)	298	540	76	20	579	195	87	70	17	159	98	324
RTOR Reduction (vph)	0	10	0	0	0	120	0	10	0	0	0	266
Lane Group Flow (vph)	298	606	0	20	579	75	87	77	0	159	98	58
Turn Type	pm+pt	NA		Perm	NA	pm+ov	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4			8	1	5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	40.0	40.0		18.1	18.1	30.4	15.3	8.6		23.9	14.2	14.2
Effective Green, g (s)	40.0	40.0		18.1	18.1	30.4	15.3	8.6		23.9	14.2	14.2
Actuated g/C Ratio	0.51	0.51		0.23	0.23	0.38	0.19	0.11		0.30	0.18	0.18
Clearance Time (s)	3.0	7.9		7.9	7.9	3.0	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.6	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	471	1623		149	748	474	243	157		350	309	221
v/s Ratio Prot	c0.15	0.19			c0.18	0.02	0.03	0.05		c0.07	0.06	
v/s Ratio Perm	0.17			0.03		0.04	0.04			c0.07		0.05
v/c Ratio	0.63	0.37		0.13	0.77	0.16	0.36	0.49		0.45	0.32	0.26
Uniform Delay, d1	12.7	11.9		24.3	28.6	16.0	27.3	33.2		21.6	28.2	27.9
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.6	0.1		0.3	4.8	0.1	0.7	1.8		0.7	0.4	0.5
Delay (s)	15.4	12.0		24.6	33.4	16.1	28.0	35.0		22.4	28.7	28.4
Level of Service	B	B		C	C	B	C	C		C	C	C
Approach Delay (s)		13.1			28.9			31.5			26.8	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	79.1	Sum of lost time (s)	21.2
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	79	402	31	72	1	226	1	14	1	4	3
Future Volume (Veh/h)	5	79	402	31	72	1	226	1	14	1	4	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	86	437	34	78	1	246	1	15	1	4	3
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	79			86			247	243	86	258	242	78
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	79			86			247	243	86	258	242	78
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			64	100	98	100	99	100
cM capacity (veh/h)	1519			1510			687	642	973	670	642	982

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	5	86	437	34	79	246	16	1	7
Volume Left	5	0	0	34	0	246	0	1	0
Volume Right	0	0	437	0	1	0	15	0	3
cSH	1519	1700	1700	1510	1700	687	942	670	754
Volume to Capacity	0.00	0.05	0.26	0.02	0.05	0.36	0.02	0.00	0.01
Queue Length 95th (m)	0.1	0.0	0.0	0.5	0.0	12.3	0.4	0.0	0.2
Control Delay (s)	7.4	0.0	0.0	7.4	0.0	13.1	8.9	10.4	9.8
Lane LOS	A			A		B	A	B	A
Approach Delay (s)	0.1			2.2		12.9		9.9	
Approach LOS						B		A	

Intersection Summary				
Average Delay	4.1			
Intersection Capacity Utilization	43.7%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	468	213	14	267	0	0	0	0	18	0	496
Future Volume (Veh/h)	0	468	213	14	267	0	0	0	0	18	0	496
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	509	232	15	290	0	0	0	0	20	0	539
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	290			509			945	945	370	574	829	290
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	290			509			945	945	370	574	829	290
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	100	95	100	24
cM capacity (veh/h)	1269			1052			51	257	627	397	300	707

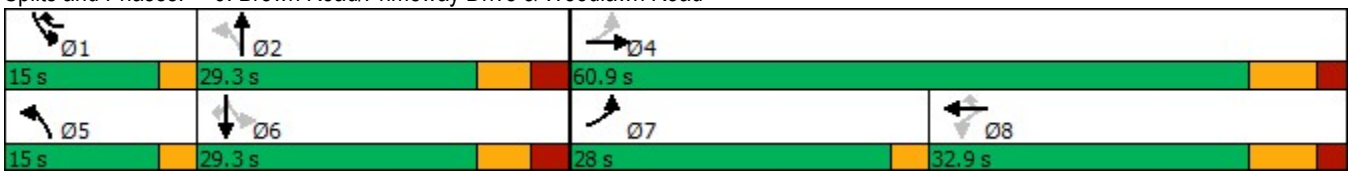
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	339	402	15	290	20	539
Volume Left	0	0	15	0	20	0
Volume Right	0	232	0	0	0	539
cSH	1700	1700	1052	1700	397	707
Volume to Capacity	0.20	0.24	0.01	0.17	0.05	0.76
Queue Length 95th (m)	0.0	0.0	0.3	0.0	1.2	54.6
Control Delay (s)	0.0	0.0	8.5	0.0	14.6	24.5
Lane LOS			A		B	C
Approach Delay (s)	0.0		0.4		24.2	
Approach LOS					C	

Intersection Summary				
Average Delay	8.5			
Intersection Capacity Utilization	55.3%	ICU Level of Service		B
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	471	455	11	528	224	85	136	214	112	412
Future Volume (vph)	471	455	11	528	224	85	136	214	112	412
Turn Type	pm+pt	NA	Perm	NA	pm+ov	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	7	4		8	1	5	2	1	6	
Permitted Phases	4		8		8	2		6		6
Detector Phase	7	4	8	8	1	5	2	1	6	6
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	6.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	17.9	17.9	17.9	9.0	9.0	15.3	9.0	15.3	15.3
Total Split (s)	28.0	60.9	32.9	32.9	15.0	15.0	29.3	15.0	29.3	29.3
Total Split (%)	26.6%	57.9%	31.3%	31.3%	14.3%	14.3%	27.9%	14.3%	27.9%	27.9%
Yellow Time (s)	3.0	5.4	5.4	5.4	3.0	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	0.0	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	3.0	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lead	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	53.9	49.0	20.6	20.6	40.3	27.9	14.6	32.7	19.4	19.4
Actuated g/C Ratio	0.58	0.52	0.22	0.22	0.43	0.30	0.16	0.35	0.21	0.21
v/c Ratio	0.98	0.34	0.08	0.80	0.36	0.26	0.68	0.62	0.34	0.73
Control Delay	56.5	13.6	31.8	44.0	4.1	23.1	52.3	31.8	37.4	11.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.5	13.6	31.8	44.0	4.1	23.1	52.3	31.8	37.4	11.7
LOS	E	B	C	D	A	C	D	C	D	B
Approach Delay		33.9		32.1			41.5		21.5	
Approach LOS		C		C			D		C	

Intersection Summary	
Cycle Length: 105.2	
Actuated Cycle Length: 93.6	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 30.7	Intersection LOS: C
Intersection Capacity Utilization 88.0%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 9: Brown Road/Primeway Drive & Woodlawn Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	471	455	67	11	528	224	85	136	7	214	112	412
Future Volume (vph)	471	455	67	11	528	224	85	136	7	214	112	412
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	3.0	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3208		1486	3271	1234	1486	1477		1486	1722	1234
Flt Permitted	0.25	1.00		0.44	1.00	1.00	0.68	1.00		0.54	1.00	1.00
Satd. Flow (perm)	395	3208		686	3271	1234	1062	1477		852	1722	1234
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)	512	495	73	12	574	243	92	148	8	233	122	448
RTOR Reduction (vph)	0	11	0	0	0	160	0	2	0	0	0	356
Lane Group Flow (vph)	512	557	0	12	574	83	92	154	0	233	122	92
Turn Type	pm+pt	NA		Perm	NA	pm+ov	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4			8	1	5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	48.9	48.9		20.6	20.6	32.2	23.0	15.4		30.0	19.4	19.4
Effective Green, g (s)	48.9	48.9		20.6	20.6	32.2	23.0	15.4		30.0	19.4	19.4
Actuated g/C Ratio	0.52	0.52		0.22	0.22	0.34	0.24	0.16		0.32	0.21	0.21
Clearance Time (s)	3.0	7.9		7.9	7.9	3.0	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.6	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	498	1667		150	716	422	293	241		349	355	254
v/s Ratio Prot	c0.28	0.17			0.18	0.02	0.03	0.10		c0.08	0.07	
v/s Ratio Perm	c0.26			0.02		0.04	0.05			c0.13		0.07
v/c Ratio	1.03	0.33		0.08	0.80	0.20	0.31	0.64		0.67	0.34	0.36
Uniform Delay, d1	21.5	13.1		29.2	34.8	21.8	28.6	36.8		26.0	31.9	32.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	47.7	0.1		0.2	6.3	0.2	0.5	5.1		4.4	0.4	0.6
Delay (s)	69.2	13.2		29.4	41.1	22.0	29.1	41.8		30.4	32.3	32.7
Level of Service	E	B		C	D	C	C	D		C	C	C
Approach Delay (s)		39.8			35.3			37.1			32.0	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	36.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	94.1	Sum of lost time (s)	21.2
Intersection Capacity Utilization	88.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX 5

Existing (2024) Traffic Conditions – Queueing Analysis Results



Existing (2024) Conditions Model – No Train – Microsimulation Results				
Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	19
			EBT	36
			EBR	34
			NBL	24
			NBT	20
			NBR	19
			SBL	13
			SBT	17
			SBR	14
			WBL	9
			WBT	38
			WBR	13
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	1
			EBT	11
			SBL	9
			WBL	0
			WBT	0
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	0
			EBT	0
			EBR	-
			NBL	24
			NBT	10
			NBR	10
			SBL	0
			SBT	0
			SBR	0
			WBL	0
			WBT	0
			WBR	0
eak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	56
			EBT	43
			EBR	42
			NBL	28
			NBT	29
			NBR	29
			SBL	41
			SBT	29
			SBR	32
			WBL	11
			WBT	52
			WBR	20
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	2
			EBT	11
			SBL	13

PM P		406 SB Ramp Terminal	WBL	0
			WBT	0
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	0
			EBT	2
			EBR	-
			NBL	32
			NBT	11
			NBR	11
			SBL	6
			SBT	0
			SBR	0
			WBL	0
			WBT	0
			WBR	0
SAT Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	109
			EBT	44
			EBR	43
			NBL	30
			NBT	51
			NBR	51
			SBL	56
			SBT	43
			SBR	53
			WBL	9
			WBT	65
			WBR	29
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	0
			EBT	13
			SBL	10
			WBL	0
			WBT	0
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	0
			EBT	0
			EBR	-
			NBL	31
			NBT	10
			NBR	10
			SBL	4
			SBT	0
			SBR	0
			WBL	0
			WBT	0
			WBR	0

Existing (2024) Conditions Model – With Train – Microsimulation Results				
Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	19
			EBT	36
			EBR	34
			NBL	24
			NBT	20
			NBR	19
			SBL	13
			SBT	17
			SBR	14
			WBL	9
			WBT	38
			WBR	13
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	1
			EBT	11
			SBL	9
			WBL	0
			WBT	0
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	0
			EBT	0
			EBR	-
			NBL	24
			NBT	10
			NBR	10
			SBL	0
			SBT	0
			SBR	0
			WBL	0
			WBT	0
			WBR	0
		Rail Crossing	EBT	8
			WBT	15
	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	56
			EBT	43
			EBR	42
			NBL	28
			NBT	29
			NBR	29
			SBL	41
			SBT	29
			SBR	32
			WBL	11
			WBT	52
			WBR	20

PM Peak Hour	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	2
			EBT	11
			SBL	13
			WBL	0
			WBT	0
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	0
			EBT	2
			EBR	-
			NBL	32
			NBT	11
			NBR	11
			SBL	6
			SBT	0
			SBR	0
			WBL	0
			WBT	0
			WBR	0
		Rail Crossing	EBT	34
			WBT	19

APPENDIX 6

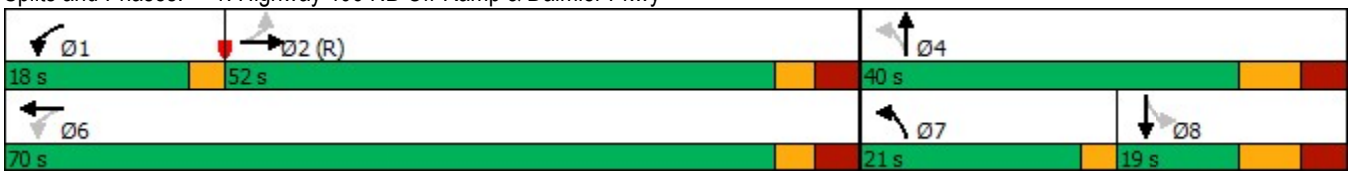
Future (2051) Total Traffic Conditions – Synchro Analysis Results



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Configurations								
Traffic Volume (vph)	1	220	669	271	555	233	1	1
Future Volume (vph)	1	220	669	271	555	233	1	1
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	NA
Protected Phases		2		1	6	7	4	8
Permitted Phases	2		Free	6		4		
Detector Phase	2	2		1	6	7	4	8
Switch Phase								
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0
Total Split (s)	52.0	52.0		18.0	70.0	21.0	40.0	19.0
Total Split (%)	47.3%	47.3%		16.4%	63.6%	19.1%	36.4%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes
Recall Mode	C-Max	C-Max		None	None	None	None	Max
Act Effct Green (s)	46.2	46.2	110.0	67.0	63.0	37.0	31.0	10.6
Actuated g/C Ratio	0.42	0.42	1.00	0.61	0.57	0.34	0.28	0.10
v/c Ratio	0.00	0.32	0.58	0.48	0.69	0.59	0.23	0.01
Control Delay	4.0	6.8	9.3	13.2	21.9	35.2	7.4	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.0	6.8	9.3	13.2	21.9	35.2	7.4	39.0
LOS	A	A	A	B	C	D	A	D
Approach Delay		8.7			19.0		27.0	39.0
Approach LOS		A			B		C	D

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 48 (44%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 15.8	Intersection LOS: B
Intersection Capacity Utilization 89.3%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy





Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	1	239	727	295	603	253	105	2
v/c Ratio	0.00	0.32	0.58	0.48	0.69	0.59	0.23	0.01
Control Delay	4.0	6.8	9.3	13.2	21.9	35.2	7.4	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.0	6.8	9.3	13.2	21.9	35.2	7.4	39.0
Queue Length 50th (m)	0.1	11.2	60.4	28.4	86.5	42.5	0.2	0.2
Queue Length 95th (m)	m0.1	m16.0	68.7	43.7	128.3	66.4	12.6	2.6
Internal Link Dist (m)		194.3			158.2		78.8	37.3
Turn Bay Length (m)	55.0					50.0		
Base Capacity (vph)	300	739	1262	628	871	435	451	153
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	0.00	0.32	0.58	0.47	0.69	0.58	0.23	0.01

Intersection Summary

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

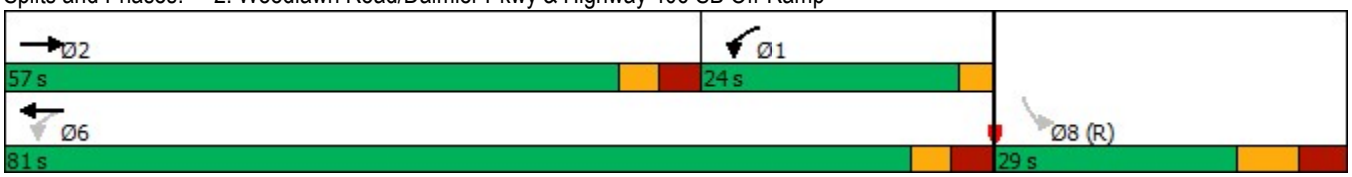
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	220	669	271	555	0	233	1	96	0	1	1
Future Volume (vph)	1	220	669	271	555	0	233	1	96	0	1	1
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0			9.0	
Lane Util. Factor	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			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1522		1606	1338			1578	
Flt Permitted	0.44	1.00	1.00	0.54	1.00		0.59	1.00			1.00	
Satd. Flow (perm)	714	1761	1262	881	1522		997	1338			1578	
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)	1	239	727	295	603	0	253	1	104	0	1	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	75	0	0	1	0
Lane Group Flow (vph)	1	239	727	295	603	0	253	30	0	0	1	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	46.2	46.2	110.0	63.0	63.0		31.0	31.0			10.6	
Effective Green, g (s)	46.2	46.2	110.0	63.0	63.0		31.0	31.0			10.6	
Actuated g/C Ratio	0.42	0.42	1.00	0.57	0.57		0.28	0.28			0.10	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0			9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	299	739	1262	589	871		377	377			152	
v/s Ratio Prot		0.14		0.06	c0.40		c0.11	0.02			0.00	
v/s Ratio Perm	0.00		c0.58	0.22			0.08					
v/c Ratio	0.00	0.32	0.58	0.50	0.69		0.67	0.08			0.01	
Uniform Delay, d1	18.5	21.4	0.0	12.6	16.6		33.7	29.0			44.9	
Progression Factor	0.22	0.27	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.0	0.8	1.4	0.7	2.4		4.6	0.1			0.1	
Delay (s)	4.2	6.6	1.4	13.3	19.0		38.4	29.1			45.0	
Level of Service	A	A	A	B	B		D	C			D	
Approach Delay (s)		2.7			17.1			35.7			45.0	
Approach LOS		A			B			D			D	

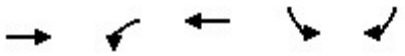
Intersection Summary			
HCM 2000 Control Delay	13.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	790	225	557	100	634
Future Volume (vph)	790	225	557	100	634
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	57.0	24.0	81.0	29.0	
Total Split (%)	51.8%	21.8%	73.6%	26.4%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	None	None	None	C-Max	
Act Effct Green (s)	44.7	65.9	62.1	31.9	110.0
Actuated g/C Ratio	0.41	0.60	0.56	0.29	1.00
v/c Ratio	0.83	0.80	0.62	0.22	0.49
Control Delay	33.6	42.9	13.0	34.6	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	33.6	42.9	13.0	34.6	1.2
LOS	C	D	B	C	A
Approach Delay	33.6		21.6		
Approach LOS	C		C		

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 0 (0%), Referenced to phase 8:SBL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 21.9	Intersection LOS: C
Intersection Capacity Utilization 64.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp





Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1107	245	605	109	689
v/c Ratio	0.83	0.80	0.62	0.22	0.49
Control Delay	33.6	42.9	13.0	34.6	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	33.6	42.9	13.0	34.6	1.2
Queue Length 50th (m)	104.7	29.3	53.9	17.8	0.0
Queue Length 95th (m)	121.4	49.3	54.8	36.7	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1498	400	1161	505	1415
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	0.74	0.61	0.52	0.22	0.49

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	790	228	225	557	0	0	0	0	100	0	634
Future Volume (vph)	0	790	228	225	557	0	0	0	0	100	0	634
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.97		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3233		1555	1722					1743		1415
Flt Permitted		1.00		0.14	1.00					0.95		1.00
Satd. Flow (perm)		3233		221	1722					1743		1415
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)	0	859	248	245	605	0	0	0	0	109	0	689
RTOR Reduction (vph)	0	27	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1080	0	245	605	0	0	0	0	109	0	689
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		44.7		65.9	62.1					31.9		110.0
Effective Green, g (s)		44.7		65.9	62.1					31.9		110.0
Actuated g/C Ratio		0.41		0.60	0.56					0.29		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1313		307	972					505		1415
v/s Ratio Prot		0.33		c0.10	0.35							
v/s Ratio Perm				c0.37						0.06		c0.49
v/c Ratio		0.82		0.80	0.62					0.22		0.49
Uniform Delay, d1		29.1		32.0	16.1					29.6		0.0
Progression Factor		1.00		0.87	0.70					1.00		1.00
Incremental Delay, d2		4.3		10.3	0.9					1.0		1.2
Delay (s)		33.4		38.2	12.2					30.6		1.2
Level of Service		C		D	B					C		A
Approach Delay (s)		33.4			19.7			0.0			5.2	
Approach LOS		C			B			A			A	

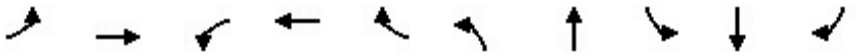
Intersection Summary			
HCM 2000 Control Delay	21.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	143	853	16	1074	101	89	50	32	56	127
Future Volume (vph)	143	853	16	1074	101	89	50	32	56	127
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	15.0	71.0	56.0	56.0	56.0	9.0	18.5	10.5	20.0	20.0
Total Split (%)	15.0%	71.0%	56.0%	56.0%	56.0%	9.0%	18.5%	10.5%	20.0%	20.0%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	72.3	67.4	55.5	55.5	55.5	19.1	11.2	20.1	10.2	10.2
Actuated g/C Ratio	0.72	0.67	0.56	0.56	0.56	0.19	0.11	0.20	0.10	0.10
v/c Ratio	0.53	0.47	0.07	0.64	0.15	0.42	0.43	0.14	0.35	0.55
Control Delay	11.8	9.1	14.2	18.8	3.2	37.8	41.9	30.5	46.7	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.8	9.1	14.2	18.8	3.2	37.8	41.9	30.5	46.7	16.1
LOS	B	A	B	B	A	D	D	C	D	B
Approach Delay		9.5		17.5			39.6		26.2	
Approach LOS		A		B			D		C	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.64	
Intersection Signal Delay: 16.2	Intersection LOS: B
Intersection Capacity Utilization 69.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road





Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	155	1030	17	1167	110	97	74	35	61	138
v/c Ratio	0.53	0.47	0.07	0.64	0.15	0.42	0.43	0.14	0.35	0.55
Control Delay	11.8	9.1	14.2	18.8	3.2	37.8	41.9	30.5	46.7	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.8	9.1	14.2	18.8	3.2	37.8	41.9	30.5	46.7	16.1
Queue Length 50th (m)	8.5	46.0	1.5	80.3	0.0	15.5	11.1	5.4	11.2	0.0
Queue Length 95th (m)	16.5	65.2	5.7	117.8	8.4	28.5	24.6	12.8	22.9	17.0
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	332	2179	241	1816	735	231	189	255	218	277
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	0.47	0.47	0.07	0.64	0.15	0.42	0.39	0.14	0.28	0.50

Intersection Summary

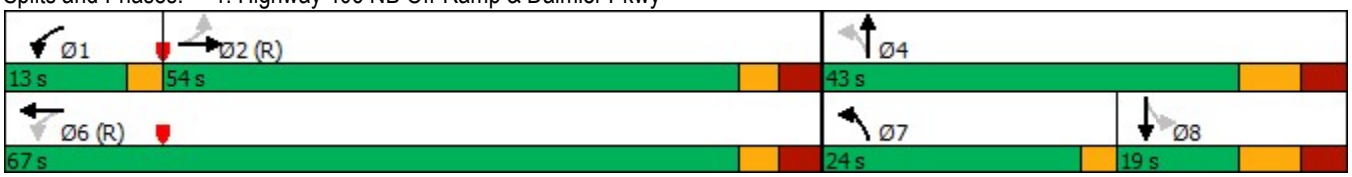
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	853	95	16	1074	101	89	50	18	32	56	127
Future Volume (vph)	143	853	95	16	1074	101	89	50	18	32	56	127
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3222		1486	3271	1234	1486	1428		1486	1722	1234
Flt Permitted	0.16	1.00		0.28	1.00	1.00	0.69	1.00		0.71	1.00	1.00
Satd. Flow (perm)	255	3222		435	3271	1234	1082	1428		1109	1722	1234
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)	155	927	103	17	1167	110	97	54	20	35	61	138
RTOR Reduction (vph)	0	8	0	0	0	50	0	13	0	0	0	123
Lane Group Flow (vph)	155	1022	0	17	1167	60	97	61	0	35	61	15
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	66.2	66.2		54.3	54.3	54.3	16.0	11.2		15.2	10.8	10.8
Effective Green, g (s)	66.2	66.2		54.3	54.3	54.3	16.0	11.2		15.2	10.8	10.8
Actuated g/C Ratio	0.66	0.66		0.54	0.54	0.54	0.16	0.11		0.15	0.11	0.11
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	278	2132		236	1776	670	192	159		185	185	133
v/s Ratio Prot	c0.05	0.32			c0.36		c0.02	0.04		0.01	0.04	
v/s Ratio Perm	0.32			0.04		0.05	c0.06			0.02		0.01
v/c Ratio	0.56	0.48		0.07	0.66	0.09	0.51	0.38		0.19	0.33	0.11
Uniform Delay, d1	9.4	8.4		10.9	16.2	11.0	37.8	41.2		36.8	41.3	40.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.2	0.8		0.1	0.8	0.0	1.6	1.1		0.4	0.8	0.3
Delay (s)	11.6	9.1		11.0	17.0	11.0	39.5	42.3		37.2	42.0	40.5
Level of Service	B	A		B	B	B	D	D		D	D	D
Approach Delay (s)		9.5			16.4			40.7			40.4	
Approach LOS		A			B			D			D	

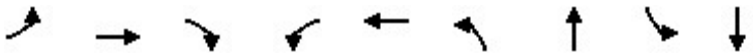
Intersection Summary			
HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	6	661	618	177	419	368	0	2	0
Future Volume (vph)	6	661	618	177	419	368	0	2	0
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2		1	6	7	4		8
Permitted Phases	2		Free	6		4		8	
Detector Phase	2	2		1	6	7	4	8	8
Switch Phase									
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0	19.0
Total Split (s)	54.0	54.0		13.0	67.0	24.0	43.0	19.0	19.0
Total Split (%)	49.1%	49.1%		11.8%	60.9%	21.8%	39.1%	17.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	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
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max	None	None	Max	Max
Act Effct Green (s)	47.0	47.0	110.0	64.0	60.0	40.0	34.0	10.0	10.0
Actuated g/C Ratio	0.43	0.43	1.00	0.58	0.55	0.36	0.31	0.09	0.09
v/c Ratio	0.02	0.95	0.53	0.88	0.55	0.84	0.48	0.02	0.02
Control Delay	13.3	37.6	1.2	58.5	19.4	47.7	6.3	46.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.3	37.6	1.2	58.5	19.4	47.7	6.3	46.0	0.1
LOS	B	D	A	E	B	D	A	D	A
Approach Delay		20.0			31.0		30.3		9.3
Approach LOS		B			C		C		A

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 15 (14%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.95	
Intersection Signal Delay: 25.1	Intersection LOS: C
Intersection Capacity Utilization 95.3%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy





Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	7	718	672	192	456	400	291	2	8
v/c Ratio	0.02	0.95	0.53	0.88	0.55	0.84	0.48	0.02	0.02
Control Delay	13.3	37.6	1.2	58.5	19.4	47.7	6.3	46.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.3	37.6	1.2	58.5	19.4	47.7	6.3	46.0	0.1
Queue Length 50th (m)	0.4	125.2	0.0	23.1	60.5	72.1	0.3	0.4	0.0
Queue Length 95th (m)	m0.5	m#208.1	m0.0	#63.7	89.8	#123.5	19.9	2.8	0.0
Internal Link Dist (m)		194.3			158.2		78.8		37.3
Turn Bay Length (m)	55.0					50.0		15.0	
Base Capacity (vph)	349	752	1262	218	830	475	612	94	423
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	0.02	0.95	0.53	0.88	0.55	0.84	0.48	0.02	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.

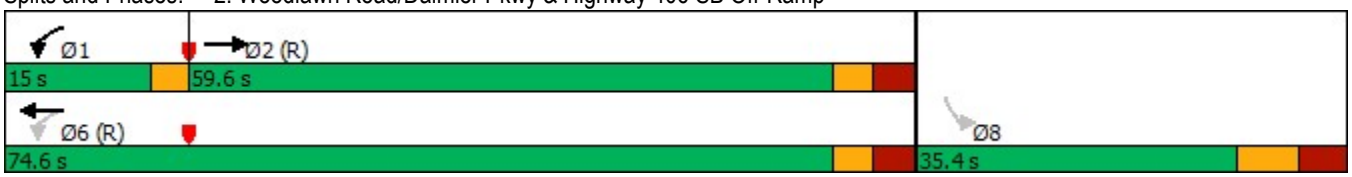
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	661	618	177	419	1	368	0	268	2	0	7
Future Volume (vph)	6	661	618	177	419	1	368	0	268	2	0	7
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0		9.0	9.0	
Lane Util. Factor	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	1.00		1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1521		1606	1336		1691	1450	
Flt Permitted	0.50	1.00	1.00	0.10	1.00		0.58	1.00		0.58	1.00	
Satd. Flow (perm)	818	1761	1262	157	1521		978	1336		1036	1450	
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)	7	718	672	192	455	1	400	0	291	2	0	8
RTOR Reduction (vph)	0	0	0	0	0	0	0	200	0	0	7	0
Lane Group Flow (vph)	7	718	672	192	456	0	400	91	0	2	1	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	47.0	47.0	110.0	60.0	60.0		34.0	34.0		10.0	10.0	
Effective Green, g (s)	47.0	47.0	110.0	60.0	60.0		34.0	34.0		10.0	10.0	
Actuated g/C Ratio	0.43	0.43	1.00	0.55	0.55		0.31	0.31		0.09	0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0		9.0	9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	349	752	1262	212	829		422	412		94	131	
v/s Ratio Prot		c0.41		c0.08	0.30		c0.18	0.07			0.00	
v/s Ratio Perm	0.01		0.53	0.41			c0.11			0.00		
v/c Ratio	0.02	0.95	0.53	0.91	0.55		0.95	0.22		0.02	0.01	
Uniform Delay, d1	18.2	30.5	0.0	26.9	16.2		35.6	28.2		45.5	45.5	
Progression Factor	0.72	0.69	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	14.9	0.8	36.7	2.6		30.5	0.3		0.4	0.1	
Delay (s)	13.1	35.8	0.8	63.6	18.9		66.1	28.5		46.0	45.6	
Level of Service	B	D	A	E	B		E	C		D	D	
Approach Delay (s)		18.9			32.1			50.3			45.6	
Approach LOS		B			C			D			D	

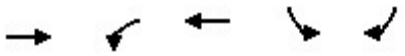
Intersection Summary			
HCM 2000 Control Delay	30.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	95.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	980	175	602	305	725
Future Volume (vph)	980	175	602	305	725
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	59.6	15.0	74.6	35.4	
Total Split (%)	54.2%	13.6%	67.8%	32.2%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	
Act Effct Green (s)	55.3	73.7	69.9	24.1	110.0
Actuated g/C Ratio	0.50	0.67	0.64	0.22	1.00
v/c Ratio	0.86	0.81	0.60	0.87	0.56
Control Delay	30.2	42.5	10.5	64.4	1.6
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	30.2	42.5	10.7	64.4	1.6
LOS	C	D	B	E	A
Approach Delay	30.2		17.9		
Approach LOS	C		B		

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.87	
Intersection Signal Delay: 23.8	Intersection LOS: C
Intersection Capacity Utilization 82.8%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp





Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1410	190	654	332	788
v/c Ratio	0.86	0.81	0.60	0.87	0.56
Control Delay	30.2	42.5	10.5	64.4	1.6
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	30.2	42.5	10.7	64.4	1.6
Queue Length 50th (m)	136.3	22.9	80.6	67.4	0.0
Queue Length 95th (m)	#174.2	m#47.4	m95.0	#109.9	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1645	240	1094	415	1415
Starvation Cap Reductn	0	0	81	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.86	0.79	0.65	0.80	0.56

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	980	317	175	602	0	0	0	0	305	0	725
Future Volume (vph)	0	980	317	175	602	0	0	0	0	305	0	725
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3222		1555	1722					1743		1415
Flt Permitted		1.00		0.08	1.00					0.95		1.00
Satd. Flow (perm)		3222		127	1722					1743		1415
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)	0	1065	345	190	654	0	0	0	0	332	0	788
RTOR Reduction (vph)	0	27	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1383	0	190	654	0	0	0	0	332	0	788
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		55.3		69.9	69.9					24.1		110.0
Effective Green, g (s)		55.3		69.9	69.9					24.1		110.0
Actuated g/C Ratio		0.50		0.64	0.64					0.22		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1619		231	1094					381		1415
v/s Ratio Prot		0.43		c0.09	0.38							
v/s Ratio Perm				c0.44						c0.19		0.56
v/c Ratio		0.85		0.82	0.60					0.87		0.56
Uniform Delay, d1		23.8		27.9	11.8					41.5		0.0
Progression Factor		1.00		0.98	0.69					1.00		1.00
Incremental Delay, d2		6.0		15.6	1.8					19.1		1.6
Delay (s)		29.8		43.0	9.8					60.5		1.6
Level of Service		C		D	A					E		A
Approach Delay (s)		29.8			17.3			0.0			19.1	
Approach LOS		C			B			A			B	

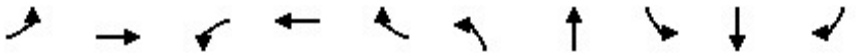
Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	82.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	436	1060	28	1014	285	128	102	233	143	474
Future Volume (vph)	436	1060	28	1014	285	128	102	233	143	474
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	34.2	83.3	49.1	49.1	49.1	9.0	21.2	15.5	27.7	27.7
Total Split (%)	28.5%	69.4%	40.9%	40.9%	40.9%	7.5%	17.7%	12.9%	23.1%	23.1%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	81.1	76.2	41.2	41.2	41.2	23.4	13.1	32.9	19.6	19.6
Actuated g/C Ratio	0.68	0.64	0.34	0.34	0.34	0.20	0.11	0.27	0.16	0.16
v/c Ratio	1.05	0.62	0.26	0.98	0.50	0.62	0.84	0.90	0.55	0.87
Control Delay	88.7	14.8	35.6	62.1	6.9	51.7	86.5	73.4	54.0	23.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	88.7	14.8	35.6	62.1	6.9	51.7	86.5	73.4	54.0	23.2
LOS	F	B	D	E	A	D	F	E	D	C
Approach Delay		34.8		49.7			69.1		42.1	
Approach LOS		C		D			E		D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 120	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.05	
Intersection Signal Delay: 43.4	Intersection LOS: D
Intersection Capacity Utilization 100.6%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road





Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	474	1273	30	1102	310	139	139	253	155	515
v/c Ratio	1.05	0.62	0.26	0.98	0.50	0.62	0.84	0.90	0.55	0.87
Control Delay	88.7	14.8	35.6	62.1	6.9	51.7	86.5	73.4	54.0	23.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	88.7	14.8	35.6	62.1	6.9	51.7	86.5	73.4	54.0	23.2
Queue Length 50th (m)	~109.1	88.7	5.1	134.5	1.9	26.0	30.3	51.7	33.7	9.9
Queue Length 95th (m)	#173.4	109.2	13.8	#180.3	23.3	44.0	#63.7	#101.3	55.1	#72.9
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	453	2053	117	1123	619	224	175	281	292	597
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	1.05	0.62	0.26	0.98	0.50	0.62	0.79	0.90	0.53	0.86

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.

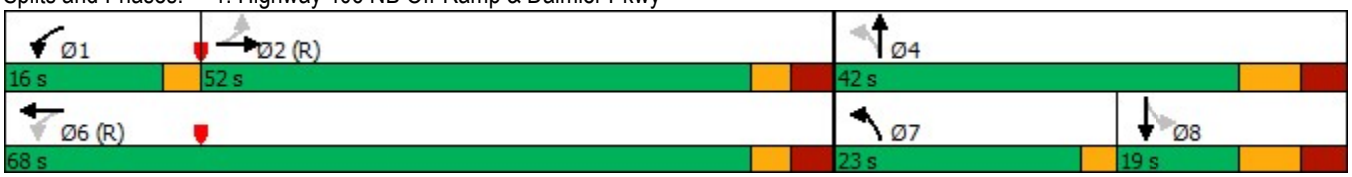
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	436	1060	111	28	1014	285	128	102	26	233	143	474
Future Volume (vph)	436	1060	111	28	1014	285	128	102	26	233	143	474
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	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	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3225		1486	3271	1234	1486	1443		1486	1722	1234
Flt Permitted	0.09	1.00		0.22	1.00	1.00	0.66	1.00		0.48	1.00	1.00
Satd. Flow (perm)	142	3225		341	3271	1234	1031	1443		744	1722	1234
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)	474	1152	121	30	1102	310	139	111	28	253	155	515
RTOR Reduction (vph)	0	7	0	0	0	196	0	8	0	0	0	391
Lane Group Flow (vph)	474	1266	0	30	1102	114	139	131	0	253	155	124
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	76.2	76.2		41.2	41.2	41.2	19.1	13.1		28.6	19.6	19.6
Effective Green, g (s)	76.2	76.2		41.2	41.2	41.2	19.1	13.1		28.6	19.6	19.6
Actuated g/C Ratio	0.64	0.64		0.34	0.34	0.34	0.16	0.11		0.24	0.16	0.16
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	448	2047		117	1123	423	186	157		254	281	201
v/s Ratio Prot	c0.28	0.39			0.34		0.04	0.09		c0.10	0.09	
v/s Ratio Perm	c0.39			0.09		0.09	0.08			c0.13		0.10
v/c Ratio	1.06	0.62		0.26	0.98	0.27	0.75	0.83		1.00	0.55	0.62
Uniform Delay, d1	36.3	13.2		28.4	39.0	28.5	47.2	52.4		44.1	46.2	46.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	58.7	1.4		0.8	22.3	0.3	14.5	29.5		55.0	1.9	4.8
Delay (s)	95.0	14.6		29.2	61.3	28.8	61.7	81.9		99.1	48.0	51.5
Level of Service	F	B		C	E	C	E	F		F	D	D
Approach Delay (s)		36.4			53.7			71.8			64.0	
Approach LOS		D			D			E			E	

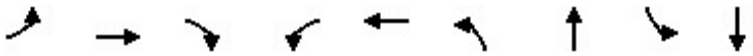
Intersection Summary			
HCM 2000 Control Delay	50.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	100.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	7	568	640	231	512	360	1	1	6
Future Volume (vph)	7	568	640	231	512	360	1	1	6
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2		1	6	7	4		8
Permitted Phases	2		Free	6		4		8	
Detector Phase	2	2		1	6	7	4	8	8
Switch Phase									
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0	19.0
Total Split (s)	52.0	52.0		16.0	68.0	23.0	42.0	19.0	19.0
Total Split (%)	47.3%	47.3%		14.5%	61.8%	20.9%	38.2%	17.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	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
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max	None	None	Max	Max
Act Effct Green (s)	45.4	45.4	110.0	65.0	61.0	39.0	33.0	10.0	10.0
Actuated g/C Ratio	0.41	0.41	1.00	0.59	0.55	0.35	0.30	0.09	0.09
v/c Ratio	0.03	0.85	0.55	0.82	0.66	0.85	0.43	0.01	0.08
Control Delay	10.1	24.8	3.9	36.0	22.0	49.6	6.3	46.0	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	24.8	3.9	36.0	22.0	49.6	6.3	46.0	36.5
LOS	B	C	A	D	C	D	A	D	D
Approach Delay		13.7			26.4		32.7		37.2
Approach LOS		B			C		C		D

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 8 (7%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 21.9	Intersection LOS: C
Intersection Capacity Utilization 94.7%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy





Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	8	617	696	251	558	391	250	1	12
v/c Ratio	0.03	0.85	0.55	0.82	0.66	0.85	0.43	0.01	0.08
Control Delay	10.1	24.8	3.9	36.0	22.0	49.6	6.3	46.0	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	24.8	3.9	36.0	22.0	49.6	6.3	46.0	36.5
Queue Length 50th (m)	0.0	96.1	0.1	24.7	80.1	71.0	0.2	0.2	1.4
Queue Length 95th (m)	m0.4	m39.1	m32.7	#61.6	118.4	#123.8	18.2	1.8	7.3
Internal Link Dist (m)		194.3			158.2		78.8		37.3
Turn Bay Length (m)	55.0					50.0		15.0	
Base Capacity (vph)	307	726	1262	312	844	460	575	97	149
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	0.03	0.85	0.55	0.80	0.66	0.85	0.43	0.01	0.08

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.

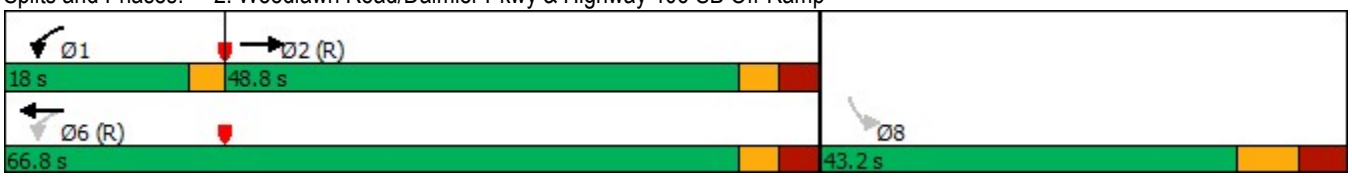
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	568	640	231	512	1	360	1	229	1	6	5
Future Volume (vph)	7	568	640	231	512	1	360	1	229	1	6	5
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0		9.0	9.0	
Lane Util. Factor	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	1.00		1.00	0.85		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1521		1606	1337		1691	1599	
Flt Permitted	0.46	1.00	1.00	0.17	1.00		0.58	1.00		0.60	1.00	
Satd. Flow (perm)	745	1761	1262	273	1521		975	1337		1075	1599	
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)	8	617	696	251	557	1	391	1	249	1	7	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	174	0	0	5	0
Lane Group Flow (vph)	8	617	696	251	558	0	391	76	0	1	7	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	45.4	45.4	110.0	61.0	61.0		33.0	33.0		10.0	10.0	
Effective Green, g (s)	45.4	45.4	110.0	61.0	61.0		33.0	33.0		10.0	10.0	
Actuated g/C Ratio	0.41	0.41	1.00	0.55	0.55		0.30	0.30		0.09	0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0		9.0	9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	307	726	1262	298	843		407	401		97	145	
v/s Ratio Prot		0.35		c0.10	0.37		c0.17	0.06			0.00	
v/s Ratio Perm	0.01		0.55	c0.37			c0.11			0.00		
v/c Ratio	0.03	0.85	0.55	0.84	0.66		0.96	0.19		0.01	0.05	
Uniform Delay, d1	19.2	29.2	0.0	19.2	17.2		36.4	28.6		45.5	45.7	
Progression Factor	0.51	0.57	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	7.0	1.0	18.9	4.1		34.4	0.2		0.2	0.7	
Delay (s)	9.8	23.5	1.0	38.2	21.3		70.8	28.8		45.7	46.3	
Level of Service	A	C	A	D	C		E	C		D	D	
Approach Delay (s)		11.5			26.5			54.4			46.3	
Approach LOS		B			C			D			D	

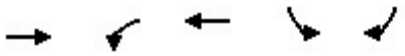
Intersection Summary			
HCM 2000 Control Delay	25.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	94.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	983	207	637	232	791
Future Volume (vph)	983	207	637	232	791
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	48.8	18.0	66.8	43.2	
Total Split (%)	44.4%	16.4%	60.7%	39.3%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	
Act Effct Green (s)	53.6	76.3	72.5	21.5	110.0
Actuated g/C Ratio	0.49	0.69	0.66	0.20	1.00
v/c Ratio	0.90	0.78	0.61	0.74	0.61
Control Delay	35.9	38.0	9.7	54.5	1.9
Queue Delay	0.0	0.0	0.3	0.0	0.0
Total Delay	35.9	38.0	10.0	54.5	1.9
LOS	D	D	B	D	A
Approach Delay	35.9		16.9		
Approach LOS	D		B		

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 108 (98%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 23.8	Intersection LOS: C
Intersection Capacity Utilization 81.0%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp





Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1436	225	692	252	860
v/c Ratio	0.90	0.78	0.61	0.74	0.61
Control Delay	35.9	38.0	9.7	54.5	1.9
Queue Delay	0.0	0.0	0.3	0.0	0.0
Total Delay	35.9	38.0	10.0	54.5	1.9
Queue Length 50th (m)	140.2	26.2	57.4	51.4	0.0
Queue Length 95th (m)	#229.7	m52.7	m115.7	72.6	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1592	307	1135	538	1415
Starvation Cap Reductn	0	0	101	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.90	0.73	0.67	0.47	0.61

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	983	339	207	637	0	0	0	0	232	0	791
Future Volume (vph)	0	983	339	207	637	0	0	0	0	232	0	791
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3216		1555	1722					1743		1415
Flt Permitted		1.00		0.07	1.00					0.95		1.00
Satd. Flow (perm)		3216		116	1722					1743		1415
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)	0	1068	368	225	692	0	0	0	0	252	0	860
RTOR Reduction (vph)	0	26	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1410	0	225	692	0	0	0	0	252	0	860
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		53.6		72.5	72.5					21.5		110.0
Effective Green, g (s)		53.6		72.5	72.5					21.5		110.0
Actuated g/C Ratio		0.49		0.66	0.66					0.20		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1567		284	1134					340		1415
v/s Ratio Prot		c0.44		c0.11	0.40							
v/s Ratio Perm				0.41						0.14		c0.61
v/c Ratio		0.90		0.79	0.61					0.74		0.61
Uniform Delay, d1		25.8		31.0	10.7					41.6		0.0
Progression Factor		1.00		1.00	0.67					1.00		1.00
Incremental Delay, d2		8.7		9.6	1.6					8.4		1.9
Delay (s)		34.4		40.7	8.7					50.1		1.9
Level of Service		C		D	A					D		A
Approach Delay (s)		34.4			16.6			0.0			12.9	
Approach LOS		C			B			A			B	

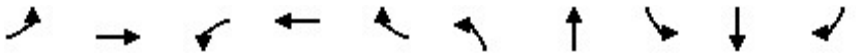
Intersection Summary			
HCM 2000 Control Delay	22.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	81.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	751	962	18	1053	357	135	217	340	178	657
Future Volume (vph)	751	962	18	1053	357	135	217	340	178	657
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	44.0	86.0	42.0	42.0	42.0	9.0	23.0	21.0	35.0	35.0
Total Split (%)	33.8%	66.2%	32.3%	32.3%	32.3%	6.9%	17.7%	16.2%	26.9%	26.9%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	83.0	78.1	34.1	34.1	34.1	26.0	15.7	41.0	27.7	27.7
Actuated g/C Ratio	0.64	0.60	0.26	0.26	0.26	0.20	0.12	0.32	0.21	0.21
v/c Ratio	1.56	0.60	0.20	1.33	0.74	0.67	1.38	1.40	0.53	1.00
Control Delay	289.6	17.5	43.6	196.6	22.3	56.2	244.6	231.2	51.4	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	289.6	17.5	43.6	196.6	22.3	56.2	244.6	231.2	51.4	44.4
LOS	F	B	D	F	C	E	F	F	D	D
Approach Delay		129.8		151.1			174.7		99.6	
Approach LOS		F		F			F		F	

Intersection Summary		
Cycle Length: 130		
Actuated Cycle Length: 130		
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green		
Natural Cycle: 130		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 1.56		
Intersection Signal Delay: 132.2	Intersection LOS: F	
Intersection Capacity Utilization 135.1%	ICU Level of Service H	
Analysis Period (min) 15		

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road





Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	816	1162	20	1145	388	147	249	370	193	714
v/c Ratio	1.56	0.60	0.20	1.33	0.74	0.67	1.38	1.40	0.53	1.00
Control Delay	289.6	17.5	43.6	196.6	22.3	56.2	244.6	231.2	51.4	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	289.6	17.5	43.6	196.6	22.3	56.2	244.6	231.2	51.4	44.4
Queue Length 50th (m)	~282.5	91.3	4.0	~200.5	26.6	28.6	~84.7	~111.0	44.2	50.0
Queue Length 95th (m)	#358.7	111.3	11.7	#242.3	67.6	#48.6	#137.7	#172.1	68.6	#139.5
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	523	1942	100	858	525	221	180	265	366	715
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	1.56	0.60	0.20	1.33	0.74	0.67	1.38	1.40	0.53	1.00

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	751	962	107	18	1053	357	135	217	12	340	178	657
Future Volume (vph)	751	962	107	18	1053	357	135	217	12	340	178	657
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	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	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3222		1486	3271	1234	1486	1477		1486	1722	1234
Flt Permitted	0.11	1.00		0.24	1.00	1.00	0.64	1.00		0.21	1.00	1.00
Satd. Flow (perm)	169	3222		381	3271	1234	995	1477		335	1722	1234
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)	816	1046	116	20	1145	388	147	236	13	370	193	714
RTOR Reduction (vph)	0	6	0	0	0	202	0	2	0	0	0	452
Lane Group Flow (vph)	816	1156	0	20	1145	186	147	247	0	370	193	262
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	78.1	78.1		34.1	34.1	34.1	21.7	15.7		36.7	27.7	27.7
Effective Green, g (s)	78.1	78.1		34.1	34.1	34.1	21.7	15.7		36.7	27.7	27.7
Actuated g/C Ratio	0.60	0.60		0.26	0.26	0.26	0.17	0.12		0.28	0.21	0.21
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	516	1935		99	858	323	188	178		253	366	262
v/s Ratio Prot	c0.50	0.36			0.35		0.04	0.17		c0.20	0.11	
v/s Ratio Perm	c0.45			0.05		0.15	0.09			c0.21		0.21
v/c Ratio	1.58	0.60		0.20	1.33	0.58	0.78	1.39		1.46	0.53	1.00
Uniform Delay, d1	37.5	16.2		37.4	48.0	41.7	50.8	57.1		42.0	45.3	51.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	270.8	1.4		0.7	158.5	2.0	18.3	205.8		228.6	1.0	54.7
Delay (s)	308.3	17.5		38.1	206.4	43.7	69.1	262.9		270.6	46.4	105.8
Level of Service	F	B		D	F	D	E	F		F	D	F
Approach Delay (s)		137.5			163.6			191.0			144.6	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	151.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.61		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	135.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX 7

Future (2051) Total Traffic Conditions – Queueing Analysis Results



Future Total (2051) Conditions Model – No Train – Microsimulation Results				
Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	35
			EBT	55
			EBR	54
			NBL	29
			NBT	27
			NBR	27
			SBL	18
			SBT	22
			SBR	17
			WBL	11
			WBT	74
			WBR	14
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	130
			EBT	130
			SBL	33
			WBL	35
			WBT	68
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1
			EBT	58
			EBR	-
			NBL	49
			NBT	14
			NBR	14
			SBL	0
			SBT	7
			SBR	7
			WBL	52
			WBT	69
			WBR	69
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	39
			EBT	39
			EBR	39
			NBL	30
			SBR	15
			WBT	27
	1	Woodlawn Road and Primeway	EBL	121
			EBT	146
			EBR	146
			NBL	44
			NBT	53
			NBR	53

PM Peak Hour	1	Drive / Brown Road	SBL	54
			SBT	51
			SBR	68
			WBL	19
			WBT	130
			WBR	41
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	240
			EBT	242
			SBL	93
			WBL	47
			WBT	132
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	6
			EBT	192
			EBR	-
			NBL	107
			NBT	52
			NBR	52
			SBL	8
			SBT	9
			SBR	9
			WBL	50
			WBT	68
			WBR	68
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	54
			EBT	54
			EBR	54
			NBL	74
			SBR	10
			WBT	24
k Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	270
			EBT	280
			EBR	280
			NBL	45
			NBT	77
			NBR	77
			SBL	99
			SBT	96
			SBR	98
			WBL	12
			WBT	141
			WBR	43
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	188
			EBT	189
			SBL	67
			WBL	39
			WBT	106
			EBL	8

SAT Peal	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBT	130
			EBR	-
			NBL	79
			NBT	26
			NBR	26
			SBL	4
			SBT	9
			SBR	9
			WBL	49
			WBT	68
			WBR	68
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	123
			EBT	123
			EBR	123
			NBL	55
			SBR	12
			WBT	23

Future Total (2051) Conditions Model – With Train – Microsimulation Results				
Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	35
			EBT	55
			EBR	54
			NBL	29
			NBT	27
			NBR	27
			SBL	18
			SBT	22
			SBR	17
			WBL	10
			WBT	75
			WBR	15
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	131
			EBT	131
			SBL	33
			WBL	37
			WBT	91
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1
			EBT	65
			EBR	-
			NBL	49
			NBT	17
			NBR	17
			SBL	0
			SBT	7
			SBR	7
			WBL	62
			WBT	69
			WBR	69
	4	Rail Crossing	EBT	60
			WBT	130
	5	Daimler Parkway and Street 'A'	EBL	40
			EBT	40
			EBR	40
			NBL	31
			SBR	15
			WBT	25
	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	120
			EBT	146
			EBR	146
			NBL	46
			NBT	53
			NBR	53
			SBL	55

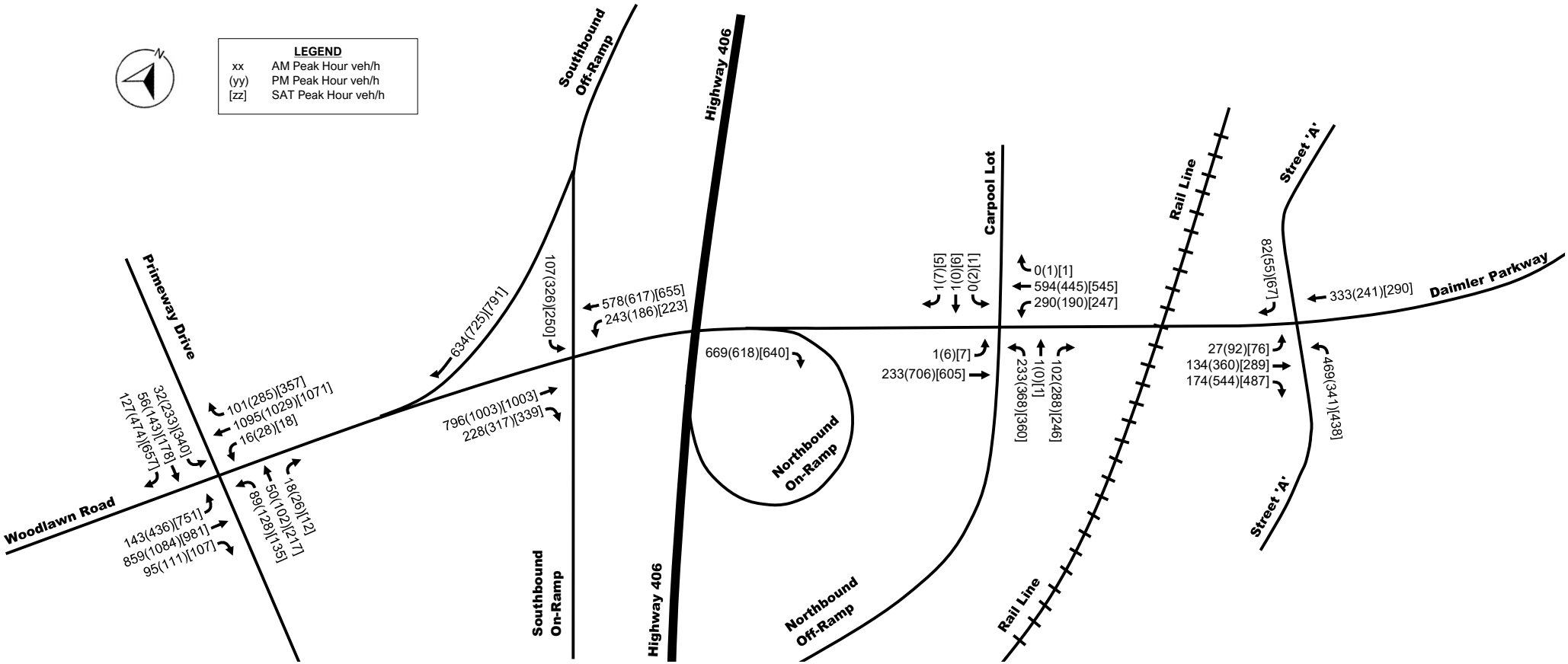
PM Peak Hour			SBT	52
			SBR	67
			WBL	17
			WBT	132
			WBR	42
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	241
			EBT	245
			SBL	125
			WBL	46
			WBT	168
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	6
			EBT	217
			EBR	-
			NBL	107
			NBT	98
			NBR	98
			SBL	8
			SBT	9
			SBR	9
			WBL	58
			WBT	68
			WBR	68
	4	Rail Crossing	EBT	59
			WBT	123
	5	Daimler Parkway and Street 'A'	EBL	59
			EBT	59
			EBR	59
			NBL	76
			SBR	10
			WBT	23

APPENDIX 8

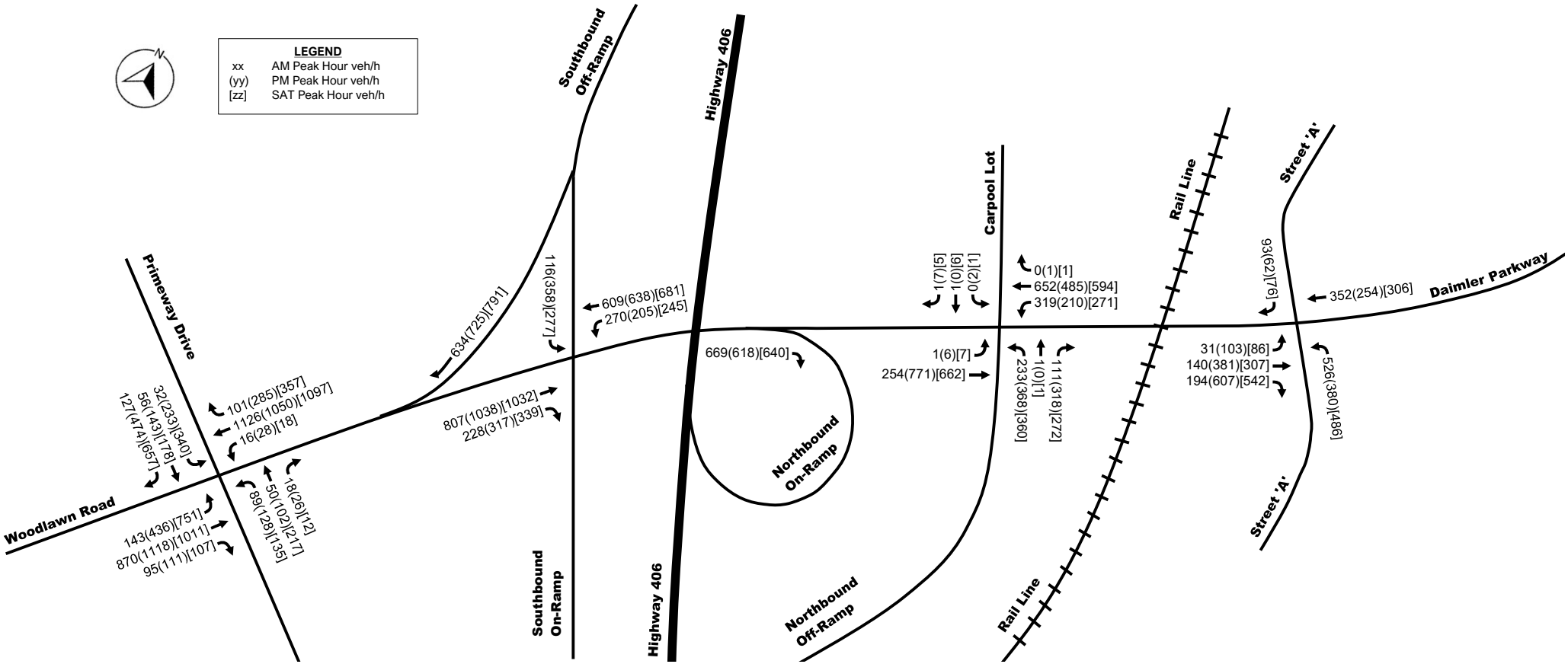
Sensitivity Analyses Volume Diagrams



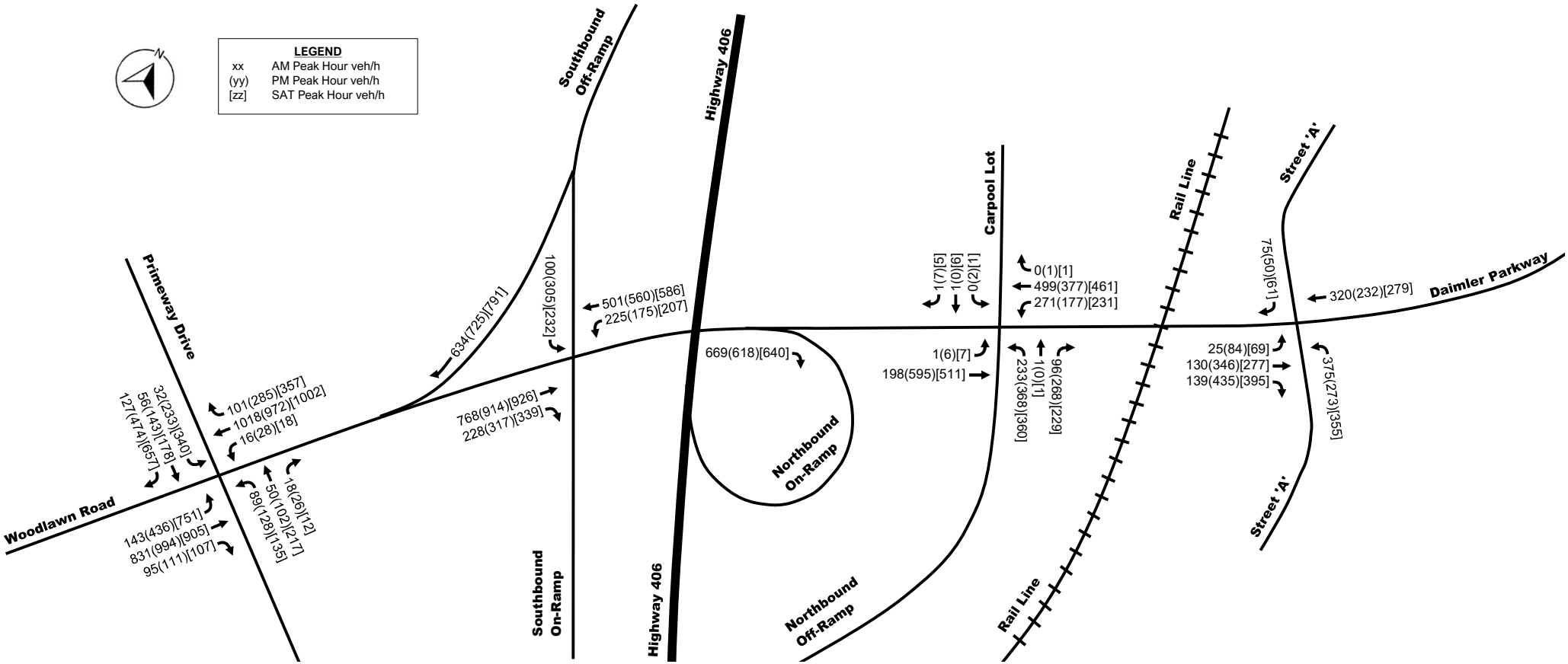
Sensitivity Analysis #1



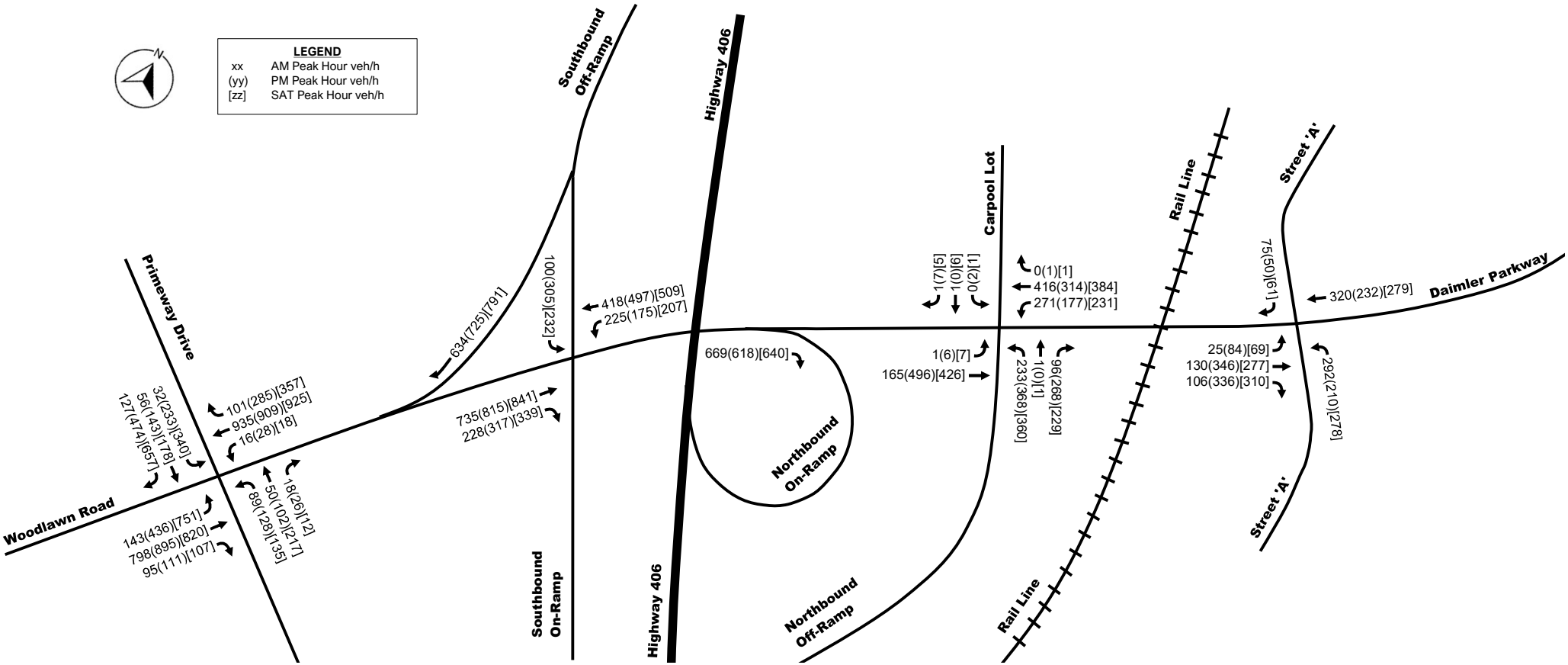
Sensitivity Analysis #2



Sensitivity Analysis #3



Sensitivity Analysis #4



APPENDIX 9

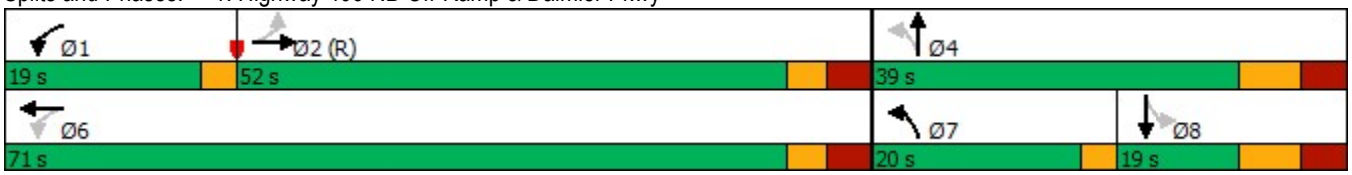
Sensitivity Analysis #1 – 10% Increase to Residential Density – Synchro Analysis Results



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Configurations								
Traffic Volume (vph)	1	233	669	290	594	233	1	1
Future Volume (vph)	1	233	669	290	594	233	1	1
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	NA
Protected Phases		2		1	6	7	4	8
Permitted Phases	2		Free	6		4		
Detector Phase	2	2		1	6	7	4	8
Switch Phase								
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0
Total Split (s)	52.0	52.0		19.0	71.0	20.0	39.0	19.0
Total Split (%)	47.3%	47.3%		17.3%	64.5%	18.2%	35.5%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes
Recall Mode	C-Max	C-Max		None	None	None	None	Max
Act Effct Green (s)	46.4	46.4	110.0	68.0	64.0	36.0	30.0	10.4
Actuated g/C Ratio	0.42	0.42	1.00	0.62	0.58	0.33	0.27	0.09
v/c Ratio	0.00	0.34	0.58	0.51	0.73	0.61	0.25	0.01
Control Delay	5.0	7.8	9.0	13.2	22.8	36.8	7.6	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	7.8	9.0	13.2	22.8	36.8	7.6	39.0
LOS	A	A	A	B	C	D	A	D
Approach Delay		8.7			19.7		27.8	39.0
Approach LOS		A			B		C	D

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 49 (45%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 16.3	Intersection LOS: B
Intersection Capacity Utilization 91.9%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy





Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	1	253	727	315	646	253	112	2
v/c Ratio	0.00	0.34	0.58	0.51	0.73	0.61	0.25	0.01
Control Delay	5.0	7.8	9.0	13.2	22.8	36.8	7.6	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	7.8	9.0	13.2	22.8	36.8	7.6	39.0
Queue Length 50th (m)	0.1	16.9	60.1	30.0	94.9	43.1	0.2	0.2
Queue Length 95th (m)	m0.1	m23.1	67.0	45.9	141.3	67.4	13.3	2.6
Internal Link Dist (m)		194.3			158.2		78.8	37.3
Turn Bay Length (m)	55.0					50.0		
Base Capacity (vph)	281	742	1262	631	885	419	445	150
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	0.00	0.34	0.58	0.50	0.73	0.60	0.25	0.01

Intersection Summary

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

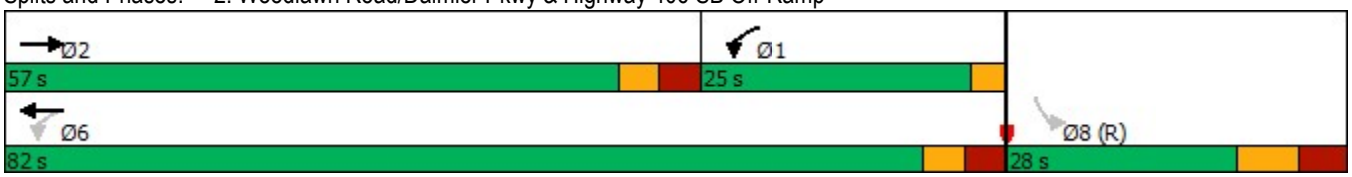
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	233	669	290	594	0	233	1	102	0	1	1
Future Volume (vph)	1	233	669	290	594	0	233	1	102	0	1	1
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0			9.0	
Lane Util. Factor	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			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1522		1606	1338			1578	
Flt Permitted	0.41	1.00	1.00	0.52	1.00		0.59	1.00			1.00	
Satd. Flow (perm)	669	1761	1262	858	1522		993	1338			1578	
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)	1	253	727	315	646	0	253	1	111	0	1	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	81	0	0	1	0
Lane Group Flow (vph)	1	253	727	315	646	0	253	31	0	0	1	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	46.4	46.4	110.0	64.0	64.0		30.0	30.0			10.4	
Effective Green, g (s)	46.4	46.4	110.0	64.0	64.0		30.0	30.0			10.4	
Actuated g/C Ratio	0.42	0.42	1.00	0.58	0.58		0.27	0.27			0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0			9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	282	742	1262	591	885		363	364			149	
v/s Ratio Prot		0.14		0.07	c0.42		c0.11	0.02			0.00	
v/s Ratio Perm	0.00		c0.58	0.24			0.08					
v/c Ratio	0.00	0.34	0.58	0.53	0.73		0.70	0.09			0.01	
Uniform Delay, d1	18.4	21.5	0.0	12.3	16.7		34.6	29.8			45.1	
Progression Factor	0.28	0.31	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.0	0.9	1.4	0.9	3.0		5.7	0.1			0.1	
Delay (s)	5.1	7.5	1.4	13.3	19.8		40.3	29.9			45.2	
Level of Service	A	A	A	B	B		D	C			D	
Approach Delay (s)		3.0			17.6			37.1			45.2	
Approach LOS		A			B			D			D	

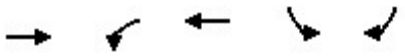
Intersection Summary			
HCM 2000 Control Delay	14.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	91.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	796	243	578	107	634
Future Volume (vph)	796	243	578	107	634
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	57.0	25.0	82.0	28.0	
Total Split (%)	51.8%	22.7%	74.5%	25.5%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	None	None	None	C-Max	
Act Effct Green (s)	45.0	67.4	63.6	30.4	110.0
Actuated g/C Ratio	0.41	0.61	0.58	0.28	1.00
v/c Ratio	0.83	0.81	0.63	0.24	0.49
Control Delay	33.3	41.8	12.2	36.2	1.2
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	33.3	41.8	12.4	36.2	1.2
LOS	C	D	B	D	A
Approach Delay	33.3		21.1		
Approach LOS	C		C		

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 0 (0%), Referenced to phase 8:SBL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 21.7	Intersection LOS: C
Intersection Capacity Utilization 66.0%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

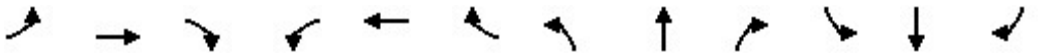




Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1113	264	628	116	689
v/c Ratio	0.83	0.81	0.63	0.24	0.49
Control Delay	33.3	41.8	12.2	36.2	1.2
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	33.3	41.8	12.4	36.2	1.2
Queue Length 50th (m)	104.4	32.3	53.8	19.6	0.0
Queue Length 95th (m)	122.5	m48.8	54.1	39.5	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1500	415	1177	482	1415
Starvation Cap Reductn	0	0	94	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.74	0.64	0.58	0.24	0.49

Intersection Summary

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	796	228	243	578	0	0	0	0	107	0	634
Future Volume (vph)	0	796	228	243	578	0	0	0	0	107	0	634
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.97		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3233		1555	1722					1743		1415
Flt Permitted		1.00		0.13	1.00					0.95		1.00
Satd. Flow (perm)		3233		220	1722					1743		1415
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)	0	865	248	264	628	0	0	0	0	116	0	689
RTOR Reduction (vph)	0	26	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1087	0	264	628	0	0	0	0	116	0	689
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		45.0		67.4	63.6					30.4		110.0
Effective Green, g (s)		45.0		67.4	63.6					30.4		110.0
Actuated g/C Ratio		0.41		0.61	0.58					0.28		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1322		324	995					481		1415
v/s Ratio Prot		0.34		c0.12	0.36							
v/s Ratio Perm				c0.38						0.07		c0.49
v/c Ratio		0.82		0.81	0.63					0.24		0.49
Uniform Delay, d1		28.9		31.4	15.4					30.9		0.0
Progression Factor		1.00		0.84	0.68					1.00		1.00
Incremental Delay, d2		4.3		10.7	0.9					1.2		1.2
Delay (s)		33.2		37.2	11.5					32.0		1.2
Level of Service		C		D	B					C		A
Approach Delay (s)		33.2			19.1			0.0			5.6	
Approach LOS		C			B			A			A	

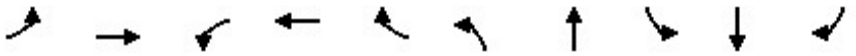
Intersection Summary			
HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	143	859	16	1095	101	89	50	32	56	127
Future Volume (vph)	143	859	16	1095	101	89	50	32	56	127
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	14.0	71.0	57.0	57.0	57.0	9.0	18.5	10.5	20.0	20.0
Total Split (%)	14.0%	71.0%	57.0%	57.0%	57.0%	9.0%	18.5%	10.5%	20.0%	20.0%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	72.3	67.4	55.7	55.7	55.7	19.1	11.2	20.1	10.2	10.2
Actuated g/C Ratio	0.72	0.67	0.56	0.56	0.56	0.19	0.11	0.20	0.10	0.10
v/c Ratio	0.54	0.48	0.07	0.65	0.15	0.42	0.43	0.14	0.35	0.55
Control Delay	12.7	9.2	13.9	18.9	3.1	37.8	41.9	30.5	46.7	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.7	9.2	13.9	18.9	3.1	37.8	41.9	30.5	46.7	16.1
LOS	B	A	B	B	A	D	D	C	D	B
Approach Delay		9.6		17.5			39.6		26.2	
Approach LOS		A		B			D		C	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.65	
Intersection Signal Delay: 16.3	Intersection LOS: B
Intersection Capacity Utilization 69.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road





Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	155	1037	17	1190	110	97	74	35	61	138
v/c Ratio	0.54	0.48	0.07	0.65	0.15	0.42	0.43	0.14	0.35	0.55
Control Delay	12.7	9.2	13.9	18.9	3.1	37.8	41.9	30.5	46.7	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.7	9.2	13.9	18.9	3.1	37.8	41.9	30.5	46.7	16.1
Queue Length 50th (m)	8.5	46.5	1.5	82.7	0.0	15.5	11.1	5.4	11.2	0.0
Queue Length 95th (m)	17.1	65.9	5.6	118.7	8.2	28.5	24.6	12.8	22.9	17.0
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	314	2179	240	1823	737	231	189	255	218	277
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	0.49	0.48	0.07	0.65	0.15	0.42	0.39	0.14	0.28	0.50

Intersection Summary

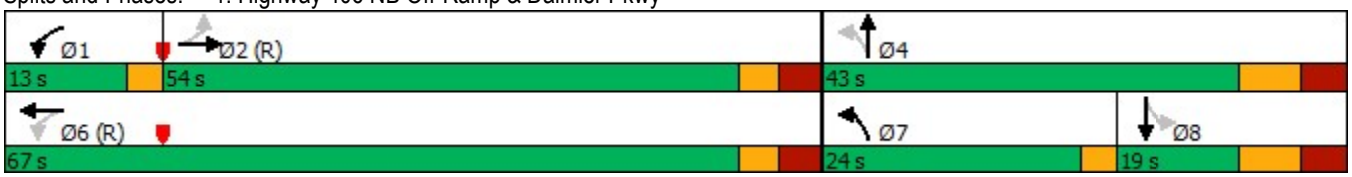
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	859	95	16	1095	101	89	50	18	32	56	127
Future Volume (vph)	143	859	95	16	1095	101	89	50	18	32	56	127
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	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	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3223		1486	3271	1234	1486	1428		1486	1722	1234
Flt Permitted	0.16	1.00		0.28	1.00	1.00	0.69	1.00		0.71	1.00	1.00
Satd. Flow (perm)	246	3223		432	3271	1234	1082	1428		1109	1722	1234
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)	155	934	103	17	1190	110	97	54	20	35	61	138
RTOR Reduction (vph)	0	8	0	0	0	50	0	13	0	0	0	123
Lane Group Flow (vph)	155	1029	0	17	1190	60	97	61	0	35	61	15
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	66.2	66.2		54.5	54.5	54.5	16.0	11.2		15.2	10.8	10.8
Effective Green, g (s)	66.2	66.2		54.5	54.5	54.5	16.0	11.2		15.2	10.8	10.8
Actuated g/C Ratio	0.66	0.66		0.54	0.54	0.54	0.16	0.11		0.15	0.11	0.11
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	270	2133		235	1782	672	192	159		185	185	133
v/s Ratio Prot	c0.05	0.32			c0.36		c0.02	0.04		0.01	0.04	
v/s Ratio Perm	0.33			0.04		0.05	c0.06			0.02		0.01
v/c Ratio	0.57	0.48		0.07	0.67	0.09	0.51	0.38		0.19	0.33	0.11
Uniform Delay, d1	9.6	8.4		10.8	16.3	10.9	37.8	41.2		36.8	41.3	40.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.7	0.8		0.1	0.9	0.0	1.6	1.1		0.4	0.8	0.3
Delay (s)	12.3	9.2		10.9	17.1	10.9	39.5	42.3		37.2	42.0	40.5
Level of Service	B	A		B	B	B	D	D		D	D	D
Approach Delay (s)		9.6			16.5			40.7			40.4	
Approach LOS		A			B			D			D	

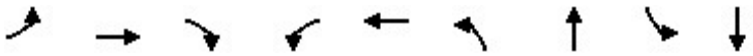
Intersection Summary			
HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	6	706	618	190	445	368	0	2	0
Future Volume (vph)	6	706	618	190	445	368	0	2	0
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2		1	6	7	4		8
Permitted Phases	2		Free	6		4		8	
Detector Phase	2	2		1	6	7	4	8	8
Switch Phase									
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0	19.0
Total Split (s)	54.0	54.0		13.0	67.0	24.0	43.0	19.0	19.0
Total Split (%)	49.1%	49.1%		11.8%	60.9%	21.8%	39.1%	17.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	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
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max	None	None	Max	Max
Act Effct Green (s)	47.0	47.0	110.0	64.0	60.0	40.0	34.0	10.0	10.0
Actuated g/C Ratio	0.43	0.43	1.00	0.58	0.55	0.36	0.31	0.09	0.09
v/c Ratio	0.02	1.02	0.53	1.01	0.58	0.84	0.52	0.02	0.02
Control Delay	11.8	51.3	1.0	93.2	20.3	47.7	8.9	46.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.8	51.3	1.0	93.2	20.3	47.7	8.9	46.0	0.1
LOS	B	D	A	F	C	D	A	D	A
Approach Delay		27.7			42.1		30.7		9.3
Approach LOS		C			D		C		A

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 17 (15%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.02	
Intersection Signal Delay: 31.9	Intersection LOS: C
Intersection Capacity Utilization 98.7%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy





Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	7	767	672	207	485	400	313	2	8
v/c Ratio	0.02	1.02	0.53	1.01	0.58	0.84	0.52	0.02	0.02
Control Delay	11.8	51.3	1.0	93.2	20.3	47.7	8.9	46.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.8	51.3	1.0	93.2	20.3	47.7	8.9	46.0	0.1
Queue Length 50th (m)	0.4	~176.6	0.0	~30.6	66.1	72.1	5.8	0.4	0.0
Queue Length 95th (m)	m0.4	m#220.3	m0.0	#77.8	98.1	#123.5	29.0	2.8	0.0
Internal Link Dist (m)		194.3			158.2		78.8		37.3
Turn Bay Length (m)	55.0					50.0		15.0	
Base Capacity (vph)	340	752	1262	205	830	475	602	92	406
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	0.02	1.02	0.53	1.01	0.58	0.84	0.52	0.02	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.

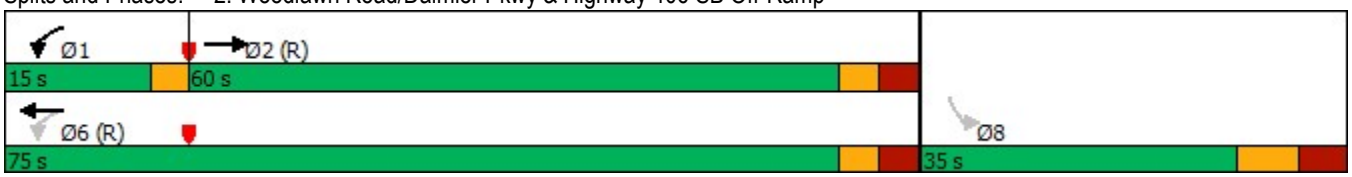
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	706	618	190	445	1	368	0	288	2	0	7
Future Volume (vph)	6	706	618	190	445	1	368	0	288	2	0	7
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0		9.0	9.0	
Lane Util. Factor	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	1.00		1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1521		1606	1336		1691	1450	
Flt Permitted	0.49	1.00	1.00	0.08	1.00		0.58	1.00		0.57	1.00	
Satd. Flow (perm)	797	1761	1262	131	1521		978	1336		1015	1450	
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)	7	767	672	207	484	1	400	0	313	2	0	8
RTOR Reduction (vph)	0	0	0	0	0	0	0	190	0	0	7	0
Lane Group Flow (vph)	7	767	672	207	485	0	400	123	0	2	1	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	47.0	47.0	110.0	60.0	60.0		34.0	34.0		10.0	10.0	
Effective Green, g (s)	47.0	47.0	110.0	60.0	60.0		34.0	34.0		10.0	10.0	
Actuated g/C Ratio	0.43	0.43	1.00	0.55	0.55		0.31	0.31		0.09	0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0		9.0	9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	340	752	1262	200	829		422	412		92	131	
v/s Ratio Prot		0.44		c0.09	0.32		c0.18	0.09			0.00	
v/s Ratio Perm	0.01		0.53	c0.47			c0.11			0.00		
v/c Ratio	0.02	1.02	0.53	1.03	0.59		0.95	0.30		0.02	0.01	
Uniform Delay, d1	18.2	31.5	0.0	32.5	16.7		35.6	28.9		45.5	45.5	
Progression Factor	0.64	0.70	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	27.3	0.7	73.1	3.0		30.5	0.4		0.4	0.1	
Delay (s)	11.6	49.2	0.7	105.6	19.7		66.1	29.3		46.0	45.6	
Level of Service	B	D	A	F	B		E	C		D	D	
Approach Delay (s)		26.5			45.4			50.0			45.6	
Approach LOS		C			D			D			D	

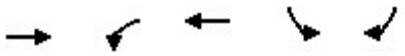
Intersection Summary			
HCM 2000 Control Delay	37.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	98.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	1003	186	617	326	725
Future Volume (vph)	1003	186	617	326	725
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	60.0	15.0	75.0	35.0	
Total Split (%)	54.5%	13.6%	68.2%	31.8%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	
Act Effct Green (s)	54.6	73.1	69.3	24.7	110.0
Actuated g/C Ratio	0.50	0.66	0.63	0.22	1.00
v/c Ratio	0.88	0.89	0.62	0.91	0.56
Control Delay	32.1	54.7	10.4	68.9	1.6
Queue Delay	0.0	0.0	0.3	0.0	0.0
Total Delay	32.1	54.7	10.7	68.9	1.6
LOS	C	D	B	E	A
Approach Delay	32.1		20.9		
Approach LOS	C		C		

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 108 (98%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 26.1	Intersection LOS: C
Intersection Capacity Utilization 85.5%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

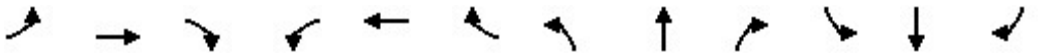




Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1435	202	671	354	788
v/c Ratio	0.88	0.89	0.62	0.91	0.56
Control Delay	32.1	54.7	10.4	68.9	1.6
Queue Delay	0.0	0.0	0.3	0.0	0.0
Total Delay	32.1	54.7	10.7	68.9	1.6
Queue Length 50th (m)	139.9	24.9	80.9	73.4	0.0
Queue Length 95th (m)	#181.5	m#56.1	m96.5	#122.5	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1628	233	1084	408	1415
Starvation Cap Reductn	0	0	84	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.88	0.87	0.67	0.87	0.56

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.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1003	317	186	617	0	0	0	0	326	0	725
Future Volume (vph)	0	1003	317	186	617	0	0	0	0	326	0	725
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3224		1555	1722					1743		1415
Flt Permitted		1.00		0.07	1.00					0.95		1.00
Satd. Flow (perm)		3224		114	1722					1743		1415
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)	0	1090	345	202	671	0	0	0	0	354	0	788
RTOR Reduction (vph)	0	27	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1408	0	202	671	0	0	0	0	354	0	788
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		54.6		69.3	69.3					24.7		110.0
Effective Green, g (s)		54.6		69.3	69.3					24.7		110.0
Actuated g/C Ratio		0.50		0.63	0.63					0.22		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1600		225	1084					391		1415
v/s Ratio Prot		0.44		c0.10	0.39							
v/s Ratio Perm				c0.47						c0.20		0.56
v/c Ratio		0.88		0.90	0.62					0.91		0.56
Uniform Delay, d1		24.8		31.7	12.3					41.5		0.0
Progression Factor		1.00		0.96	0.65					1.00		1.00
Incremental Delay, d2		7.3		26.1	1.9					23.8		1.6
Delay (s)		32.1		56.6	9.9					65.3		1.6
Level of Service		C		E	A					E		A
Approach Delay (s)		32.1			20.7			0.0			21.3	
Approach LOS		C			C			A			C	

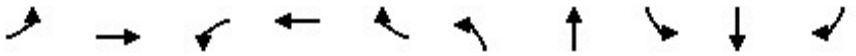
Intersection Summary			
HCM 2000 Control Delay	25.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	85.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	436	1084	28	1029	285	128	102	233	143	474
Future Volume (vph)	436	1084	28	1029	285	128	102	233	143	474
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	34.2	83.6	49.4	49.4	49.4	9.0	20.4	16.0	27.4	27.4
Total Split (%)	28.5%	69.7%	41.2%	41.2%	41.2%	7.5%	17.0%	13.3%	22.8%	22.8%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	81.1	76.2	41.5	41.5	41.5	22.9	12.6	32.9	19.6	19.6
Actuated g/C Ratio	0.68	0.64	0.35	0.35	0.35	0.19	0.10	0.27	0.16	0.16
v/c Ratio	1.05	0.63	0.26	0.99	0.50	0.63	0.88	0.90	0.55	0.87
Control Delay	91.1	15.0	35.9	63.5	7.0	53.0	95.2	73.0	54.2	23.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	91.1	15.0	35.9	63.5	7.0	53.0	95.2	73.0	54.2	23.9
LOS	F	B	D	E	A	D	F	E	D	C
Approach Delay		35.3		50.9			74.1		42.5	
Approach LOS		D		D			E		D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.05	
Intersection Signal Delay: 44.4	Intersection LOS: D
Intersection Capacity Utilization 101.0%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



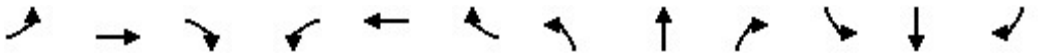


Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	474	1299	30	1118	310	139	139	253	155	515
v/c Ratio	1.05	0.63	0.26	0.99	0.50	0.63	0.88	0.90	0.55	0.87
Control Delay	91.1	15.0	35.9	63.5	7.0	53.0	95.2	73.0	54.2	23.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	91.1	15.0	35.9	63.5	7.0	53.0	95.2	73.0	54.2	23.9
Queue Length 50th (m)	~108.9	91.1	5.1	136.8	2.3	26.1	30.8	51.9	33.8	10.6
Queue Length 95th (m)	#173.2	112.1	13.8	#183.4	23.9	44.2	#66.6	#101.9	55.3	#74.3
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	450	2054	114	1131	619	219	164	282	288	592
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	1.05	0.63	0.26	0.99	0.50	0.63	0.85	0.90	0.54	0.87

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.



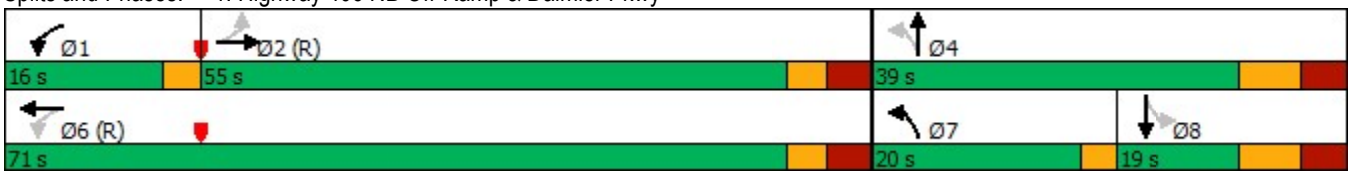
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	436	1084	111	28	1029	285	128	102	26	233	143	474
Future Volume (vph)	436	1084	111	28	1029	285	128	102	26	233	143	474
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	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	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3226		1486	3271	1234	1486	1443		1486	1722	1234
Flt Permitted	0.09	1.00		0.21	1.00	1.00	0.66	1.00		0.47	1.00	1.00
Satd. Flow (perm)	141	3226		332	3271	1234	1031	1443		731	1722	1234
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)	474	1178	121	30	1118	310	139	111	28	253	155	515
RTOR Reduction (vph)	0	6	0	0	0	193	0	7	0	0	0	388
Lane Group Flow (vph)	474	1293	0	30	1118	117	139	132	0	253	155	127
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	76.2	76.2		41.5	41.5	41.5	18.6	12.6		28.6	19.6	19.6
Effective Green, g (s)	76.2	76.2		41.5	41.5	41.5	18.6	12.6		28.6	19.6	19.6
Actuated g/C Ratio	0.64	0.64		0.35	0.35	0.35	0.16	0.10		0.24	0.16	0.16
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	444	2048		114	1131	426	182	151		256	281	201
v/s Ratio Prot	c0.28	0.40			0.34		0.04	0.09		c0.11	0.09	
v/s Ratio Perm	c0.40			0.09		0.09	0.08			c0.13		0.10
v/c Ratio	1.07	0.63		0.26	0.99	0.27	0.76	0.87		0.99	0.55	0.63
Uniform Delay, d1	36.5	13.3		28.2	39.0	28.4	47.7	52.9		43.9	46.2	46.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	61.9	1.5		0.9	23.7	0.3	16.6	38.5		52.4	1.9	5.5
Delay (s)	98.3	14.8		29.1	62.7	28.6	64.3	91.4		96.3	48.0	52.4
Level of Service	F	B		C	E	C	E	F		F	D	D
Approach Delay (s)		37.2			54.8			77.9			63.7	
Approach LOS		D			D			E			E	

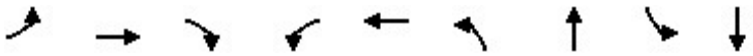
Intersection Summary			
HCM 2000 Control Delay	51.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	101.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	7	605	640	247	545	360	1	1	6
Future Volume (vph)	7	605	640	247	545	360	1	1	6
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2		1	6	7	4		8
Permitted Phases	2		Free	6		4		8	
Detector Phase	2	2		1	6	7	4	8	8
Switch Phase									
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0	19.0
Total Split (s)	55.0	55.0		16.0	71.0	20.0	39.0	19.0	19.0
Total Split (%)	50.0%	50.0%		14.5%	64.5%	18.2%	35.5%	17.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	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
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max	None	None	Max	Max
Act Effct Green (s)	48.2	48.2	110.0	68.0	64.0	36.0	30.0	10.0	10.0
Actuated g/C Ratio	0.44	0.44	1.00	0.62	0.58	0.33	0.27	0.09	0.09
v/c Ratio	0.03	0.85	0.55	0.86	0.67	0.94	0.48	0.01	0.08
Control Delay	14.3	25.4	1.8	41.8	20.5	66.6	7.0	46.0	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.3	25.4	1.8	41.8	20.5	66.6	7.0	46.0	36.5
LOS	B	C	A	D	C	E	A	D	D
Approach Delay		13.3			27.1		42.4		37.2
Approach LOS		B			C		D		D

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 8 (7%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 24.1	Intersection LOS: C
Intersection Capacity Utilization 96.9%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy





Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	8	658	696	268	593	391	268	1	12
v/c Ratio	0.03	0.85	0.55	0.86	0.67	0.94	0.48	0.01	0.08
Control Delay	14.3	25.4	1.8	41.8	20.5	66.6	7.0	46.0	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.3	25.4	1.8	41.8	20.5	66.6	7.0	46.0	36.5
Queue Length 50th (m)	0.5	60.3	0.0	25.8	82.1	74.3	0.2	0.2	1.4
Queue Length 95th (m)	m0.6	m115.3	m6.4	#70.3	121.8	#139.1	20.0	1.8	7.3
Internal Link Dist (m)		194.3			158.2		78.8		37.3
Turn Bay Length (m)	55.0					50.0		15.0	
Base Capacity (vph)	316	771	1262	313	885	416	559	96	149
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	0.03	0.85	0.55	0.86	0.67	0.94	0.48	0.01	0.08

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.

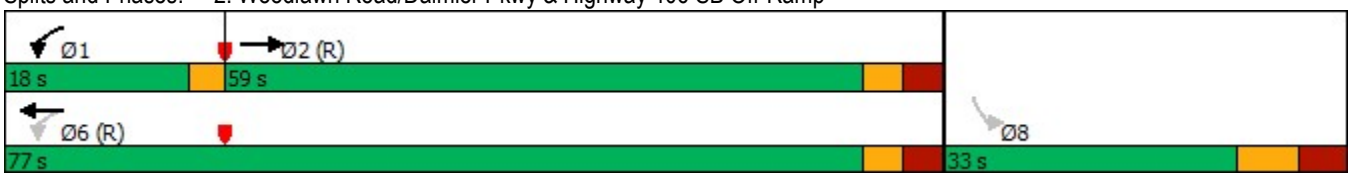
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	605	640	247	545	1	360	1	246	1	6	5
Future Volume (vph)	7	605	640	247	545	1	360	1	246	1	6	5
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0		9.0	9.0	
Lane Util. Factor	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	1.00		1.00	0.85		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1521		1606	1337		1691	1599	
Flt Permitted	0.44	1.00	1.00	0.16	1.00		0.58	1.00		0.59	1.00	
Satd. Flow (perm)	721	1761	1262	260	1521		975	1337		1058	1599	
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)	8	658	696	268	592	1	391	1	267	1	7	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	194	0	0	5	0
Lane Group Flow (vph)	8	658	696	268	593	0	391	74	0	1	7	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	48.2	48.2	110.0	64.0	64.0		30.0	30.0		10.0	10.0	
Effective Green, g (s)	48.2	48.2	110.0	64.0	64.0		30.0	30.0		10.0	10.0	
Actuated g/C Ratio	0.44	0.44	1.00	0.58	0.58		0.27	0.27		0.09	0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0		9.0	9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	315	771	1262	301	884		363	364		96	145	
v/s Ratio Prot		0.37		c0.10	0.39		c0.17	0.06			0.00	
v/s Ratio Perm	0.01		0.55	c0.41			c0.13			0.00		
v/c Ratio	0.03	0.85	0.55	0.89	0.67		1.08	0.20		0.01	0.05	
Uniform Delay, d1	17.6	27.7	0.0	19.9	15.8		38.7	30.8		45.5	45.7	
Progression Factor	0.79	0.65	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	6.2	0.9	26.2	4.0		69.4	0.3		0.2	0.7	
Delay (s)	13.9	24.2	0.9	46.1	19.8		108.1	31.1		45.7	46.3	
Level of Service	B	C	A	D	B		F	C		D	D	
Approach Delay (s)		12.2			28.0			76.8			46.3	
Approach LOS		B			C			E			D	

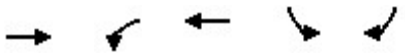
Intersection Summary			
HCM 2000 Control Delay	31.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	96.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	1003	223	655	250	791
Future Volume (vph)	1003	223	655	250	791
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	59.0	18.0	77.0	33.0	
Total Split (%)	53.6%	16.4%	70.0%	30.0%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	
Act Effct Green (s)	55.4	76.9	73.1	20.9	110.0
Actuated g/C Ratio	0.50	0.70	0.66	0.19	1.00
v/c Ratio	0.88	0.90	0.62	0.82	0.61
Control Delay	32.3	53.8	9.7	62.9	1.9
Queue Delay	0.0	0.0	0.4	0.0	0.0
Total Delay	32.3	53.8	10.1	62.9	1.9
LOS	C	D	B	E	A
Approach Delay	32.3		21.2		
Approach LOS	C		C		

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 108 (98%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 24.3	Intersection LOS: C
Intersection Capacity Utilization 83.7%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp





Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1458	242	712	272	860
v/c Ratio	0.88	0.90	0.62	0.82	0.61
Control Delay	32.3	53.8	9.7	62.9	1.9
Queue Delay	0.0	0.0	0.4	0.0	0.0
Total Delay	32.3	53.8	10.1	62.9	1.9
Queue Length 50th (m)	146.9	36.9	73.8	55.5	0.0
Queue Length 95th (m)	#198.5	m#66.3	m95.4	#85.4	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1649	281	1144	377	1415
Starvation Cap Reductn	0	0	108	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.88	0.86	0.69	0.72	0.61

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1003	339	223	655	0	0	0	0	250	0	791
Future Volume (vph)	0	1003	339	223	655	0	0	0	0	250	0	791
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3218		1555	1722					1743		1415
Flt Permitted		1.00		0.07	1.00					0.95		1.00
Satd. Flow (perm)		3218		112	1722					1743		1415
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)	0	1090	368	242	712	0	0	0	0	272	0	860
RTOR Reduction (vph)	0	28	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1430	0	242	712	0	0	0	0	272	0	860
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		55.4		73.1	73.1					20.9		110.0
Effective Green, g (s)		55.4		73.1	73.1					20.9		110.0
Actuated g/C Ratio		0.50		0.66	0.66					0.19		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1620		267	1144					331		1415
v/s Ratio Prot		0.44		c0.12	0.41							
v/s Ratio Perm				c0.48						0.16		c0.61
v/c Ratio		0.88		0.91	0.62					0.82		0.61
Uniform Delay, d1		24.4		33.5	10.6					42.8		0.0
Progression Factor		1.00		1.04	0.70					1.00		1.00
Incremental Delay, d2		7.3		22.0	1.6					15.0		1.9
Delay (s)		31.7		57.0	9.0					57.8		1.9
Level of Service		C		E	A					E		A
Approach Delay (s)		31.7			21.2			0.0			15.4	
Approach LOS		C			C			A			B	

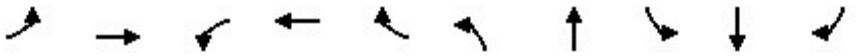
Intersection Summary			
HCM 2000 Control Delay	23.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	83.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	751	981	18	1071	357	135	217	340	178	657
Future Volume (vph)	751	981	18	1071	357	135	217	340	178	657
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	44.0	86.0	42.0	42.0	42.0	9.0	23.0	21.0	35.0	35.0
Total Split (%)	33.8%	66.2%	32.3%	32.3%	32.3%	6.9%	17.7%	16.2%	26.9%	26.9%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	83.0	78.1	34.1	34.1	34.1	26.0	15.7	41.0	27.7	27.7
Actuated g/C Ratio	0.64	0.60	0.26	0.26	0.26	0.20	0.12	0.32	0.21	0.21
v/c Ratio	1.56	0.61	0.20	1.36	0.74	0.67	1.38	1.40	0.53	1.00
Control Delay	289.6	17.8	43.8	205.8	22.3	56.2	244.6	231.2	51.4	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	289.6	17.8	43.8	205.8	22.3	56.2	244.6	231.2	51.4	44.4
LOS	F	B	D	F	C	E	F	F	D	D
Approach Delay		128.8		158.4			174.7		99.6	
Approach LOS		F		F			F		F	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 130	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.56	
Intersection Signal Delay: 134.0	Intersection LOS: F
Intersection Capacity Utilization 135.6%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



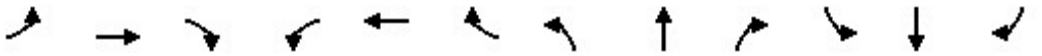


Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	816	1182	20	1164	388	147	249	370	193	714
v/c Ratio	1.56	0.61	0.20	1.36	0.74	0.67	1.38	1.40	0.53	1.00
Control Delay	289.6	17.8	43.8	205.8	22.3	56.2	244.6	231.2	51.4	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	289.6	17.8	43.8	205.8	22.3	56.2	244.6	231.2	51.4	44.4
Queue Length 50th (m)	~282.5	93.8	4.0	~205.8	26.6	28.6	~84.7	~111.0	44.2	50.0
Queue Length 95th (m)	#358.7	114.3	11.7	#247.6	67.6	#48.6	#137.7	#172.1	68.6	#139.5
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	523	1942	98	858	525	221	180	265	366	715
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	1.56	0.61	0.20	1.36	0.74	0.67	1.38	1.40	0.53	1.00

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.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	751	981	107	18	1071	357	135	217	12	340	178	657
Future Volume (vph)	751	981	107	18	1071	357	135	217	12	340	178	657
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	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	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3223		1486	3271	1234	1486	1477		1486	1722	1234
Flt Permitted	0.11	1.00		0.24	1.00	1.00	0.64	1.00		0.21	1.00	1.00
Satd. Flow (perm)	169	3223		374	3271	1234	995	1477		335	1722	1234
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)	816	1066	116	20	1164	388	147	236	13	370	193	714
RTOR Reduction (vph)	0	6	0	0	0	202	0	2	0	0	0	452
Lane Group Flow (vph)	816	1176	0	20	1164	186	147	247	0	370	193	262
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	78.1	78.1		34.1	34.1	34.1	21.7	15.7		36.7	27.7	27.7
Effective Green, g (s)	78.1	78.1		34.1	34.1	34.1	21.7	15.7		36.7	27.7	27.7
Actuated g/C Ratio	0.60	0.60		0.26	0.26	0.26	0.17	0.12		0.28	0.21	0.21
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	516	1936		98	858	323	188	178		253	366	262
v/s Ratio Prot	c0.50	0.36			0.36		0.04	0.17		c0.20	0.11	
v/s Ratio Perm	c0.45			0.05		0.15	0.09			c0.21		0.21
v/c Ratio	1.58	0.61		0.20	1.36	0.58	0.78	1.39		1.46	0.53	1.00
Uniform Delay, d1	37.5	16.3		37.4	48.0	41.7	50.8	57.1		42.0	45.3	51.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	270.8	1.4		0.8	168.1	2.0	18.3	205.8		228.6	1.0	54.7
Delay (s)	308.3	17.7		38.1	216.1	43.7	69.1	262.9		270.6	46.4	105.8
Level of Service	F	B		D	F	D	E	F		F	D	F
Approach Delay (s)		136.4			171.3			191.0			144.6	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	153.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.61		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	135.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX 10

Sensitivity Analysis #1 – 10% Increase to Residential Density – Queueing Analysis Results



Future Total (2051) Conditions Model – Bridge Adjustment (+10%) – No Train – Microsimulation Results				
Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	38
			EBT	54
			EBR	53
			NBL	28
			NBT	26
			NBR	26
			SBL	18
			SBT	26
			SBR	16
			WBL	9
			WBT	76
			WBR	15
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	128
			EBT	129
			SBL	35
			WBL	36
			WBT	70
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	2
			EBT	64
			EBR	-
			NBL	47
			NBT	17
			NBR	17
			SBL	0
			SBT	7
			SBR	7
			WBL	49
			WBT	70
			WBR	70
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	53
			EBT	53
			EBR	53
			NBL	35
			SBR	16
			WBT	27
	1	Woodlawn Road and Primeway	EBL	114
			EBT	161
			EBR	161
			NBL	44
			NBT	55
			NBR	55

PM Peak Hour	1	Drive / Brown Road	SBL	60
			SBT	57
			SBR	65
			WBL	15
			WBT	145
			WBR	47
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	261
			EBT	264
			SBL	118
			WBL	54
			WBT	159
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	7
			EBT	208
			EBR	-
			NBL	104
			NBT	66
			NBR	66
			SBL	8
			SBT	8
			SBR	8
			WBL	57
			WBT	70
			WBR	70
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	64
			EBT	64
			EBR	64
			NBL	86
			SBR	14
			WBT	26
k Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	276
			EBT	315
			EBR	315
			NBL	44
			NBT	76
			NBR	75
			SBL	96
			SBT	92
			SBR	100
			WBL	12
			WBT	150
			WBR	47
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	220
			EBT	233
			SBL	60
			WBL	41
			WBT	105
			EBL	8

SAT Peal	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBT	137
			EBR	-
			NBL	84
			NBT	32
			NBR	32
			SBL	4
			SBT	10
			SBR	10
			WBL	52
			WBT	69
			WBR	69
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	132
			EBT	132
			EBR	132
			NBL	55
			SBR	17
			WBT	30

Future Total (2051) Conditions Model – Bridge Adjustment (+10%) – With Train – Microsimulation Results				
Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	38
			EBT	55
			EBR	54
			NBL	28
			NBT	26
			NBR	26
			SBL	18
			SBT	26
			SBR	16
			WBL	10
			WBT	83
			WBR	17
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	132
			EBT	132
			SBL	35
			WBL	39
			WBT	94
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1
			EBT	64
			EBR	-
			NBL	51
			NBT	20
			NBR	20
			SBL	0
			SBT	7
			SBR	7
			WBL	59
			WBT	70
			WBR	70
	4	Rail Crossing	EBT	57
			WBT	130
	5	Daimler Parkway and Street 'A'	EBL	51
			EBT	51
			EBR	51
			NBL	34
			SBR	16
			WBT	28
	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	116
			EBT	159
			EBR	159
			NBL	44
			NBT	55
			NBR	55
			SBL	60

PM Peak Hour			SBT	56
			SBR	67
			WBL	14
			WBT	145
			WBR	44
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	271
			EBT	273
			SBL	205
			WBL	55
			WBT	176
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	6
			EBT	218
			EBR	-
			NBL	108
			NBT	102
			NBR	102
			SBL	8
			SBT	8
			SBR	8
			WBL	62
			WBT	70
			WBR	70
	4	Rail Crossing	EBT	66
			WBT	118
	5	Daimler Parkway and Street 'A'	EBL	66
			EBT	66
			EBR	66
			NBL	90
			SBR	15
			WBT	26

APPENDIX 11

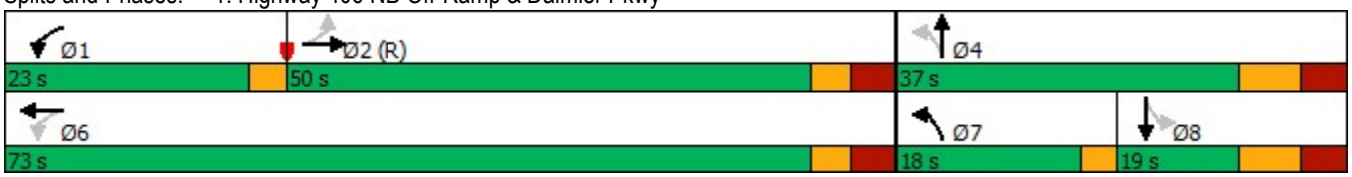
Sensitivity Analysis #2 – 25% Increase to Residential Density – Synchro Analysis Results



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Configurations								
Traffic Volume (vph)	1	254	669	319	652	233	1	1
Future Volume (vph)	1	254	669	319	652	233	1	1
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	NA
Protected Phases		2		1	6	7	4	8
Permitted Phases	2		Free	6		4		
Detector Phase	2	2		1	6	7	4	8
Switch Phase								
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0
Total Split (s)	50.0	50.0		23.0	73.0	18.0	37.0	19.0
Total Split (%)	45.5%	45.5%		20.9%	66.4%	16.4%	33.6%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes
Recall Mode	C-Max	C-Max		None	None	None	None	Max
Act Effct Green (s)	46.5	46.5	110.0	70.0	66.0	34.0	28.0	10.0
Actuated g/C Ratio	0.42	0.42	1.00	0.64	0.60	0.31	0.25	0.09
v/c Ratio	0.00	0.37	0.58	0.55	0.78	0.65	0.28	0.01
Control Delay	5.0	7.9	8.6	13.0	23.9	40.4	7.9	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	7.9	8.6	13.0	23.9	40.4	7.9	39.0
LOS	A	A	A	B	C	D	A	D
Approach Delay		8.4			20.3		29.8	39.0
Approach LOS		A			C		C	D

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 47 (43%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 16.9	Intersection LOS: B
Intersection Capacity Utilization 95.7%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy





Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	1	276	727	347	709	253	122	2
v/c Ratio	0.00	0.37	0.58	0.55	0.78	0.65	0.28	0.01
Control Delay	5.0	7.9	8.6	13.0	23.9	40.4	7.9	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	7.9	8.6	13.0	23.9	40.4	7.9	39.0
Queue Length 50th (m)	0.1	14.7	57.3	32.1	106.5	44.4	0.2	0.2
Queue Length 95th (m)	m0.1	m28.8	61.4	48.4	160.6	69.3	14.0	2.6
Internal Link Dist (m)		194.3			158.2		78.8	37.3
Turn Bay Length (m)	55.0					50.0		
Base Capacity (vph)	261	743	1262	654	913	388	430	144
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	0.00	0.37	0.58	0.53	0.78	0.65	0.28	0.01

Intersection Summary

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

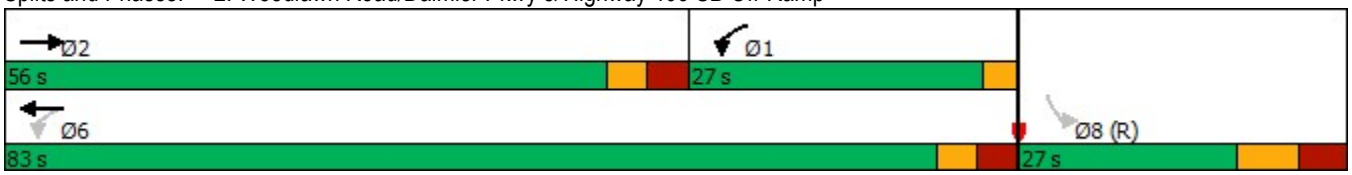
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	254	669	319	652	0	233	1	111	0	1	1
Future Volume (vph)	1	254	669	319	652	0	233	1	111	0	1	1
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0			9.0	
Lane Util. Factor	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			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1522		1606	1338			1578	
Flt Permitted	0.38	1.00	1.00	0.50	1.00		0.58	1.00			1.00	
Satd. Flow (perm)	618	1761	1262	819	1522		984	1338			1578	
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)	1	276	727	347	709	0	253	1	121	0	1	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	90	0	0	1	0
Lane Group Flow (vph)	1	276	727	347	709	0	253	32	0	0	1	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	46.5	46.5	110.0	66.0	66.0		28.0	28.0			10.0	
Effective Green, g (s)	46.5	46.5	110.0	66.0	66.0		28.0	28.0			10.0	
Actuated g/C Ratio	0.42	0.42	1.00	0.60	0.60		0.25	0.25			0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0			9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	261	744	1262	601	913		335	340			143	
v/s Ratio Prot		0.16		0.09	c0.47		c0.10	0.02			0.00	
v/s Ratio Perm	0.00		c0.58	0.26			0.09					
v/c Ratio	0.00	0.37	0.58	0.58	0.78		0.76	0.09			0.01	
Uniform Delay, d1	18.4	21.7	0.0	11.7	16.5		36.4	31.3			45.5	
Progression Factor	0.25	0.30	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.0	1.0	1.3	1.3	4.2		9.3	0.1			0.1	
Delay (s)	4.7	7.5	1.3	13.1	20.7		45.7	31.4			45.6	
Level of Service	A	A	A	B	C		D	C			D	
Approach Delay (s)		3.0			18.2			41.1			45.6	
Approach LOS		A			B			D			D	

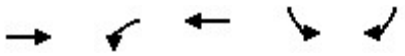
Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	95.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	807	270	609	116	634
Future Volume (vph)	807	270	609	116	634
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	56.0	27.0	83.0	27.0	
Total Split (%)	50.9%	24.5%	75.5%	24.5%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	None	None	None	C-Max	
Act Effct Green (s)	44.9	69.1	65.3	28.7	110.0
Actuated g/C Ratio	0.41	0.63	0.59	0.26	1.00
v/c Ratio	0.84	0.85	0.65	0.28	0.49
Control Delay	34.2	43.2	11.3	38.2	1.2
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	34.2	43.2	11.5	38.2	1.2
LOS	C	D	B	D	A
Approach Delay	34.2		21.2		
Approach LOS	C		C		

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 108 (98%), Referenced to phase 8:SBL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 22.2	Intersection LOS: C
Intersection Capacity Utilization 68.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp





Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1125	293	662	126	689
v/c Ratio	0.84	0.85	0.65	0.28	0.49
Control Delay	34.2	43.2	11.3	38.2	1.2
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	34.2	43.2	11.5	38.2	1.2
Queue Length 50th (m)	106.3	38.8	51.8	22.1	0.0
Queue Length 95th (m)	127.0	m52.9	52.1	43.2	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1470	439	1192	454	1415
Starvation Cap Reductn	0	0	109	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.77	0.67	0.61	0.28	0.49

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	807	228	270	609	0	0	0	0	116	0	634
Future Volume (vph)	0	807	228	270	609	0	0	0	0	116	0	634
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.97		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3234		1555	1722					1743		1415
Flt Permitted		1.00		0.13	1.00					0.95		1.00
Satd. Flow (perm)		3234		213	1722					1743		1415
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)	0	877	248	293	662	0	0	0	0	126	0	689
RTOR Reduction (vph)	0	25	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1100	0	293	662	0	0	0	0	126	0	689
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		44.9		69.2	65.4					28.6		110.0
Effective Green, g (s)		44.9		69.2	65.4					28.6		110.0
Actuated g/C Ratio		0.41		0.63	0.59					0.26		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1320		347	1023					453		1415
v/s Ratio Prot		0.34		c0.13	0.38							
v/s Ratio Perm				c0.40						0.07		c0.49
v/c Ratio		0.83		0.84	0.65					0.28		0.49
Uniform Delay, d1		29.2		31.0	14.7					32.5		0.0
Progression Factor		1.00		0.86	0.66					1.00		1.00
Incremental Delay, d2		4.7		11.7	0.9					1.5		1.2
Delay (s)		33.9		38.3	10.6					34.0		1.2
Level of Service		C		D	B					C		A
Approach Delay (s)		33.9			19.1			0.0			6.3	
Approach LOS		C			B			A			A	

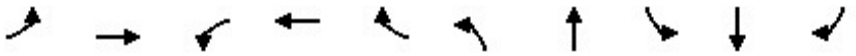
Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	143	870	16	1126	101	89	50	32	56	127
Future Volume (vph)	143	870	16	1126	101	89	50	32	56	127
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	14.0	71.0	57.0	57.0	57.0	9.0	18.5	10.5	20.0	20.0
Total Split (%)	14.0%	71.0%	57.0%	57.0%	57.0%	9.0%	18.5%	10.5%	20.0%	20.0%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	72.3	67.4	55.7	55.7	55.7	19.1	11.2	20.1	10.2	10.2
Actuated g/C Ratio	0.72	0.67	0.56	0.56	0.56	0.19	0.11	0.20	0.10	0.10
v/c Ratio	0.56	0.48	0.07	0.67	0.15	0.42	0.43	0.14	0.35	0.55
Control Delay	14.1	9.2	13.9	19.3	3.1	37.8	41.9	30.5	46.7	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.1	9.2	13.9	19.3	3.1	37.8	41.9	30.5	46.7	16.1
LOS	B	A	B	B	A	D	D	C	D	B
Approach Delay		9.9		18.0			39.6		26.2	
Approach LOS		A		B			D		C	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 16.6	Intersection LOS: B
Intersection Capacity Utilization 70.8%	ICU Level of Service C
Analysis Period (min) 15	

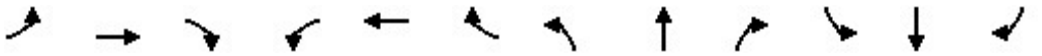
Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road





Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	155	1049	17	1224	110	97	74	35	61	138
v/c Ratio	0.56	0.48	0.07	0.67	0.15	0.42	0.43	0.14	0.35	0.55
Control Delay	14.1	9.2	13.9	19.3	3.1	37.8	41.9	30.5	46.7	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.1	9.2	13.9	19.3	3.1	37.8	41.9	30.5	46.7	16.1
Queue Length 50th (m)	8.5	47.3	1.5	86.5	0.0	15.5	11.1	5.4	11.2	0.0
Queue Length 95th (m)	19.1	67.0	5.6	124.0	8.2	28.5	24.6	12.8	22.9	17.0
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	305	2178	238	1823	737	231	189	255	218	277
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	0.51	0.48	0.07	0.67	0.15	0.42	0.39	0.14	0.28	0.50

Intersection Summary



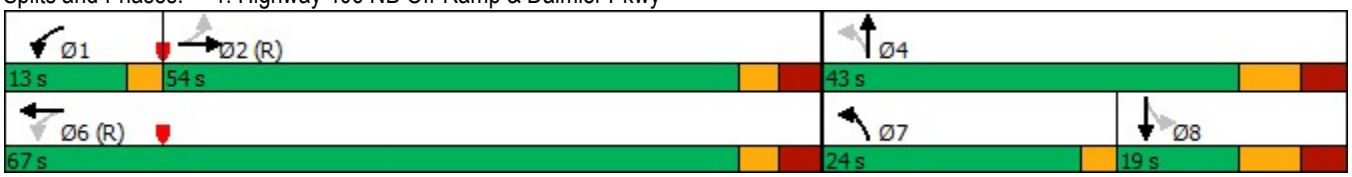
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	870	95	16	1126	101	89	50	18	32	56	127
Future Volume (vph)	143	870	95	16	1126	101	89	50	18	32	56	127
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	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	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3223		1486	3271	1234	1486	1428		1486	1722	1234
Flt Permitted	0.15	1.00		0.27	1.00	1.00	0.69	1.00		0.71	1.00	1.00
Satd. Flow (perm)	231	3223		427	3271	1234	1082	1428		1109	1722	1234
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)	155	946	103	17	1224	110	97	54	20	35	61	138
RTOR Reduction (vph)	0	7	0	0	0	50	0	13	0	0	0	123
Lane Group Flow (vph)	155	1042	0	17	1224	60	97	61	0	35	61	15
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	66.2	66.2		54.5	54.5	54.5	16.0	11.2		15.2	10.8	10.8
Effective Green, g (s)	66.2	66.2		54.5	54.5	54.5	16.0	11.2		15.2	10.8	10.8
Actuated g/C Ratio	0.66	0.66		0.54	0.54	0.54	0.16	0.11		0.15	0.11	0.11
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	262	2133		232	1782	672	192	159		185	185	133
v/s Ratio Prot	c0.05	0.32			c0.37		c0.02	0.04		0.01	0.04	
v/s Ratio Perm	0.34			0.04		0.05	c0.06			0.02		0.01
v/c Ratio	0.59	0.49		0.07	0.69	0.09	0.51	0.38		0.19	0.33	0.11
Uniform Delay, d1	10.1	8.4		10.8	16.5	10.9	37.8	41.2		36.8	41.3	40.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.3	0.8		0.1	1.0	0.0	1.6	1.1		0.4	0.8	0.3
Delay (s)	13.4	9.2		10.9	17.6	10.9	39.5	42.3		37.2	42.0	40.5
Level of Service	B	A		B	B	B	D	D		D	D	D
Approach Delay (s)		9.8			16.9			40.7			40.4	
Approach LOS		A			B			D			D	

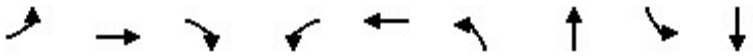
Intersection Summary			
HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	6	771	618	210	485	368	0	2	0
Future Volume (vph)	6	771	618	210	485	368	0	2	0
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2		1	6	7	4		8
Permitted Phases	2		Free	6		4		8	
Detector Phase	2	2		1	6	7	4	8	8
Switch Phase									
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0	19.0
Total Split (s)	54.0	54.0		13.0	67.0	24.0	43.0	19.0	19.0
Total Split (%)	49.1%	49.1%		11.8%	60.9%	21.8%	39.1%	17.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	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
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max	None	None	Max	Max
Act Effct Green (s)	47.0	47.0	110.0	64.0	60.0	40.0	34.0	10.0	10.0
Actuated g/C Ratio	0.43	0.43	1.00	0.58	0.55	0.36	0.31	0.09	0.09
v/c Ratio	0.02	1.11	0.53	1.11	0.64	0.84	0.59	0.02	0.02
Control Delay	12.5	84.1	0.8	123.3	21.8	47.7	13.1	46.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.5	84.1	0.8	123.3	21.8	47.7	13.1	46.5	0.1
LOS	B	F	A	F	C	D	B	D	A
Approach Delay		46.9			52.4		31.7		9.4
Approach LOS		D			D		C		A

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 40 (36%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.11	
Intersection Signal Delay: 44.4	Intersection LOS: D
Intersection Capacity Utilization 103.6%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy





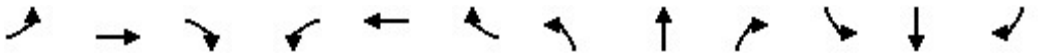
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	7	838	672	228	528	400	346	2	8
v/c Ratio	0.02	1.11	0.53	1.11	0.64	0.84	0.59	0.02	0.02
Control Delay	12.5	84.1	0.8	123.3	21.8	47.7	13.1	46.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.5	84.1	0.8	123.3	21.8	47.7	13.1	46.5	0.1
Queue Length 50th (m)	0.7	~206.5	0.0	~41.3	75.2	72.1	14.1	0.4	0.0
Queue Length 95th (m)	m0.8	m#234.0	m0.0	#89.2	111.3	#123.5	43.3	2.8	0.0
Internal Link Dist (m)		194.3			158.2		78.8		37.3
Turn Bay Length (m)	55.0					50.0		15.0	
Base Capacity (vph)	321	752	1262	205	830	475	590	89	384
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	0.02	1.11	0.53	1.11	0.64	0.84	0.59	0.02	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.



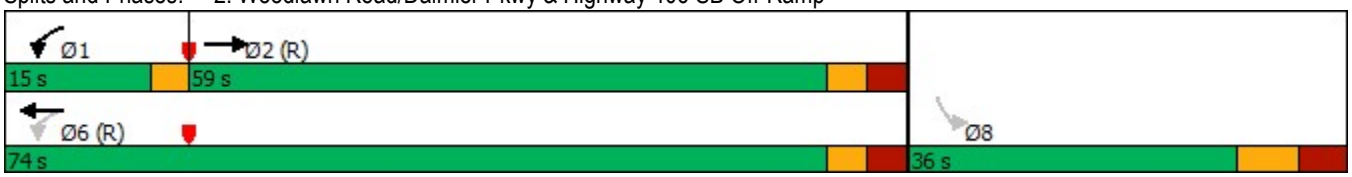
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	771	618	210	485	1	368	0	318	2	0	7
Future Volume (vph)	6	771	618	210	485	1	368	0	318	2	0	7
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0		9.0	9.0	
Lane Util. Factor	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	1.00		1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1521		1606	1336		1691	1450	
Flt Permitted	0.46	1.00	1.00	0.08	1.00		0.58	1.00		0.55	1.00	
Satd. Flow (perm)	753	1761	1262	131	1521		978	1336		985	1450	
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)	7	838	672	228	527	1	400	0	346	2	0	8
RTOR Reduction (vph)	0	0	0	0	0	0	0	178	0	0	7	0
Lane Group Flow (vph)	7	838	672	228	528	0	400	168	0	2	1	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	47.0	47.0	110.0	60.0	60.0		34.0	34.0		10.0	10.0	
Effective Green, g (s)	47.0	47.0	110.0	60.0	60.0		34.0	34.0		10.0	10.0	
Actuated g/C Ratio	0.43	0.43	1.00	0.55	0.55		0.31	0.31		0.09	0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0		9.0	9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	321	752	1262	200	829		422	412		89	131	
v/s Ratio Prot		0.48		c0.10	0.35		c0.18	0.13			0.00	
v/s Ratio Perm	0.01		0.53	c0.52			c0.11			0.00		
v/c Ratio	0.02	1.11	0.53	1.14	0.64		0.95	0.41		0.02	0.01	
Uniform Delay, d1	18.2	31.5	0.0	33.0	17.4		35.6	30.1		45.5	45.5	
Progression Factor	0.67	0.76	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	58.7	0.6	106.4	3.7		30.5	0.7		0.5	0.1	
Delay (s)	12.3	82.6	0.6	139.4	21.1		66.1	30.7		46.0	45.6	
Level of Service	B	F	A	F	C		E	C		D	D	
Approach Delay (s)		45.9			56.8			49.7			45.6	
Approach LOS		D			E			D			D	

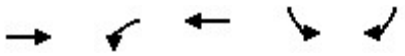
Intersection Summary			
HCM 2000 Control Delay	49.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	103.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	1038	205	638	358	725
Future Volume (vph)	1038	205	638	358	725
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	59.0	15.0	74.0	36.0	
Total Split (%)	53.6%	13.6%	67.3%	32.7%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	
Act Effct Green (s)	52.4	71.6	67.8	26.2	110.0
Actuated g/C Ratio	0.48	0.65	0.62	0.24	1.00
v/c Ratio	0.94	0.94	0.65	0.94	0.56
Control Delay	39.6	72.1	16.9	73.2	1.6
Queue Delay	0.0	0.0	0.6	0.0	0.0
Total Delay	39.6	72.1	17.6	73.2	1.6
LOS	D	E	B	E	A
Approach Delay	39.6		30.8		
Approach LOS	D		C		

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 108 (98%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 32.6	Intersection LOS: C
Intersection Capacity Utilization 89.8%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

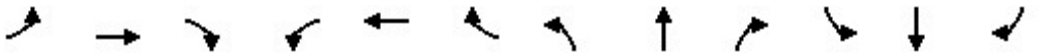




Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1473	223	693	389	788
v/c Ratio	0.94	0.94	0.65	0.94	0.56
Control Delay	39.6	72.1	16.9	73.2	1.6
Queue Delay	0.0	0.0	0.6	0.0	0.0
Total Delay	39.6	72.1	17.6	73.2	1.6
Queue Length 50th (m)	150.0	37.2	67.4	81.7	0.0
Queue Length 95th (m)	#202.6	m#71.7	m126.4	#136.9	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1565	238	1061	424	1415
Starvation Cap Reductn	0	0	118	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.94	0.94	0.73	0.92	0.56

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.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1038	317	205	638	0	0	0	0	358	0	725
Future Volume (vph)	0	1038	317	205	638	0	0	0	0	358	0	725
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3227		1555	1722					1743		1415
Flt Permitted		1.00		0.07	1.00					0.95		1.00
Satd. Flow (perm)		3227		118	1722					1743		1415
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)	0	1128	345	223	693	0	0	0	0	389	0	788
RTOR Reduction (vph)	0	26	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1447	0	223	693	0	0	0	0	389	0	788
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		52.4		67.8	67.8					26.2		110.0
Effective Green, g (s)		52.4		67.8	67.8					26.2		110.0
Actuated g/C Ratio		0.48		0.62	0.62					0.24		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1537		234	1061					415		1415
v/s Ratio Prot		0.45		c0.11	0.40							
v/s Ratio Perm				c0.48						c0.22		0.56
v/c Ratio		0.94		0.95	0.65					0.94		0.56
Uniform Delay, d1		27.3		33.5	13.5					41.1		0.0
Progression Factor		1.00		1.40	1.04					1.00		1.00
Incremental Delay, d2		12.7		36.1	2.1					28.6		1.6
Delay (s)		40.0		83.0	16.2					69.7		1.6
Level of Service		D		F	B					E		A
Approach Delay (s)		40.0			32.4			0.0			24.1	
Approach LOS		D			C			A			C	

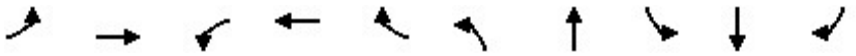
Intersection Summary			
HCM 2000 Control Delay	32.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	89.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	436	1118	28	1050	285	128	102	233	143	474
Future Volume (vph)	436	1118	28	1050	285	128	102	233	143	474
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	34.2	83.6	49.4	49.4	49.4	9.0	20.4	16.0	27.4	27.4
Total Split (%)	28.5%	69.7%	41.2%	41.2%	41.2%	7.5%	17.0%	13.3%	22.8%	22.8%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	81.1	76.2	41.5	41.5	41.5	22.9	12.6	32.9	19.6	19.6
Actuated g/C Ratio	0.68	0.64	0.35	0.35	0.35	0.19	0.10	0.27	0.16	0.16
v/c Ratio	1.05	0.65	0.27	1.01	0.50	0.63	0.88	0.90	0.55	0.87
Control Delay	91.1	15.4	36.4	68.3	7.5	53.0	95.2	73.0	54.2	23.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	91.1	15.4	36.4	68.3	7.5	53.0	95.2	73.0	54.2	23.9
LOS	F	B	D	E	A	D	F	E	D	C
Approach Delay		35.2		54.9			74.1		42.5	
Approach LOS		D		D			E		D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.05	
Intersection Signal Delay: 45.6	Intersection LOS: D
Intersection Capacity Utilization 101.6%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



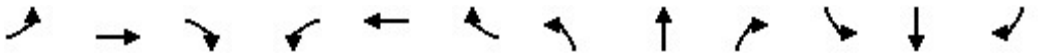


Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	474	1336	30	1141	310	139	139	253	155	515
v/c Ratio	1.05	0.65	0.27	1.01	0.50	0.63	0.88	0.90	0.55	0.87
Control Delay	91.1	15.4	36.4	68.3	7.5	53.0	95.2	73.0	54.2	23.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	91.1	15.4	36.4	68.3	7.5	53.0	95.2	73.0	54.2	23.9
Queue Length 50th (m)	~108.9	95.7	5.1	~143.1	3.4	26.1	30.8	51.9	33.8	10.6
Queue Length 95th (m)	#173.2	117.8	14.0	#189.6	25.7	44.2	#66.6	#101.9	55.3	#74.3
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	450	2054	111	1131	615	219	164	282	288	592
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	1.05	0.65	0.27	1.01	0.50	0.63	0.85	0.90	0.54	0.87

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.



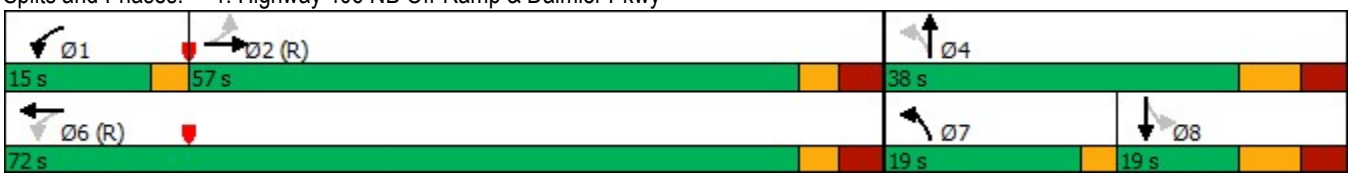
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	436	1118	111	28	1050	285	128	102	26	233	143	474
Future Volume (vph)	436	1118	111	28	1050	285	128	102	26	233	143	474
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	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	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3227		1486	3271	1234	1486	1443		1486	1722	1234
Flt Permitted	0.09	1.00		0.20	1.00	1.00	0.66	1.00		0.47	1.00	1.00
Satd. Flow (perm)	141	3227		320	3271	1234	1031	1443		731	1722	1234
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)	474	1215	121	30	1141	310	139	111	28	253	155	515
RTOR Reduction (vph)	0	6	0	0	0	188	0	7	0	0	0	388
Lane Group Flow (vph)	474	1330	0	30	1141	122	139	132	0	253	155	127
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	76.2	76.2		41.5	41.5	41.5	18.6	12.6		28.6	19.6	19.6
Effective Green, g (s)	76.2	76.2		41.5	41.5	41.5	18.6	12.6		28.6	19.6	19.6
Actuated g/C Ratio	0.64	0.64		0.35	0.35	0.35	0.16	0.10		0.24	0.16	0.16
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	444	2049		110	1131	426	182	151		256	281	201
v/s Ratio Prot	c0.28	0.41			0.35		0.04	0.09		c0.11	0.09	
v/s Ratio Perm	c0.40			0.09		0.10	0.08			c0.13		0.10
v/c Ratio	1.07	0.65		0.27	1.01	0.29	0.76	0.87		0.99	0.55	0.63
Uniform Delay, d1	36.5	13.6		28.3	39.2	28.5	47.7	52.9		43.9	46.2	46.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	61.9	1.6		1.0	28.9	0.3	16.6	38.5		52.4	1.9	5.5
Delay (s)	98.4	15.2		29.3	68.2	28.8	64.3	91.4		96.3	48.0	52.4
Level of Service	F	B		C	E	C	E	F		F	D	D
Approach Delay (s)		37.0			59.2			77.9			63.7	
Approach LOS		D			E			E			E	

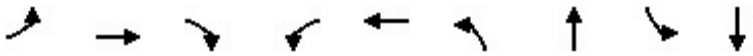
Intersection Summary			
HCM 2000 Control Delay	52.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	101.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	7	662	640	271	594	360	1	1	6
Future Volume (vph)	7	662	640	271	594	360	1	1	6
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2		1	6	7	4		8
Permitted Phases	2		Free	6		4		8	
Detector Phase	2	2		1	6	7	4	8	8
Switch Phase									
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0	19.0
Total Split (s)	57.0	57.0		15.0	72.0	19.0	38.0	19.0	19.0
Total Split (%)	51.8%	51.8%		13.6%	65.5%	17.3%	34.5%	17.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	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
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max	None	None	Max	Max
Act Effct Green (s)	50.0	50.0	110.0	69.0	65.0	35.0	29.0	10.0	10.0
Actuated g/C Ratio	0.45	0.45	1.00	0.63	0.59	0.32	0.26	0.09	0.09
v/c Ratio	0.03	0.90	0.55	1.07	0.72	0.97	0.52	0.01	0.08
Control Delay	10.1	24.6	1.4	96.2	21.8	74.9	7.4	46.0	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	24.6	1.4	96.2	21.8	74.9	7.4	46.0	36.5
LOS	B	C	A	F	C	E	A	D	D
Approach Delay		13.2			45.1		45.8		37.2
Approach LOS		B			D		D		D

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 16 (15%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.07	
Intersection Signal Delay: 30.4	Intersection LOS: C
Intersection Capacity Utilization 100.8%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy





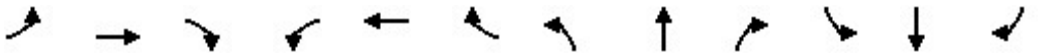
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	8	720	696	295	647	391	297	1	12
v/c Ratio	0.03	0.90	0.55	1.07	0.72	0.97	0.52	0.01	0.08
Control Delay	10.1	24.6	1.4	96.2	21.8	74.9	7.4	46.0	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	24.6	1.4	96.2	21.8	74.9	7.4	46.0	36.5
Queue Length 50th (m)	0.4	100.8	0.0	~45.6	92.7	75.3	0.2	0.2	1.4
Queue Length 95th (m)	m0.5	m123.1	m0.0	#98.5	137.7	#142.4	21.4	1.8	7.3
Internal Link Dist (m)		194.3			158.2		78.8		37.3
Turn Bay Length (m)	55.0					50.0		15.0	
Base Capacity (vph)	291	800	1262	276	899	402	570	93	149
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	0.03	0.90	0.55	1.07	0.72	0.97	0.52	0.01	0.08

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.



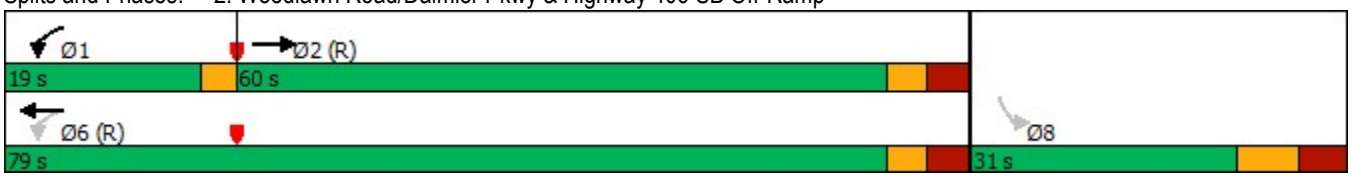
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	662	640	271	594	1	360	1	272	1	6	5
Future Volume (vph)	7	662	640	271	594	1	360	1	272	1	6	5
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0		9.0	9.0	
Lane Util. Factor	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	1.00		1.00	0.85		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1521		1606	1337		1691	1599	
Flt Permitted	0.39	1.00	1.00	0.13	1.00		0.58	1.00		0.58	1.00	
Satd. Flow (perm)	641	1761	1262	206	1521		975	1337		1030	1599	
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)	8	720	696	295	646	1	391	1	296	1	7	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	218	0	0	5	0
Lane Group Flow (vph)	8	720	696	295	647	0	391	79	0	1	7	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	50.0	50.0	110.0	65.0	65.0		29.0	29.0		10.0	10.0	
Effective Green, g (s)	50.0	50.0	110.0	65.0	65.0		29.0	29.0		10.0	10.0	
Actuated g/C Ratio	0.45	0.45	1.00	0.59	0.59		0.26	0.26		0.09	0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0		9.0	9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	291	800	1262	268	898		348	352		93	145	
v/s Ratio Prot		0.41		c0.12	0.43		c0.16	0.06			0.00	
v/s Ratio Perm	0.01		0.55	c0.53			c0.13			0.00		
v/c Ratio	0.03	0.90	0.55	1.10	0.72		1.12	0.22		0.01	0.05	
Uniform Delay, d1	16.6	27.7	0.0	27.0	16.0		39.2	31.7		45.5	45.7	
Progression Factor	0.59	0.59	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	7.0	0.7	84.6	5.0		86.0	0.3		0.2	0.7	
Delay (s)	9.9	23.2	0.7	111.6	21.0		125.3	32.0		45.7	46.3	
Level of Service	A	C	A	F	C		F	C		D	D	
Approach Delay (s)		12.1			49.4			85.0			46.3	
Approach LOS		B			D			F			D	

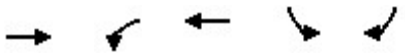
Intersection Summary			
HCM 2000 Control Delay	40.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	100.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	1032	245	681	277	791
Future Volume (vph)	1032	245	681	277	791
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	60.0	19.0	79.0	31.0	
Total Split (%)	54.5%	17.3%	71.8%	28.2%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	
Act Effct Green (s)	54.4	76.7	72.9	21.1	110.0
Actuated g/C Ratio	0.49	0.70	0.66	0.19	1.00
v/c Ratio	0.92	0.94	0.65	0.90	0.61
Control Delay	35.8	58.2	9.8	74.0	1.9
Queue Delay	1.2	0.0	0.5	0.0	0.0
Total Delay	37.0	58.2	10.2	74.0	1.9
LOS	D	E	B	E	A
Approach Delay	37.0		22.9		
Approach LOS	D		C		

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 27.9	Intersection LOS: C
Intersection Capacity Utilization 87.7%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

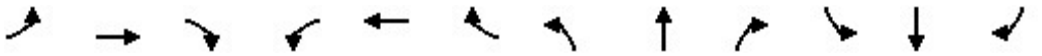




Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1490	266	740	301	860
v/c Ratio	0.92	0.94	0.65	0.90	0.61
Control Delay	35.8	58.2	9.8	74.0	1.9
Queue Delay	1.2	0.0	0.5	0.0	0.0
Total Delay	37.0	58.2	10.2	74.0	1.9
Queue Length 50th (m)	149.8	40.5	65.6	63.2	0.0
Queue Length 95th (m)	#202.9	m#71.2	m105.9	#109.8	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1619	289	1142	345	1415
Starvation Cap Reductn	0	0	116	0	0
Spillback Cap Reductn	38	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.94	0.92	0.72	0.87	0.61

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.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1032	339	245	681	0	0	0	0	277	0	791
Future Volume (vph)	0	1032	339	245	681	0	0	0	0	277	0	791
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3221		1555	1722					1743		1415
Flt Permitted		1.00		0.07	1.00					0.95		1.00
Satd. Flow (perm)		3221		114	1722					1743		1415
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)	0	1122	368	266	740	0	0	0	0	301	0	860
RTOR Reduction (vph)	0	28	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1462	0	266	740	0	0	0	0	301	0	860
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		54.3		72.9	72.9					21.1		110.0
Effective Green, g (s)		54.3		72.9	72.9					21.1		110.0
Actuated g/C Ratio		0.49		0.66	0.66					0.19		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1590		279	1141					334		1415
v/s Ratio Prot		0.45		c0.13	0.43							
v/s Ratio Perm				c0.49						c0.17		0.61
v/c Ratio		0.92		0.95	0.65					0.90		0.61
Uniform Delay, d1		25.8		34.8	11.0					43.4		0.0
Progression Factor		1.00		1.02	0.70					1.00		1.00
Incremental Delay, d2		10.1		28.6	1.6					26.0		1.9
Delay (s)		35.9		64.0	9.3					69.5		1.9
Level of Service		D		E	A					E		A
Approach Delay (s)		35.9			23.7			0.0			19.5	
Approach LOS		D			C			A			B	

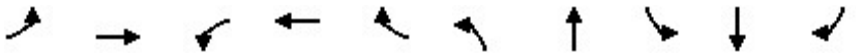
Intersection Summary			
HCM 2000 Control Delay	27.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	87.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	751	1011	18	1097	357	135	217	340	178	657
Future Volume (vph)	751	1011	18	1097	357	135	217	340	178	657
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	43.0	86.0	43.0	43.0	43.0	9.0	23.0	21.0	35.0	35.0
Total Split (%)	33.1%	66.2%	33.1%	33.1%	33.1%	6.9%	17.7%	16.2%	26.9%	26.9%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	83.0	78.1	35.1	35.1	35.1	26.0	15.7	41.0	27.7	27.7
Actuated g/C Ratio	0.64	0.60	0.27	0.27	0.27	0.20	0.12	0.32	0.21	0.21
v/c Ratio	1.60	0.62	0.21	1.35	0.73	0.67	1.38	1.40	0.53	1.01
Control Delay	305.7	18.1	43.3	202.5	21.4	56.2	244.6	231.2	51.4	49.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	305.7	18.1	43.3	202.5	21.4	56.2	244.6	231.2	51.4	49.3
LOS	F	B	D	F	C	E	F	F	D	D
Approach Delay		133.7		156.6			174.7		102.3	
Approach LOS		F		F			F		F	

Intersection Summary		
Cycle Length: 130		
Actuated Cycle Length: 130		
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green		
Natural Cycle: 130		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 1.60		
Intersection Signal Delay: 136.1	Intersection LOS: F	
Intersection Capacity Utilization 136.4%	ICU Level of Service H	
Analysis Period (min) 15		

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



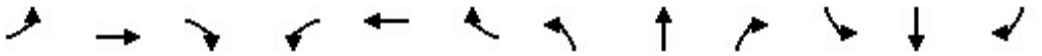


Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	816	1215	20	1192	388	147	249	370	193	714
v/c Ratio	1.60	0.62	0.21	1.35	0.73	0.67	1.38	1.40	0.53	1.01
Control Delay	305.7	18.1	43.3	202.5	21.4	56.2	244.6	231.2	51.4	49.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	305.7	18.1	43.3	202.5	21.4	56.2	244.6	231.2	51.4	49.3
Queue Length 50th (m)	~285.8	98.0	4.0	~210.2	25.9	28.6	~84.7	~111.0	44.2	~63.3
Queue Length 95th (m)	#362.0	119.3	11.7	#252.2	66.3	#48.6	#137.7	#172.1	68.6	#145.5
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	511	1944	97	883	533	221	180	265	366	704
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	1.60	0.63	0.21	1.35	0.73	0.67	1.38	1.40	0.53	1.01

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.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	751	1011	107	18	1097	357	135	217	12	340	178	657
Future Volume (vph)	751	1011	107	18	1097	357	135	217	12	340	178	657
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	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	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3225		1486	3271	1234	1486	1477		1486	1722	1234
Flt Permitted	0.10	1.00		0.23	1.00	1.00	0.64	1.00		0.21	1.00	1.00
Satd. Flow (perm)	164	3225		362	3271	1234	995	1477		335	1722	1234
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)	816	1099	116	20	1192	388	147	236	13	370	193	714
RTOR Reduction (vph)	0	6	0	0	0	201	0	2	0	0	0	441
Lane Group Flow (vph)	816	1209	0	20	1192	187	147	247	0	370	193	273
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	78.1	78.1		35.1	35.1	35.1	21.7	15.7		36.7	27.7	27.7
Effective Green, g (s)	78.1	78.1		35.1	35.1	35.1	21.7	15.7		36.7	27.7	27.7
Actuated g/C Ratio	0.60	0.60		0.27	0.27	0.27	0.17	0.12		0.28	0.21	0.21
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	505	1937		97	883	333	188	178		253	366	262
v/s Ratio Prot	c0.50	0.37			0.36		0.04	0.17		c0.20	0.11	
v/s Ratio Perm	c0.47			0.06		0.15	0.09			c0.21		0.22
v/c Ratio	1.62	0.62		0.21	1.35	0.56	0.78	1.39		1.46	0.53	1.04
Uniform Delay, d1	37.9	16.6		36.7	47.5	40.8	50.8	57.1		42.0	45.3	51.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	286.2	1.5		0.8	165.0	1.8	18.3	205.8		228.6	1.0	66.5
Delay (s)	324.1	18.1		37.5	212.4	42.6	69.1	262.9		270.6	46.4	117.6
Level of Service	F	B		D	F	D	E	F		F	D	F
Approach Delay (s)		141.1			169.1			191.0			151.2	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	155.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.64		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	136.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX 12

Sensitivity Analysis #2 – 25% Increase to Residential Density – Queueing Analysis Results



Future Total (2051) Conditions Model – Bridge Adjustment (+25%) – No Train – Microsimulation Results				
Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	37
			EBT	55
			EBR	53
			NBL	28
			NBT	28
			NBR	28
			SBL	20
			SBT	26
			SBR	16
			WBL	13
			WBT	87
			WBR	15
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	132
			EBT	132
			SBL	35
			WBL	40
			WBT	82
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	2
			EBT	62
			EBR	-
			NBL	51
			NBT	20
			NBR	20
			SBL	0
			SBT	7
			SBR	7
			WBL	60
			WBT	69
			WBR	69
	4	Rail Crossing	EBT	0
			WBT	34
	5	Daimler Parkway and Street 'A'	EBL	58
			EBT	58
			EBR	58
			NBL	40
			SBR	18
			WBT	31
	1	Woodlawn Road and Primeway	EBL	124
			EBT	222
			EBR	222
			NBL	43
			NBT	61
			NBR	61

PM Peak Hour	1	Drive / Brown Road	SBL	69
			SBT	67
			SBR	78
			WBL	16
			WBT	159
			WBR	38
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	450
			EBT	453
			SBL	298
			WBL	54
			WBT	193
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	7
			EBT	219
			EBR	-
			NBL	122
			NBT	107
			NBR	107
			SBL	8
			SBT	8
			SBR	8
			WBL	68
			WBT	70
			WBR	70
	4	Rail Crossing	EBT	75
			WBT	39
	5	Daimler Parkway and Street 'A'	EBL	75
			EBT	75
			EBR	75
			NBL	123
			SBR	14
			WBT	36
k Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	275
			EBT	323
			EBR	323
			NBL	44
			NBT	81
			NBR	80
			SBL	95
			SBT	99
			SBR	103
			WBL	13
			WBT	157
			WBR	49
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	202
			EBT	203
			SBL	78
			WBL	54
			WBT	111
			EBL	9

SAT Peal	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBT	158
			EBR	-
			NBL	80
			NBT	43
			NBR	43
			SBL	4
			SBT	10
			SBR	10
			WBL	60
			WBT	70
			WBR	70
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	156
			EBT	156
			EBR	156
			NBL	71
			SBR	16
			WBT	37

Future Total (2051) Conditions Model – Bridge Adjustment (+25%) – With Train – Microsimulation Results				
Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	36
			EBT	55
			EBR	53
			NBL	28
			NBT	28
			NBR	28
			SBL	20
			SBT	26
			SBR	16
			WBL	14
			WBT	89
			WBR	17
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	130
			EBT	130
			SBL	34
			WBL	41
			WBT	91
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	2
			EBT	63
			EBR	-
			NBL	53
			NBT	20
			NBR	20
			SBL	0
			SBT	7
			SBR	7
			WBL	62
			WBT	70
			WBR	70
	4	Rail Crossing	EBT	55
			WBT	147
	5	Daimler Parkway and Street 'A'	EBL	63
			EBT	63
			EBR	63
			NBL	44
			SBR	20
			WBT	34
	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	129
			EBT	286
			EBR	286
			NBL	46
			NBT	71
			NBR	71
			SBL	78

PM Peak Hour			SBT	76
			SBR	82
			WBL	15
			WBT	171
			WBR	37
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	483
			EBT	484
			SBL	368
			WBL	57
			WBT	202
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	6
			EBT	220
			EBR	-
			NBL	132
			NBT	131
			NBR	131
			SBL	8
			SBT	8
			SBR	8
			WBL	68
			WBT	70
			WBR	70
	4	Rail Crossing	EBT	75
			WBT	130
	5	Daimler Parkway and Street 'A'	EBL	75
			EBT	75
			EBR	75
			NBL	122
			SBR	13
			WBT	35

APPENDIX 13

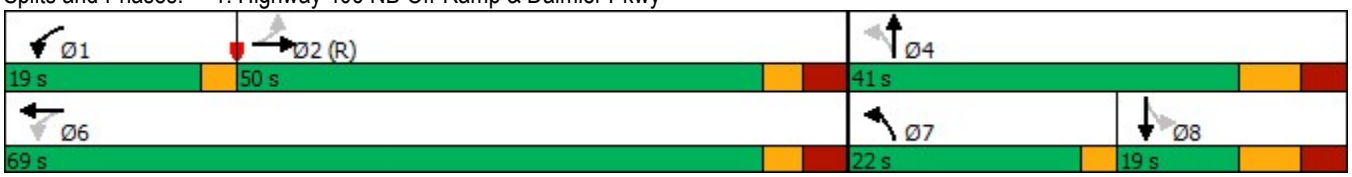
Sensitivity Analysis #3 – 10% Decrease to Through Volumes along Woodlawn Road/Daimler Parkway – Synchro Analysis Results



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Configurations								
Traffic Volume (vph)	1	198	669	271	499	233	1	1
Future Volume (vph)	1	198	669	271	499	233	1	1
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	NA
Protected Phases		2		1	6	7	4	8
Permitted Phases	2		Free	6		4		
Detector Phase	2	2		1	6	7	4	8
Switch Phase								
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0
Total Split (s)	50.0	50.0		19.0	69.0	22.0	41.0	19.0
Total Split (%)	45.5%	45.5%		17.3%	62.7%	20.0%	37.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes
Recall Mode	C-Max	C-Max		None	None	None	None	Max
Act Effct Green (s)	44.6	44.6	110.0	66.0	62.0	38.0	32.0	10.9
Actuated g/C Ratio	0.41	0.41	1.00	0.60	0.56	0.35	0.29	0.10
v/c Ratio	0.00	0.30	0.58	0.47	0.63	0.57	0.23	0.01
Control Delay	5.0	7.7	9.6	13.6	20.5	33.8	7.2	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	7.7	9.6	13.6	20.5	33.8	7.2	39.0
LOS	A	A	A	B	C	C	A	D
Approach Delay		9.1			18.0		26.0	39.0
Approach LOS		A			B		C	D

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 49 (45%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 15.5	Intersection LOS: B
Intersection Capacity Utilization 85.7%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy





Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	1	215	727	295	542	253	105	2
v/c Ratio	0.00	0.30	0.58	0.47	0.63	0.57	0.23	0.01
Control Delay	5.0	7.7	9.6	13.6	20.5	33.8	7.2	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	7.7	9.6	13.6	20.5	33.8	7.2	39.0
Queue Length 50th (m)	0.1	13.1	61.9	29.3	74.7	41.9	0.2	0.2
Queue Length 95th (m)	m0.1	m18.7	72.1	44.9	110.4	65.4	12.4	2.6
Internal Link Dist (m)		194.3			158.2		78.8	37.3
Turn Bay Length (m)	55.0					50.0		
Base Capacity (vph)	306	713	1262	643	857	450	462	157
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	0.00	0.30	0.58	0.46	0.63	0.56	0.23	0.01

Intersection Summary

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

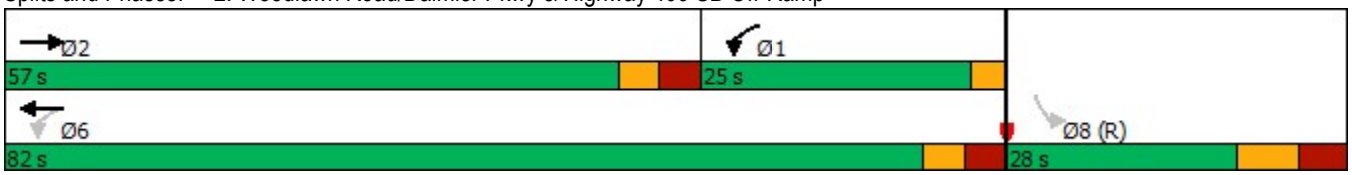
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	198	669	271	499	0	233	1	96	0	1	1
Future Volume (vph)	1	198	669	271	499	0	233	1	96	0	1	1
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0			9.0	
Lane Util. Factor	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			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1522		1606	1338			1578	
Flt Permitted	0.46	1.00	1.00	0.56	1.00		0.59	1.00			1.00	
Satd. Flow (perm)	756	1761	1262	916	1522		1003	1338			1578	
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)	1	215	727	295	542	0	253	1	104	0	1	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	74	0	0	1	0
Lane Group Flow (vph)	1	215	727	295	542	0	253	31	0	0	1	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	44.6	44.6	110.0	62.0	62.0		32.0	32.0			10.9	
Effective Green, g (s)	44.6	44.6	110.0	62.0	62.0		32.0	32.0			10.9	
Actuated g/C Ratio	0.41	0.41	1.00	0.56	0.56		0.29	0.29			0.10	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0			9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	306	714	1262	599	857		391	389			156	
v/s Ratio Prot		0.12		0.06	c0.36		0.11	0.02			0.00	
v/s Ratio Perm	0.00		c0.58	0.21			0.08					
v/c Ratio	0.00	0.30	0.58	0.49	0.63		0.65	0.08			0.01	
Uniform Delay, d1	19.5	22.1	0.0	13.1	16.3		32.9	28.3			44.7	
Progression Factor	0.24	0.30	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.0	0.8	1.4	0.6	1.5		3.7	0.1			0.1	
Delay (s)	4.7	7.4	1.4	13.7	17.8		36.5	28.4			44.8	
Level of Service	A	A	A	B	B		D	C			D	
Approach Delay (s)		2.8			16.4			34.2			44.8	
Approach LOS		A			B			C			D	

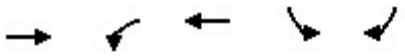
Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	768	225	501	100	634
Future Volume (vph)	768	225	501	100	634
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	57.0	25.0	82.0	28.0	
Total Split (%)	51.8%	22.7%	74.5%	25.5%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	None	None	None	C-Max	
Act Effct Green (s)	43.9	64.9	61.1	32.9	110.0
Actuated g/C Ratio	0.40	0.59	0.56	0.30	1.00
v/c Ratio	0.82	0.80	0.57	0.21	0.49
Control Delay	33.8	45.0	13.2	33.9	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	33.8	45.0	13.2	33.9	1.2
LOS	C	D	B	C	A
Approach Delay	33.8		23.1		
Approach LOS	C		C		

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 0 (0%), Referenced to phase 8:SBL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 22.2	Intersection LOS: C
Intersection Capacity Utilization 63.6%	ICU Level of Service B
Analysis Period (min) 15	

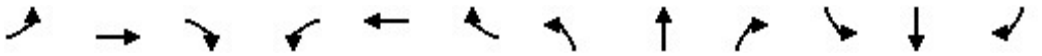
Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp





Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1083	245	545	109	689
v/c Ratio	0.82	0.80	0.57	0.21	0.49
Control Delay	33.8	45.0	13.2	33.9	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	33.8	45.0	13.2	33.9	1.2
Queue Length 50th (m)	102.3	29.4	51.1	17.5	0.0
Queue Length 95th (m)	117.5	48.5	53.3	36.6	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1499	416	1177	521	1415
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	0.72	0.59	0.46	0.21	0.49

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	768	228	225	501	0	0	0	0	100	0	634
Future Volume (vph)	0	768	228	225	501	0	0	0	0	100	0	634
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.97		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3230		1555	1722					1743		1415
Flt Permitted		1.00		0.14	1.00					0.95		1.00
Satd. Flow (perm)		3230		229	1722					1743		1415
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)	0	835	248	245	545	0	0	0	0	109	0	689
RTOR Reduction (vph)	0	28	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1055	0	245	545	0	0	0	0	109	0	689
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		43.9		64.9	61.1					32.9		110.0
Effective Green, g (s)		43.9		64.9	61.1					32.9		110.0
Actuated g/C Ratio		0.40		0.59	0.56					0.30		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1289		306	956					521		1415
v/s Ratio Prot		0.33		c0.10	0.32							
v/s Ratio Perm				c0.37						0.06		c0.49
v/c Ratio		0.82		0.80	0.57					0.21		0.49
Uniform Delay, d1		29.5		32.1	15.9					28.8		0.0
Progression Factor		1.00		0.91	0.74					1.00		1.00
Incremental Delay, d2		4.2		11.3	0.7					0.9		1.2
Delay (s)		33.7		40.4	12.5					29.7		1.2
Level of Service		C		D	B					C		A
Approach Delay (s)		33.7			21.2			0.0			5.1	
Approach LOS		C			C			A			A	

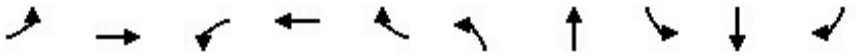
Intersection Summary			
HCM 2000 Control Delay	21.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	143	831	16	1018	101	89	50	32	56	127
Future Volume (vph)	143	831	16	1018	101	89	50	32	56	127
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	16.0	70.0	54.0	54.0	54.0	9.0	19.5	10.5	21.0	21.0
Total Split (%)	16.0%	70.0%	54.0%	54.0%	54.0%	9.0%	19.5%	10.5%	21.0%	21.0%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	72.1	67.2	55.2	55.2	55.2	19.3	11.4	20.3	10.4	10.4
Actuated g/C Ratio	0.72	0.67	0.55	0.55	0.55	0.19	0.11	0.20	0.10	0.10
v/c Ratio	0.50	0.46	0.07	0.61	0.15	0.42	0.42	0.14	0.34	0.55
Control Delay	10.8	9.1	14.6	18.6	3.4	37.4	41.3	30.1	46.1	15.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.8	9.1	14.6	18.6	3.4	37.4	41.3	30.1	46.1	15.8
LOS	B	A	B	B	A	D	D	C	D	B
Approach Delay		9.4		17.2			39.1		25.8	
Approach LOS		A		B			D		C	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 16.0	Intersection LOS: B
Intersection Capacity Utilization 67.7%	ICU Level of Service C
Analysis Period (min) 15	

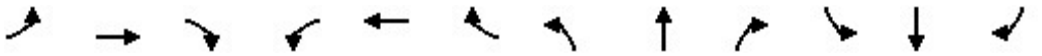
Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road





Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	155	1006	17	1107	110	97	74	35	61	138
v/c Ratio	0.50	0.46	0.07	0.61	0.15	0.42	0.42	0.14	0.34	0.55
Control Delay	10.8	9.1	14.6	18.6	3.4	37.4	41.3	30.1	46.1	15.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.8	9.1	14.6	18.6	3.4	37.4	41.3	30.1	46.1	15.8
Queue Length 50th (m)	8.5	44.4	1.5	74.0	0.0	15.5	11.1	5.4	11.2	0.0
Queue Length 95th (m)	17.1	65.0	5.9	113.3	8.7	28.1	24.3	12.6	22.7	16.8
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	359	2172	246	1804	731	233	201	257	235	288
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	0.43	0.46	0.07	0.61	0.15	0.42	0.37	0.14	0.26	0.48

Intersection Summary



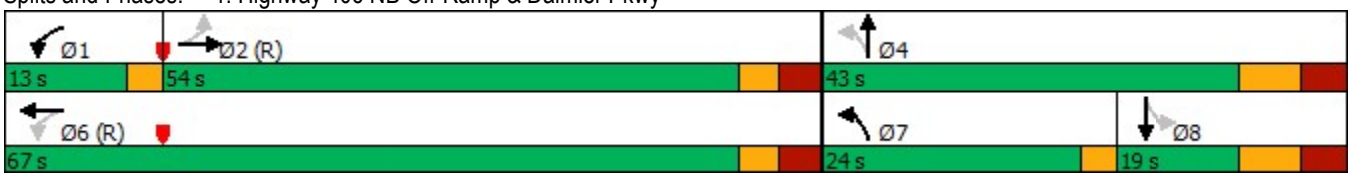
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	831	95	16	1018	101	89	50	18	32	56	127
Future Volume (vph)	143	831	95	16	1018	101	89	50	18	32	56	127
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3221		1486	3271	1234	1486	1428		1486	1722	1234
Flt Permitted	0.18	1.00		0.28	1.00	1.00	0.69	1.00		0.71	1.00	1.00
Satd. Flow (perm)	282	3221		446	3271	1234	1083	1428		1109	1722	1234
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)	155	903	103	17	1107	110	97	54	20	35	61	138
RTOR Reduction (vph)	0	8	0	0	0	51	0	13	0	0	0	123
Lane Group Flow (vph)	155	998	0	17	1107	59	97	61	0	35	61	15
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	66.0	66.0		54.0	54.0	54.0	16.2	11.4		15.4	11.0	11.0
Effective Green, g (s)	66.0	66.0		54.0	54.0	54.0	16.2	11.4		15.4	11.0	11.0
Actuated g/C Ratio	0.66	0.66		0.54	0.54	0.54	0.16	0.11		0.15	0.11	0.11
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	294	2125		240	1766	666	194	162		187	189	135
v/s Ratio Prot	c0.05	0.31			c0.34		c0.02	0.04		0.01	0.04	
v/s Ratio Perm	0.30			0.04		0.05	c0.06			0.02		0.01
v/c Ratio	0.53	0.47		0.07	0.63	0.09	0.50	0.37		0.19	0.32	0.11
Uniform Delay, d1	8.8	8.4		11.0	16.0	11.1	37.7	41.0		36.6	41.1	40.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.5	0.7		0.1	0.6	0.0	1.6	1.1		0.4	0.7	0.3
Delay (s)	10.4	9.1		11.1	16.6	11.2	39.2	42.1		37.0	41.8	40.4
Level of Service	B	A		B	B	B	D	D		D	D	D
Approach Delay (s)		9.3			16.0			40.5			40.2	
Approach LOS		A			B			D			D	

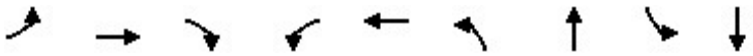
Intersection Summary			
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	6	595	618	177	377	368	0	2	0
Future Volume (vph)	6	595	618	177	377	368	0	2	0
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2		1	6	7	4		8
Permitted Phases	2		Free	6		4		8	
Detector Phase	2	2		1	6	7	4	8	8
Switch Phase									
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0	19.0
Total Split (s)	54.0	54.0		13.0	67.0	24.0	43.0	19.0	19.0
Total Split (%)	49.1%	49.1%		11.8%	60.9%	21.8%	39.1%	17.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	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
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max	None	None	Max	Max
Act Effct Green (s)	47.0	47.0	110.0	64.0	60.0	40.0	34.0	10.0	10.0
Actuated g/C Ratio	0.43	0.43	1.00	0.58	0.55	0.36	0.31	0.09	0.09
v/c Ratio	0.02	0.86	0.53	0.72	0.50	0.84	0.46	0.02	0.02
Control Delay	11.7	27.4	2.5	28.6	18.2	47.7	5.0	46.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.7	27.4	2.5	28.6	18.2	47.7	5.0	46.0	0.1
LOS	B	C	A	C	B	D	A	D	A
Approach Delay		14.7			21.5		29.7		9.3
Approach LOS		B			C		C		A

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 8 (7%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 20.2	Intersection LOS: C
Intersection Capacity Utilization 91.6%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy

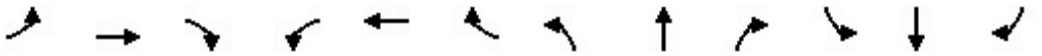




Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	7	647	672	192	411	400	291	2	8
v/c Ratio	0.02	0.86	0.53	0.72	0.50	0.84	0.46	0.02	0.02
Control Delay	11.7	27.4	2.5	28.6	18.2	47.7	5.0	46.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.7	27.4	2.5	28.6	18.2	47.7	5.0	46.0	0.1
Queue Length 50th (m)	0.0	108.2	0.0	18.5	52.3	72.1	0.0	0.4	0.0
Queue Length 95th (m)	m0.0	m#91.7	m22.2	#35.9	78.2	#123.5	14.8	2.8	0.0
Internal Link Dist (m)		194.3			158.2		78.8		37.3
Turn Bay Length (m)	55.0					50.0		15.0	
Base Capacity (vph)	364	752	1262	266	830	475	629	94	451
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	0.02	0.86	0.53	0.72	0.50	0.84	0.46	0.02	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.



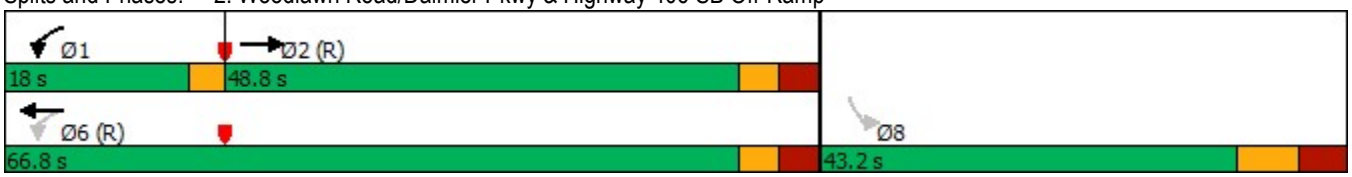
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	595	618	177	377	1	368	0	268	2	0	7
Future Volume (vph)	6	595	618	177	377	1	368	0	268	2	0	7
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0		9.0	9.0	
Lane Util. Factor	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	1.00		1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1521		1606	1336		1691	1450	
Flt Permitted	0.52	1.00	1.00	0.16	1.00		0.58	1.00		0.58	1.00	
Satd. Flow (perm)	853	1761	1262	256	1521		978	1336		1036	1450	
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)	7	647	672	192	410	1	400	0	291	2	0	8
RTOR Reduction (vph)	0	0	0	0	0	0	0	201	0	0	7	0
Lane Group Flow (vph)	7	647	672	192	411	0	400	90	0	2	1	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	47.0	47.0	110.0	60.0	60.0		34.0	34.0		10.0	10.0	
Effective Green, g (s)	47.0	47.0	110.0	60.0	60.0		34.0	34.0		10.0	10.0	
Actuated g/C Ratio	0.43	0.43	1.00	0.55	0.55		0.31	0.31		0.09	0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0		9.0	9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	364	752	1262	257	829		422	412		94	131	
v/s Ratio Prot		c0.37		c0.07	0.27		c0.18	0.07			0.00	
v/s Ratio Perm	0.01		0.53	0.34			c0.11			0.00		
v/c Ratio	0.02	0.86	0.53	0.75	0.50		0.95	0.22		0.02	0.01	
Uniform Delay, d1	18.2	28.5	0.0	19.2	15.6		35.6	28.2		45.5	45.5	
Progression Factor	0.63	0.65	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	7.5	0.9	11.2	2.1		30.5	0.3		0.4	0.1	
Delay (s)	11.5	26.2	0.9	30.4	17.7		66.1	28.4		46.0	45.6	
Level of Service	B	C	A	C	B		E	C		D	D	
Approach Delay (s)		13.3			21.7			50.2			45.6	
Approach LOS		B			C			D			D	

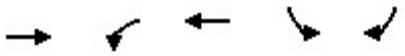
Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	91.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	914	175	560	305	725
Future Volume (vph)	914	175	560	305	725
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	48.8	18.0	66.8	43.2	
Total Split (%)	44.4%	16.4%	60.7%	39.3%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	
Act Effct Green (s)	51.9	71.7	67.9	26.1	110.0
Actuated g/C Ratio	0.47	0.65	0.62	0.24	1.00
v/c Ratio	0.87	0.75	0.57	0.80	0.56
Control Delay	34.0	35.5	10.9	53.9	1.6
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	34.0	35.5	11.1	53.9	1.6
LOS	C	D	B	D	A
Approach Delay	34.0		16.9		
Approach LOS	C		B		

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.87	
Intersection Signal Delay: 24.0	Intersection LOS: C
Intersection Capacity Utilization 80.8%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp





Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1338	190	609	332	788
v/c Ratio	0.87	0.75	0.57	0.80	0.56
Control Delay	34.0	35.5	10.9	53.9	1.6
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	34.0	35.5	11.1	53.9	1.6
Queue Length 50th (m)	127.8	19.1	75.2	67.2	0.0
Queue Length 95th (m)	#205.6	m42.2	m105.9	90.4	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1545	283	1062	538	1415
Starvation Cap Reductn	0	0	71	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.87	0.67	0.61	0.62	0.56

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	914	317	175	560	0	0	0	0	305	0	725
Future Volume (vph)	0	914	317	175	560	0	0	0	0	305	0	725
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3216		1555	1722					1743		1415
Flt Permitted		1.00		0.08	1.00					0.95		1.00
Satd. Flow (perm)		3216		131	1722					1743		1415
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)	0	993	345	190	609	0	0	0	0	332	0	788
RTOR Reduction (vph)	0	27	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1311	0	190	609	0	0	0	0	332	0	788
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		52.0		67.9	67.9					26.1		110.0
Effective Green, g (s)		52.0		67.9	67.9					26.1		110.0
Actuated g/C Ratio		0.47		0.62	0.62					0.24		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1520		247	1062					413		1415
v/s Ratio Prot		c0.41		c0.09	0.35							
v/s Ratio Perm				0.38						c0.19		0.56
v/c Ratio		0.86		0.77	0.57					0.80		0.56
Uniform Delay, d1		25.8		26.9	12.5					39.5		0.0
Progression Factor		1.00		0.94	0.65					1.00		1.00
Incremental Delay, d2		6.7		10.3	1.7					10.8		1.6
Delay (s)		32.5		35.7	9.8					50.4		1.6
Level of Service		C		D	A					D		A
Approach Delay (s)		32.5			15.9			0.0			16.0	
Approach LOS		C			B			A			B	

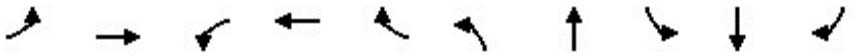
Intersection Summary			
HCM 2000 Control Delay	22.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	436	994	28	972	285	128	102	233	143	474
Future Volume (vph)	436	994	28	972	285	128	102	233	143	474
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	34.3	83.0	48.7	48.7	48.7	9.0	21.6	15.4	28.0	28.0
Total Split (%)	28.6%	69.2%	40.6%	40.6%	40.6%	7.5%	18.0%	12.8%	23.3%	23.3%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	81.0	76.1	40.8	40.8	40.8	23.6	13.3	33.0	19.7	19.7
Actuated g/C Ratio	0.68	0.63	0.34	0.34	0.34	0.20	0.11	0.28	0.16	0.16
v/c Ratio	1.04	0.59	0.24	0.95	0.50	0.62	0.83	0.90	0.55	0.86
Control Delay	86.1	14.2	34.9	56.4	6.2	51.2	84.4	72.9	53.8	22.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	86.1	14.2	34.9	56.4	6.2	51.2	84.4	72.9	53.8	22.2
LOS	F	B	C	E	A	D	F	E	D	C
Approach Delay		34.5		44.8			67.8		41.4	
Approach LOS		C		D			E		D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.04	
Intersection Signal Delay: 41.5	Intersection LOS: D
Intersection Capacity Utilization 99.3%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road





Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	474	1201	30	1057	310	139	139	253	155	515
v/c Ratio	1.04	0.59	0.24	0.95	0.50	0.62	0.83	0.90	0.55	0.86
Control Delay	86.1	14.2	34.9	56.4	6.2	51.2	84.4	72.9	53.8	22.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	86.1	14.2	34.9	56.4	6.2	51.2	84.4	72.9	53.8	22.2
Queue Length 50th (m)	~108.8	81.3	5.1	127.1	0.2	25.9	30.2	51.5	33.6	8.8
Queue Length 95th (m)	#173.1	100.5	13.6	#169.9	20.6	43.9	#62.5	#100.2	54.9	#70.6
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	457	2050	124	1112	623	225	180	282	297	603
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	1.04	0.59	0.24	0.95	0.50	0.62	0.77	0.90	0.52	0.85

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.

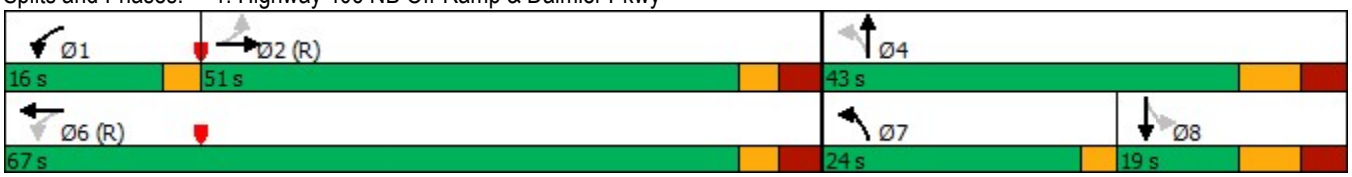
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	436	994	111	28	972	285	128	102	26	233	143	474
Future Volume (vph)	436	994	111	28	972	285	128	102	26	233	143	474
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3222		1486	3271	1234	1486	1443		1486	1722	1234
Flt Permitted	0.09	1.00		0.23	1.00	1.00	0.66	1.00		0.48	1.00	1.00
Satd. Flow (perm)	143	3222		367	3271	1234	1031	1443		749	1722	1234
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)	474	1080	121	30	1057	310	139	111	28	253	155	515
RTOR Reduction (vph)	0	7	0	0	0	204	0	8	0	0	0	395
Lane Group Flow (vph)	474	1194	0	30	1057	106	139	131	0	253	155	120
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	76.1	76.1		40.8	40.8	40.8	19.3	13.3		28.7	19.7	19.7
Effective Green, g (s)	76.1	76.1		40.8	40.8	40.8	19.3	13.3		28.7	19.7	19.7
Actuated g/C Ratio	0.63	0.63		0.34	0.34	0.34	0.16	0.11		0.24	0.16	0.16
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	452	2043		124	1112	419	188	159		255	282	202
v/s Ratio Prot	c0.28	0.37			0.32		0.04	0.09		c0.10	0.09	
v/s Ratio Perm	c0.38			0.08		0.09	0.08			c0.13		0.10
v/c Ratio	1.05	0.58		0.24	0.95	0.25	0.74	0.82		0.99	0.55	0.60
Uniform Delay, d1	36.1	12.8		28.5	38.6	28.6	47.0	52.2		44.0	46.1	46.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	55.7	1.2		0.7	16.5	0.2	13.5	27.4		54.0	1.7	3.9
Delay (s)	91.8	14.0		29.2	55.1	28.8	60.5	79.6		97.9	47.8	50.4
Level of Service	F	B		C	E	C	E	E		F	D	D
Approach Delay (s)		36.0			48.7			70.1			63.0	
Approach LOS		D			D			E			E	

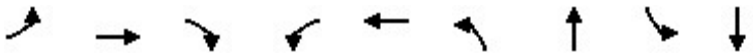
Intersection Summary			
HCM 2000 Control Delay	48.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	99.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	7	511	640	231	461	360	1	1	6
Future Volume (vph)	7	511	640	231	461	360	1	1	6
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2		1	6	7	4		8
Permitted Phases	2		Free	6		4		8	
Detector Phase	2	2		1	6	7	4	8	8
Switch Phase									
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0	19.0
Total Split (s)	51.0	51.0		16.0	67.0	24.0	43.0	19.0	19.0
Total Split (%)	46.4%	46.4%		14.5%	60.9%	21.8%	39.1%	17.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	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
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max	None	None	Max	Max
Act Effct Green (s)	44.6	44.6	110.0	64.0	60.0	40.0	34.0	10.0	10.0
Actuated g/C Ratio	0.41	0.41	1.00	0.58	0.55	0.36	0.31	0.09	0.09
v/c Ratio	0.03	0.78	0.55	0.74	0.60	0.82	0.43	0.01	0.08
Control Delay	12.1	24.7	2.0	25.9	20.8	45.9	6.1	46.0	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.1	24.7	2.0	25.9	20.8	45.9	6.1	46.0	36.5
LOS	B	C	A	C	C	D	A	D	D
Approach Delay		12.1			22.5		30.4		37.2
Approach LOS		B			C		C		D

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 21 (19%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 19.6	Intersection LOS: B
Intersection Capacity Utilization 91.4%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy





Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	8	555	696	251	502	391	250	1	12
v/c Ratio	0.03	0.78	0.55	0.74	0.60	0.82	0.43	0.01	0.08
Control Delay	12.1	24.7	2.0	25.9	20.8	45.9	6.1	46.0	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.1	24.7	2.0	25.9	20.8	45.9	6.1	46.0	36.5
Queue Length 50th (m)	0.5	90.1	3.0	25.3	69.7	69.9	0.2	0.2	1.4
Queue Length 95th (m)	m0.6	m118.9	10.7	#43.0	103.2	#117.5	17.9	1.8	7.3
Internal Link Dist (m)		194.3			158.2		78.8		37.3
Turn Bay Length (m)	55.0					50.0		15.0	
Base Capacity (vph)	317	713	1262	346	830	475	585	97	149
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	0.03	0.78	0.55	0.73	0.60	0.82	0.43	0.01	0.08

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.

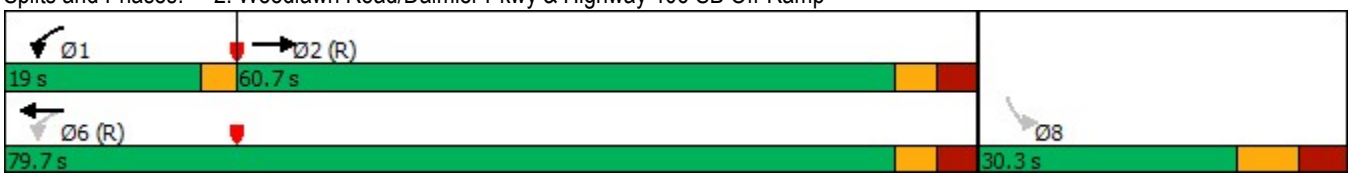
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	511	640	231	461	1	360	1	229	1	6	5
Future Volume (vph)	7	511	640	231	461	1	360	1	229	1	6	5
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0		9.0	9.0	
Lane Util. Factor	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	1.00		1.00	0.85		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1521		1606	1337		1691	1599	
Flt Permitted	0.48	1.00	1.00	0.22	1.00		0.58	1.00		0.60	1.00	
Satd. Flow (perm)	784	1761	1262	352	1521		975	1337		1075	1599	
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)	8	555	696	251	501	1	391	1	249	1	7	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	172	0	0	5	0
Lane Group Flow (vph)	8	555	696	251	502	0	391	78	0	1	7	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	44.6	44.6	110.0	60.0	60.0		34.0	34.0		10.0	10.0	
Effective Green, g (s)	44.6	44.6	110.0	60.0	60.0		34.0	34.0		10.0	10.0	
Actuated g/C Ratio	0.41	0.41	1.00	0.55	0.55		0.31	0.31		0.09	0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0		9.0	9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	317	714	1262	327	829		421	413		97	145	
v/s Ratio Prot		0.32		c0.09	0.33		c0.18	0.06			0.00	
v/s Ratio Perm	0.01		0.55	c0.33			c0.11			0.00		
v/c Ratio	0.03	0.78	0.55	0.77	0.61		0.93	0.19		0.01	0.05	
Uniform Delay, d1	19.6	28.4	0.0	17.9	17.0		35.3	27.9		45.5	45.7	
Progression Factor	0.59	0.66	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	4.9	1.0	10.3	3.3		26.6	0.2		0.2	0.7	
Delay (s)	11.7	23.7	1.0	28.2	20.2		61.8	28.1		45.7	46.3	
Level of Service	B	C	A	C	C		E	C		D	D	
Approach Delay (s)		11.1			22.9			48.7			46.3	
Approach LOS		B			C			D			D	

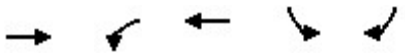
Intersection Summary			
HCM 2000 Control Delay	23.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	91.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	926	207	586	232	791
Future Volume (vph)	926	207	586	232	791
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	60.7	19.0	79.7	30.3	
Total Split (%)	55.2%	17.3%	72.5%	27.5%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	
Act Effct Green (s)	57.5	78.4	74.6	19.4	110.0
Actuated g/C Ratio	0.52	0.71	0.68	0.18	1.00
v/c Ratio	0.80	0.78	0.55	0.82	0.61
Control Delay	26.0	33.7	7.0	65.3	1.9
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	26.0	33.7	7.2	65.3	1.9
LOS	C	C	A	E	A
Approach Delay	26.0		14.1		
Approach LOS	C		B		

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 108 (98%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 19.7	Intersection LOS: B
Intersection Capacity Utilization 79.3%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp





Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1375	225	637	252	860
v/c Ratio	0.80	0.78	0.55	0.82	0.61
Control Delay	26.0	33.7	7.0	65.3	1.9
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	26.0	33.7	7.2	65.3	1.9
Queue Length 50th (m)	126.7	20.8	44.8	51.6	0.0
Queue Length 95th (m)	159.4	m42.7	m77.5	#86.8	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1709	313	1168	334	1415
Starvation Cap Reductn	0	0	121	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.80	0.72	0.61	0.75	0.61

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	926	339	207	586	0	0	0	0	232	0	791
Future Volume (vph)	0	926	339	207	586	0	0	0	0	232	0	791
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3211		1555	1722					1743		1415
Flt Permitted		1.00		0.09	1.00					0.95		1.00
Satd. Flow (perm)		3211		154	1722					1743		1415
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)	0	1007	368	225	637	0	0	0	0	252	0	860
RTOR Reduction (vph)	0	32	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1343	0	225	637	0	0	0	0	252	0	860
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		57.4		74.6	74.6					19.4		110.0
Effective Green, g (s)		57.4		74.6	74.6					19.4		110.0
Actuated g/C Ratio		0.52		0.68	0.68					0.18		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1675		285	1167					307		1415
v/s Ratio Prot		0.42		c0.10	0.37							
v/s Ratio Perm				c0.43						0.14		c0.61
v/c Ratio		0.80		0.79	0.55					0.82		0.61
Uniform Delay, d1		21.6		25.3	9.0					43.6		0.0
Progression Factor		1.00		1.00	0.58					1.00		1.00
Incremental Delay, d2		4.2		9.9	1.3					16.0		1.9
Delay (s)		25.8		35.3	6.6					59.6		1.9
Level of Service		C		D	A					E		A
Approach Delay (s)		25.8			14.1			0.0			15.0	
Approach LOS		C			B			A			B	

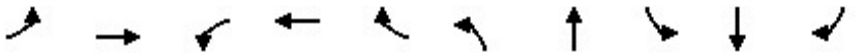
Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	79.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	751	905	18	1002	357	135	217	340	178	657
Future Volume (vph)	751	905	18	1002	357	135	217	340	178	657
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	44.0	86.0	42.0	42.0	42.0	9.0	23.0	21.0	35.0	35.0
Total Split (%)	33.8%	66.2%	32.3%	32.3%	32.3%	6.9%	17.7%	16.2%	26.9%	26.9%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	83.0	78.1	34.1	34.1	34.1	26.0	15.7	41.0	27.7	27.7
Actuated g/C Ratio	0.64	0.60	0.26	0.26	0.26	0.20	0.12	0.32	0.21	0.21
v/c Ratio	1.56	0.57	0.19	1.27	0.74	0.67	1.38	1.40	0.53	1.00
Control Delay	289.6	16.8	42.8	170.1	22.3	56.2	244.6	231.2	51.4	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	289.6	16.8	42.8	170.1	22.3	56.2	244.6	231.2	51.4	44.4
LOS	F	B	D	F	C	E	F	F	D	D
Approach Delay		133.0		130.1			174.7		99.6	
Approach LOS		F		F			F		F	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 130	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.56	
Intersection Signal Delay: 127.0	Intersection LOS: F
Intersection Capacity Utilization 133.6%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road





Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	816	1100	20	1089	388	147	249	370	193	714
v/c Ratio	1.56	0.57	0.19	1.27	0.74	0.67	1.38	1.40	0.53	1.00
Control Delay	289.6	16.8	42.8	170.1	22.3	56.2	244.6	231.2	51.4	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	289.6	16.8	42.8	170.1	22.3	56.2	244.6	231.2	51.4	44.4
Queue Length 50th (m)	~282.5	83.7	4.0	~184.8	26.6	28.6	~84.7	~111.0	44.2	50.0
Queue Length 95th (m)	#358.7	102.5	11.6	#226.6	67.6	#48.6	#137.7	#172.1	68.6	#139.5
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	523	1940	106	858	525	221	180	265	366	715
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	1.56	0.57	0.19	1.27	0.74	0.67	1.38	1.40	0.53	1.00

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	751	905	107	18	1002	357	135	217	12	340	178	657
Future Volume (vph)	751	905	107	18	1002	357	135	217	12	340	178	657
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3220		1486	3271	1234	1486	1477		1486	1722	1234
Flt Permitted	0.11	1.00		0.26	1.00	1.00	0.64	1.00		0.21	1.00	1.00
Satd. Flow (perm)	169	3220		406	3271	1234	995	1477		335	1722	1234
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)	816	984	116	20	1089	388	147	236	13	370	193	714
RTOR Reduction (vph)	0	7	0	0	0	202	0	2	0	0	0	452
Lane Group Flow (vph)	816	1093	0	20	1089	186	147	247	0	370	193	262
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	78.1	78.1		34.1	34.1	34.1	21.7	15.7		36.7	27.7	27.7
Effective Green, g (s)	78.1	78.1		34.1	34.1	34.1	21.7	15.7		36.7	27.7	27.7
Actuated g/C Ratio	0.60	0.60		0.26	0.26	0.26	0.17	0.12		0.28	0.21	0.21
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	516	1934		106	858	323	188	178		253	366	262
v/s Ratio Prot	c0.50	0.34			0.33		0.04	0.17		c0.20	0.11	
v/s Ratio Perm	c0.45			0.05		0.15	0.09			c0.21		0.21
v/c Ratio	1.58	0.57		0.19	1.27	0.58	0.78	1.39		1.46	0.53	1.00
Uniform Delay, d1	37.5	15.7		37.2	48.0	41.7	50.8	57.1		42.0	45.3	51.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	270.8	1.2		0.6	130.3	2.0	18.3	205.8		228.6	1.0	54.7
Delay (s)	308.3	16.9		37.8	178.3	43.7	69.1	262.9		270.6	46.4	105.8
Level of Service	F	B		D	F	D	E	F		F	D	F
Approach Delay (s)		141.0			141.5			191.0			144.6	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	145.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.61		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	133.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX 14

Sensitivity Analysis #3 – 10% Decrease to Through Volumes along Woodlawn Road/Daimler Parkway – Queueing Analysis Results



Future Total (2051) Conditions Model – Bridge Adjustment (-10%) – No Train – Microsimulation Results				
Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	35
			EBT	53
			EBR	51
			NBL	26
			NBT	28
			NBR	27
			SBL	18
			SBT	25
			SBR	16
			WBL	9
			WBT	72
			WBR	16
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	126
			EBT	127
			SBL	32
			WBL	38
			WBT	63
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1
			EBT	58
			EBR	-
			NBL	49
			NBT	15
			NBR	15
			SBL	0
			SBT	6
			SBR	6
			WBL	40
			WBT	66
			WBR	66
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	31
			EBT	31
			EBR	31
			NBL	26
			SBR	10
			WBT	31
	1	Woodlawn Road and Primeway	EBL	118
			EBT	126
			EBR	126
			NBL	43
			NBT	56
			NBR	56

PM Peak Hour	1	Drive / Brown Road	SBL	59
			SBT	55
			SBR	67
			WBL	17
			WBT	125
			WBR	41
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	226
			EBT	229
			SBL	97
			WBL	46
			WBT	98
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	7
			EBT	158
			EBR	-
			NBL	100
			NBT	44
			NBR	44
			SBL	8
			SBT	8
			SBR	8
			WBL	44
			WBT	69
			WBR	69
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	17
			EBT	17
			EBR	17
			NBL	45
			SBR	10
			WBT	20
k Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	257
			EBT	233
			EBR	233
			NBL	45
			NBT	76
			NBR	76
			SBL	93
			SBT	93
			SBR	102
			WBL	14
			WBT	132
			WBR	47
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	175
			EBT	175
			SBL	68
			WBL	42
			WBT	85
			EBL	7

SAT Peal	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBT	118
			EBR	-
			NBL	72
			NBT	33
			NBR	33
			SBL	4
			SBT	10
			SBR	10
			WBL	42
			WBT	67
			WBR	67
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	99
			EBT	99
			EBR	99
			NBL	38
			SBR	10
			WBT	24

Future Total (2051) Conditions Model – Bridge Adjustment (-10%) – With Train – Microsimulation Results				
Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	35
			EBT	53
			EBR	51
			NBL	26
			NBT	28
			NBR	27
			SBL	18
			SBT	25
			SBR	16
			WBL	9
			WBT	72
			WBR	15
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	125
			EBT	126
			SBL	34
			WBL	38
			WBT	82
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1
			EBT	59
			EBR	-
			NBL	49
			NBT	16
			NBR	16
			SBL	0
			SBT	6
			SBR	6
			WBL	61
			WBT	68
			WBR	68
	4	Rail Crossing	EBT	55
			WBT	98
	5	Daimler Parkway and Street 'A'	EBL	33
			EBT	33
			EBR	33
			NBL	27
			SBR	11
			WBT	29
	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	118
			EBT	129
			EBR	129
			NBL	43
			NBT	56
			NBR	56
			SBL	59

PM Peak Hour			SBT	53
			SBR	67
			WBL	17
			WBT	128
			WBR	39
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	225
			EBT	228
			SBL	116
			WBL	47
			WBT	120
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	6
			EBT	207
			EBR	-
			NBL	103
			NBT	75
			NBR	75
			SBL	8
			SBT	8
			SBR	8
			WBL	54
			WBT	69
			WBR	69
	4	Rail Crossing	EBT	61
			WBT	89
	5	Daimler Parkway and Street 'A'	EBL	61
			EBT	61
			EBR	61
			NBL	53
			SBR	10
			WBT	21

APPENDIX 15

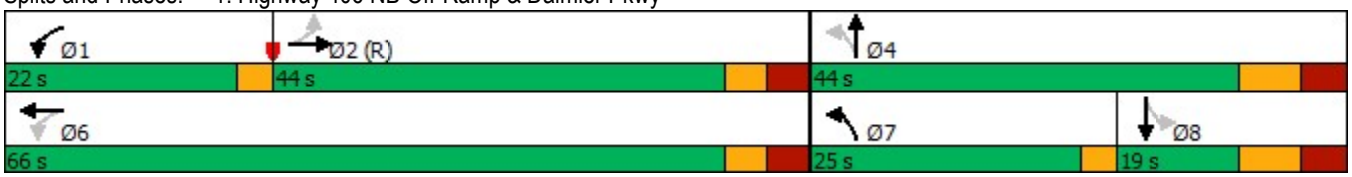
Sensitivity Analysis #4 – 25% Decrease to Through Volumes along Woodlawn Road/Daimler Parkway – Synchro Analysis Results



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Configurations								
Traffic Volume (vph)	1	165	669	271	416	233	1	1
Future Volume (vph)	1	165	669	271	416	233	1	1
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	NA
Protected Phases		2		1	6	7	4	8
Permitted Phases	2		Free	6		4		
Detector Phase	2	2		1	6	7	4	8
Switch Phase								
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0
Total Split (s)	44.0	44.0		22.0	66.0	25.0	44.0	19.0
Total Split (%)	40.0%	40.0%		20.0%	60.0%	22.7%	40.0%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes
Recall Mode	C-Max	C-Max		None	None	None	None	Max
Act Effct Green (s)	40.0	40.0	110.0	63.0	59.0	41.0	35.0	12.1
Actuated g/C Ratio	0.36	0.36	1.00	0.57	0.54	0.37	0.32	0.11
v/c Ratio	0.00	0.28	0.58	0.46	0.55	0.52	0.21	0.01
Control Delay	10.0	12.3	9.9	15.1	20.1	30.2	6.6	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.0	12.3	9.9	15.1	20.1	30.2	6.6	39.0
LOS	A	B	A	B	C	C	A	D
Approach Delay		10.4			18.1		23.3	39.0
Approach LOS		B			B		C	D

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 85 (77%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay: 15.6	Intersection LOS: B
Intersection Capacity Utilization 80.3%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy





Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	1	179	727	295	452	253	105	2
v/c Ratio	0.00	0.28	0.58	0.46	0.55	0.52	0.21	0.01
Control Delay	10.0	12.3	9.9	15.1	20.1	30.2	6.6	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.0	12.3	9.9	15.1	20.1	30.2	6.6	39.0
Queue Length 50th (m)	0.1	20.0	63.5	31.6	61.1	40.0	0.2	0.2
Queue Length 95th (m)	m0.1	m30.9	74.4	48.4	90.9	62.4	11.9	2.6
Internal Link Dist (m)		194.3			158.2		78.8	37.3
Turn Bay Length (m)	55.0					50.0		
Base Capacity (vph)	299	640	1262	653	816	498	496	174
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	0.00	0.28	0.58	0.45	0.55	0.51	0.21	0.01

Intersection Summary

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

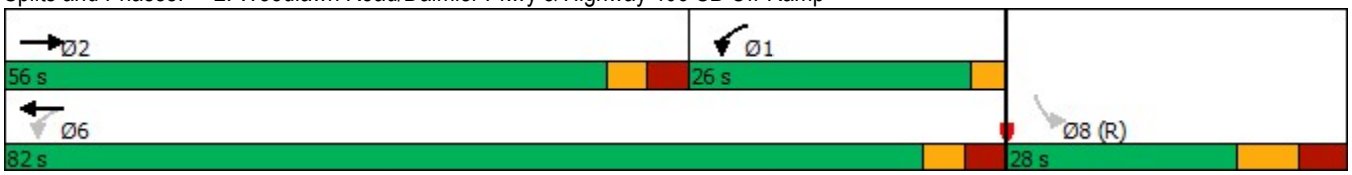
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	165	669	271	416	0	233	1	96	0	1	1
Future Volume (vph)	1	165	669	271	416	0	233	1	96	0	1	1
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0			9.0	
Lane Util. Factor	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			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1522		1606	1338			1578	
Flt Permitted	0.50	1.00	1.00	0.59	1.00		0.61	1.00			1.00	
Satd. Flow (perm)	821	1761	1262	963	1522		1025	1338			1578	
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)	1	179	727	295	452	0	253	1	104	0	1	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	71	0	0	1	0
Lane Group Flow (vph)	1	179	727	295	452	0	253	34	0	0	1	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	40.0	40.0	110.0	59.0	59.0		35.0	35.0			12.1	
Effective Green, g (s)	40.0	40.0	110.0	59.0	59.0		35.0	35.0			12.1	
Actuated g/C Ratio	0.36	0.36	1.00	0.54	0.54		0.32	0.32			0.11	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0			9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	298	640	1262	602	816		431	425			173	
v/s Ratio Prot		0.10		0.07	0.30		0.11	0.03			0.00	
v/s Ratio Perm	0.00		c0.58	0.19			0.08					
v/c Ratio	0.00	0.28	0.58	0.49	0.55		0.59	0.08			0.01	
Uniform Delay, d1	22.3	24.8	0.0	14.7	16.8		30.4	26.2			43.6	
Progression Factor	0.40	0.44	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.0	0.8	1.5	0.6	0.8		2.0	0.1			0.1	
Delay (s)	8.9	11.7	1.5	15.3	17.6		32.4	26.3			43.7	
Level of Service	A	B	A	B	B		C	C			D	
Approach Delay (s)		3.5			16.7			30.6			43.7	
Approach LOS		A			B			C			D	

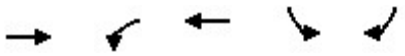
Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	80.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	735	225	418	100	634
Future Volume (vph)	735	225	418	100	634
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	56.0	26.0	82.0	28.0	
Total Split (%)	50.9%	23.6%	74.5%	25.5%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	None	None	None	C-Max	
Act Effct Green (s)	42.7	63.5	59.7	34.3	110.0
Actuated g/C Ratio	0.39	0.58	0.54	0.31	1.00
v/c Ratio	0.82	0.80	0.49	0.20	0.49
Control Delay	34.2	45.8	13.1	32.7	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	34.2	45.8	13.1	32.7	1.2
LOS	C	D	B	C	A
Approach Delay	34.2		24.5		
Approach LOS	C		C		

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 27 (25%), Referenced to phase 8:SBL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 22.6	Intersection LOS: C
Intersection Capacity Utilization 62.6%	ICU Level of Service B
Analysis Period (min) 15	

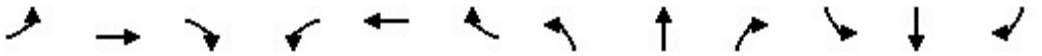
Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp





Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1047	245	454	109	689
v/c Ratio	0.82	0.80	0.49	0.20	0.49
Control Delay	34.2	45.8	13.1	32.7	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	34.2	45.8	13.1	32.7	1.2
Queue Length 50th (m)	99.2	29.2	46.5	17.2	0.0
Queue Length 95th (m)	113.7	48.3	51.3	36.0	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1468	433	1177	543	1415
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	0.71	0.57	0.39	0.20	0.49

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	735	228	225	418	0	0	0	0	100	0	634
Future Volume (vph)	0	735	228	225	418	0	0	0	0	100	0	634
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3226		1555	1722					1743		1415
Flt Permitted		1.00		0.15	1.00					0.95		1.00
Satd. Flow (perm)		3226		241	1722					1743		1415
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)	0	799	248	245	454	0	0	0	0	109	0	689
RTOR Reduction (vph)	0	29	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1018	0	245	454	0	0	0	0	109	0	689
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		42.7		63.5	59.7					34.3		110.0
Effective Green, g (s)		42.7		63.5	59.7					34.3		110.0
Actuated g/C Ratio		0.39		0.58	0.54					0.31		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1252		306	934					543		1415
v/s Ratio Prot		0.32		c0.10	0.26							
v/s Ratio Perm				c0.36						0.06		c0.49
v/c Ratio		0.81		0.80	0.49					0.20		0.49
Uniform Delay, d1		30.1		32.3	15.6					27.8		0.0
Progression Factor		1.00		0.90	0.78					1.00		1.00
Incremental Delay, d2		4.1		12.1	0.3					0.8		1.2
Delay (s)		34.2		41.1	12.5					28.6		1.2
Level of Service		C		D	B					C		A
Approach Delay (s)		34.2			22.5			0.0			4.9	
Approach LOS		C			C			A			A	

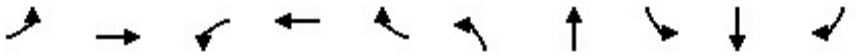
Intersection Summary			
HCM 2000 Control Delay	21.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	143	798	16	935	101	89	50	32	56	127
Future Volume (vph)	143	798	16	935	101	89	50	32	56	127
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	15.1	68.6	53.5	53.5	53.5	10.0	20.9	10.5	21.4	21.4
Total Split (%)	15.1%	68.6%	53.5%	53.5%	53.5%	10.0%	20.9%	10.5%	21.4%	21.4%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	71.6	66.7	54.8	54.8	54.8	20.4	11.9	20.0	10.1	10.1
Actuated g/C Ratio	0.72	0.67	0.55	0.55	0.55	0.20	0.12	0.20	0.10	0.10
v/c Ratio	0.46	0.45	0.07	0.57	0.15	0.41	0.40	0.14	0.35	0.56
Control Delay	10.0	9.3	14.8	17.8	3.4	36.1	40.1	29.7	46.8	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.0	9.3	14.8	17.8	3.4	36.1	40.1	29.7	46.8	16.2
LOS	A	A	B	B	A	D	D	C	D	B
Approach Delay		9.4		16.4			37.8		26.2	
Approach LOS		A		B			D		C	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.57	
Intersection Signal Delay: 15.7	Intersection LOS: B
Intersection Capacity Utilization 66.8%	ICU Level of Service C
Analysis Period (min) 15	

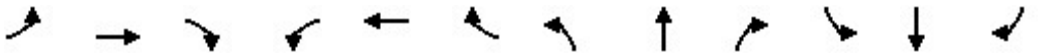
Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road





Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	155	970	17	1016	110	97	74	35	61	138
v/c Ratio	0.46	0.45	0.07	0.57	0.15	0.41	0.40	0.14	0.35	0.56
Control Delay	10.0	9.3	14.8	17.8	3.4	36.1	40.1	29.7	46.8	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.0	9.3	14.8	17.8	3.4	36.1	40.1	29.7	46.8	16.2
Queue Length 50th (m)	8.5	42.2	1.5	65.2	0.0	15.5	11.1	5.4	11.4	0.0
Queue Length 95th (m)	18.0	64.5	6.0	101.7	8.9	27.5	23.9	12.3	22.5	16.7
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	374	2155	253	1793	727	239	219	254	242	292
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	0.41	0.45	0.07	0.57	0.15	0.41	0.34	0.14	0.25	0.47

Intersection Summary



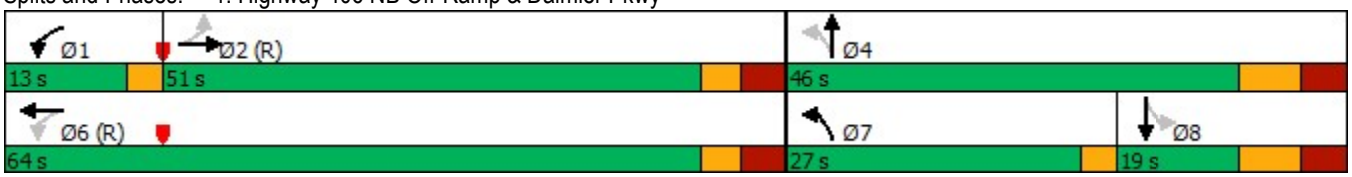
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	798	95	16	935	101	89	50	18	32	56	127
Future Volume (vph)	143	798	95	16	935	101	89	50	18	32	56	127
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3219		1486	3271	1234	1486	1428		1486	1722	1234
Flt Permitted	0.21	1.00		0.30	1.00	1.00	0.64	1.00		0.71	1.00	1.00
Satd. Flow (perm)	327	3219		462	3271	1234	1009	1428		1109	1722	1234
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)	155	867	103	17	1016	110	97	54	20	35	61	138
RTOR Reduction (vph)	0	8	0	0	0	51	0	13	0	0	0	123
Lane Group Flow (vph)	155	962	0	17	1016	59	97	61	0	35	61	15
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	65.5	65.5		53.6	53.6	53.6	17.5	11.9		15.1	10.7	10.7
Effective Green, g (s)	65.5	65.5		53.6	53.6	53.6	17.5	11.9		15.1	10.7	10.7
Actuated g/C Ratio	0.66	0.66		0.54	0.54	0.54	0.18	0.12		0.15	0.11	0.11
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	317	2108		247	1753	661	203	169		184	184	132
v/s Ratio Prot	c0.04	0.30			c0.31		c0.03	0.04		0.01	0.04	
v/s Ratio Perm	0.28			0.04		0.05	c0.06			0.02		0.01
v/c Ratio	0.49	0.46		0.07	0.58	0.09	0.48	0.36		0.19	0.33	0.11
Uniform Delay, d1	8.3	8.5		11.2	15.6	11.3	36.4	40.5		36.9	41.3	40.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.1	0.7		0.1	0.4	0.0	1.4	1.0		0.4	0.8	0.3
Delay (s)	9.4	9.2		11.3	16.0	11.3	37.8	41.5		37.3	42.1	40.6
Level of Service	A	A		B	B	B	D	D		D	D	D
Approach Delay (s)		9.2			15.5			39.4			40.5	
Approach LOS		A			B			D			D	

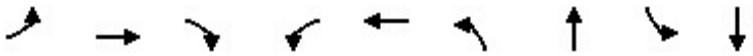
Intersection Summary			
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	6	496	618	177	314	368	0	2	0
Future Volume (vph)	6	496	618	177	314	368	0	2	0
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2		1	6	7	4		8
Permitted Phases	2		Free	6		4		8	
Detector Phase	2	2		1	6	7	4	8	8
Switch Phase									
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0	19.0
Total Split (s)	51.0	51.0		13.0	64.0	27.0	46.0	19.0	19.0
Total Split (%)	46.4%	46.4%		11.8%	58.2%	24.5%	41.8%	17.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	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
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max	None	None	Max	Max
Act Effct Green (s)	44.0	44.0	110.0	61.0	57.0	43.0	37.0	10.3	10.3
Actuated g/C Ratio	0.40	0.40	1.00	0.55	0.52	0.39	0.34	0.09	0.09
v/c Ratio	0.02	0.77	0.53	0.62	0.43	0.77	0.43	0.02	0.02
Control Delay	15.8	31.3	2.2	21.8	18.7	39.0	3.0	46.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.8	31.3	2.2	21.8	18.7	39.0	3.0	46.0	0.0
LOS	B	C	A	C	B	D	A	D	A
Approach Delay		15.1			19.8		23.8		9.2
Approach LOS		B			B		C		A

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 16 (15%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.77	
Intersection Signal Delay: 18.6	Intersection LOS: B
Intersection Capacity Utilization 86.0%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy

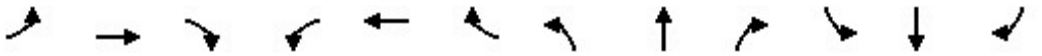




Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	7	539	672	192	342	400	291	2	8
v/c Ratio	0.02	0.77	0.53	0.62	0.43	0.77	0.43	0.02	0.02
Control Delay	15.8	31.3	2.2	21.8	18.7	39.0	3.0	46.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.8	31.3	2.2	21.8	18.7	39.0	3.0	46.0	0.0
Queue Length 50th (m)	0.7	113.6	0.7	19.9	43.8	68.6	0.0	0.4	0.0
Queue Length 95th (m)	m0.6	m140.7	20.3	32.4	66.3	#104.2	7.8	2.8	0.0
Internal Link Dist (m)		194.3			158.2		78.8		37.3
Turn Bay Length (m)	55.0					50.0		15.0	
Base Capacity (vph)	363	704	1262	311	788	520	684	96	488
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	0.02	0.77	0.53	0.62	0.43	0.77	0.43	0.02	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.



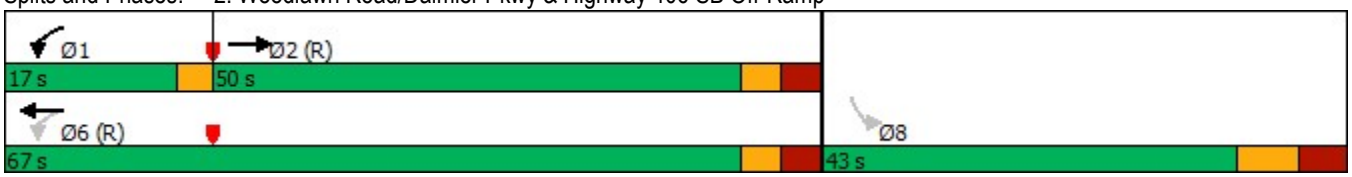
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	496	618	177	314	1	368	0	268	2	0	7
Future Volume (vph)	6	496	618	177	314	1	368	0	268	2	0	7
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0		9.0	9.0	
Lane Util. Factor	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	1.00		1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1521		1606	1336		1691	1450	
Flt Permitted	0.56	1.00	1.00	0.22	1.00		0.58	1.00		0.58	1.00	
Satd. Flow (perm)	909	1761	1262	368	1521		985	1336		1036	1450	
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)	7	539	672	192	341	1	400	0	291	2	0	8
RTOR Reduction (vph)	0	0	0	0	0	0	0	193	0	0	7	0
Lane Group Flow (vph)	7	539	672	192	342	0	400	98	0	2	1	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	44.0	44.0	110.0	57.0	57.0		37.0	37.0		10.3	10.3	
Effective Green, g (s)	44.0	44.0	110.0	57.0	57.0		37.0	37.0		10.3	10.3	
Actuated g/C Ratio	0.40	0.40	1.00	0.52	0.52		0.34	0.34		0.09	0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0		9.0	9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	363	704	1262	298	788		465	449		97	135	
v/s Ratio Prot		c0.31		0.06	0.22		c0.19	0.07			0.00	
v/s Ratio Perm	0.01		c0.53	0.28			c0.10			0.00		
v/c Ratio	0.02	0.77	0.53	0.64	0.43		0.86	0.22		0.02	0.01	
Uniform Delay, d1	20.0	28.5	0.0	18.1	16.5		32.4	26.1		45.3	45.2	
Progression Factor	0.78	0.89	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	5.1	1.0	4.7	1.7		14.9	0.2		0.4	0.1	
Delay (s)	15.6	30.6	1.0	22.9	18.2		47.3	26.4		45.7	45.3	
Level of Service	B	C	A	C	B		D	C		D	D	
Approach Delay (s)		14.2			19.9			38.5			45.4	
Approach LOS		B			B			D			D	

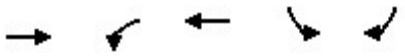
Intersection Summary			
HCM 2000 Control Delay	22.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	86.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	815	175	497	305	725
Future Volume (vph)	815	175	497	305	725
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	50.0	17.0	67.0	43.0	
Total Split (%)	45.5%	15.5%	60.9%	39.1%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	
Act Effct Green (s)	51.9	71.7	67.9	26.1	110.0
Actuated g/C Ratio	0.47	0.65	0.62	0.24	1.00
v/c Ratio	0.80	0.69	0.51	0.80	0.56
Control Delay	29.8	25.4	8.2	54.0	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	29.8	25.4	8.2	54.0	1.6
LOS	C	C	A	D	A
Approach Delay	29.8		12.6		
Approach LOS	C		B		

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 108 (98%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 21.1	Intersection LOS: C
Intersection Capacity Utilization 77.9%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

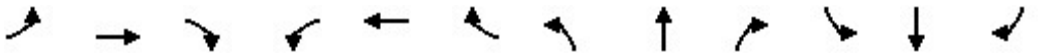




Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1231	190	540	332	788
v/c Ratio	0.80	0.69	0.51	0.80	0.56
Control Delay	29.8	25.4	8.2	54.0	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	29.8	25.4	8.2	54.0	1.6
Queue Length 50th (m)	110.8	10.0	33.5	67.2	0.0
Queue Length 95th (m)	#174.3	m34.8	85.6	90.7	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1545	298	1063	535	1415
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	0.80	0.64	0.51	0.62	0.56

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.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	815	317	175	497	0	0	0	0	305	0	725
Future Volume (vph)	0	815	317	175	497	0	0	0	0	305	0	725
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3204		1555	1722					1743		1415
Flt Permitted		1.00		0.11	1.00					0.95		1.00
Satd. Flow (perm)		3204		177	1722					1743		1415
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)	0	886	345	190	540	0	0	0	0	332	0	788
RTOR Reduction (vph)	0	32	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1199	0	190	540	0	0	0	0	332	0	788
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		51.9		67.9	67.9					26.1		110.0
Effective Green, g (s)		51.9		67.9	67.9					26.1		110.0
Actuated g/C Ratio		0.47		0.62	0.62					0.24		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1511		272	1062					413		1415
v/s Ratio Prot		c0.37		c0.08	0.31							
v/s Ratio Perm				0.35						c0.19		0.56
v/c Ratio		0.79		0.70	0.51					0.80		0.56
Uniform Delay, d1		24.5		18.6	11.7					39.5		0.0
Progression Factor		1.00		0.93	0.51					1.00		1.00
Incremental Delay, d2		4.4		6.1	1.4					10.8		1.6
Delay (s)		28.9		23.4	7.4					50.4		1.6
Level of Service		C		C	A					D		A
Approach Delay (s)		28.9			11.6			0.0			16.0	
Approach LOS		C			B			A			B	

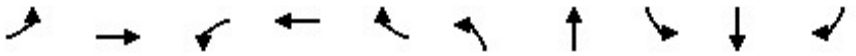
Intersection Summary			
HCM 2000 Control Delay	20.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	77.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	436	895	28	909	285	128	102	233	143	474
Future Volume (vph)	436	895	28	909	285	128	102	233	143	474
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	36.0	82.4	46.4	46.4	46.4	9.0	22.6	15.0	28.6	28.6
Total Split (%)	30.0%	68.7%	38.7%	38.7%	38.7%	7.5%	18.8%	12.5%	23.8%	23.8%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	80.9	76.0	38.5	38.5	38.5	24.1	13.8	33.1	19.8	19.8
Actuated g/C Ratio	0.67	0.63	0.32	0.32	0.32	0.20	0.12	0.28	0.16	0.16
v/c Ratio	0.98	0.54	0.23	0.94	0.51	0.61	0.80	0.90	0.55	0.83
Control Delay	69.4	13.4	35.7	56.9	6.6	50.1	79.9	72.9	53.4	17.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	69.4	13.4	35.7	56.9	6.6	50.1	79.9	72.9	53.4	17.2
LOS	E	B	D	E	A	D	E	E	D	B
Approach Delay		30.3		44.7			65.0		38.6	
Approach LOS		C		D			E		D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 39.2	Intersection LOS: D
Intersection Capacity Utilization 97.5%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



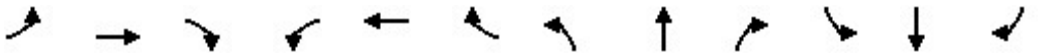


Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	474	1094	30	988	310	139	139	253	155	515
v/c Ratio	0.98	0.54	0.23	0.94	0.51	0.61	0.80	0.90	0.55	0.83
Control Delay	69.4	13.4	35.7	56.9	6.6	50.1	79.9	72.9	53.4	17.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	69.4	13.4	35.7	56.9	6.6	50.1	79.9	72.9	53.4	17.2
Queue Length 50th (m)	~100.3	71.3	5.2	118.7	0.0	25.7	29.9	51.2	33.3	2.8
Queue Length 95th (m)	#167.6	88.4	13.7	#159.6	21.2	43.6	#59.5	#98.4	54.6	#58.2
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	485	2044	130	1049	606	229	191	282	305	631
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	0.98	0.54	0.23	0.94	0.51	0.61	0.73	0.90	0.51	0.82

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.



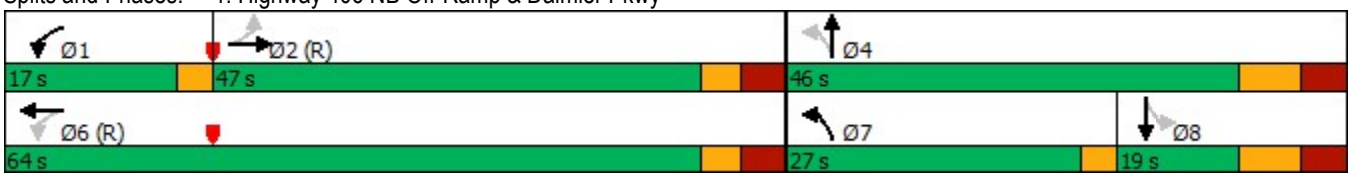
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	436	895	111	28	909	285	128	102	26	233	143	474
Future Volume (vph)	436	895	111	28	909	285	128	102	26	233	143	474
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3217		1486	3271	1234	1486	1443		1486	1722	1234
Flt Permitted	0.10	1.00		0.26	1.00	1.00	0.66	1.00		0.49	1.00	1.00
Satd. Flow (perm)	151	3217		408	3271	1234	1031	1443		760	1722	1234
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)	474	973	121	30	988	310	139	111	28	253	155	515
RTOR Reduction (vph)	0	8	0	0	0	211	0	8	0	0	0	418
Lane Group Flow (vph)	474	1086	0	30	988	99	139	131	0	253	155	97
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	76.0	76.0		38.5	38.5	38.5	19.8	13.8		28.8	19.8	19.8
Effective Green, g (s)	76.0	76.0		38.5	38.5	38.5	19.8	13.8		28.8	19.8	19.8
Actuated g/C Ratio	0.63	0.63		0.32	0.32	0.32	0.17	0.12		0.24	0.17	0.17
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	479	2037		130	1049	395	192	165		255	284	203
v/s Ratio Prot	c0.28	0.34			0.30		0.04	0.09		c0.10	0.09	
v/s Ratio Perm	c0.34			0.07		0.08	0.08			c0.14		0.08
v/c Ratio	0.99	0.53		0.23	0.94	0.25	0.72	0.79		0.99	0.55	0.48
Uniform Delay, d1	35.1	12.2		29.9	39.7	30.1	46.5	51.7		44.0	46.0	45.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	38.0	1.0		0.7	15.7	0.2	12.1	21.9		54.0	1.7	1.3
Delay (s)	73.0	13.2		30.6	55.4	30.4	58.6	73.6		98.0	47.7	46.7
Level of Service	E	B		C	E	C	E	E		F	D	D
Approach Delay (s)		31.3			49.0			66.1			60.9	
Approach LOS		C			D			E			E	

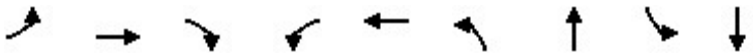
Intersection Summary			
HCM 2000 Control Delay	46.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	7	426	640	231	384	360	1	1	6
Future Volume (vph)	7	426	640	231	384	360	1	1	6
Turn Type	Perm	NA	Free	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2		1	6	7	4		8
Permitted Phases	2		Free	6		4		8	
Detector Phase	2	2		1	6	7	4	8	8
Switch Phase									
Minimum Initial (s)	15.0	15.0		10.0	15.0	15.0	15.0	10.0	10.0
Minimum Split (s)	22.0	22.0		13.0	22.0	18.0	24.0	19.0	19.0
Total Split (s)	47.0	47.0		17.0	64.0	27.0	46.0	19.0	19.0
Total Split (%)	42.7%	42.7%		15.5%	58.2%	24.5%	41.8%	17.3%	17.3%
Yellow Time (s)	3.3	3.3		3.0	3.3	3.0	5.0	5.0	5.0
All-Red Time (s)	3.7	3.7		0.0	3.7	0.0	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
Total Lost Time (s)	7.0	7.0		3.0	7.0	3.0	9.0	9.0	9.0
Lead/Lag	Lag	Lag		Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max	None	None	Max	Max
Act Effct Green (s)	41.0	41.0	110.0	61.0	57.0	43.0	37.0	10.4	10.4
Actuated g/C Ratio	0.37	0.37	1.00	0.55	0.52	0.39	0.34	0.09	0.09
v/c Ratio	0.03	0.71	0.55	0.67	0.53	0.75	0.41	0.01	0.08
Control Delay	13.6	24.1	4.2	22.3	20.7	37.9	5.5	46.0	36.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.6	24.1	4.2	22.3	20.7	37.9	5.5	46.0	36.4
LOS	B	C	A	C	C	D	A	D	D
Approach Delay		12.2			21.3		25.3		37.1
Approach LOS		B			C		C		D

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 11 (10%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 18.1	Intersection LOS: B
Intersection Capacity Utilization 86.4%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Highway 406 NB Off-Ramp & Daimler Pkwy





Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	8	463	696	251	418	391	250	1	12
v/c Ratio	0.03	0.71	0.55	0.67	0.53	0.75	0.41	0.01	0.08
Control Delay	13.6	24.1	4.2	22.3	20.7	37.9	5.5	46.0	36.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.6	24.1	4.2	22.3	20.7	37.9	5.5	46.0	36.4
Queue Length 50th (m)	0.7	84.8	0.0	27.2	57.2	66.6	0.2	0.2	1.4
Queue Length 95th (m)	m0.6	m57.2	67.4	42.6	85.3	98.8	17.0	1.8	7.3
Internal Link Dist (m)		194.3			158.2		78.8		37.3
Turn Bay Length (m)	55.0					50.0		15.0	
Base Capacity (vph)	316	656	1262	388	788	520	615	101	155
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	0.03	0.71	0.55	0.65	0.53	0.75	0.41	0.01	0.08

Intersection Summary

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

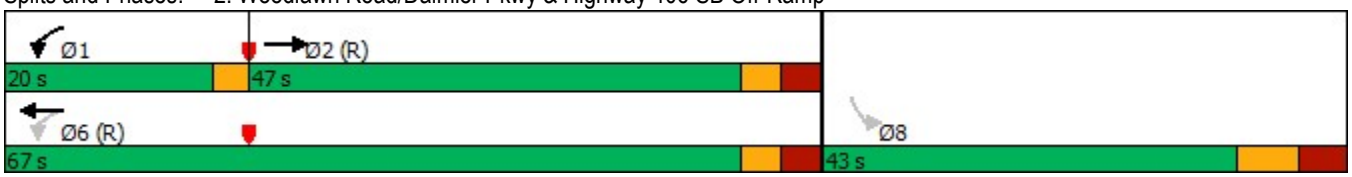
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	426	640	231	384	1	360	1	229	1	6	5
Future Volume (vph)	7	426	640	231	384	1	360	1	229	1	6	5
Ideal Flow (vphpl)	1651	1776	1498	1651	1535	1535	1651	1535	1535	1651	1535	1535
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.5	4.8	4.8
Total Lost time (s)	7.0	7.0	4.0	3.0	7.0		3.0	9.0		9.0	9.0	
Lane Util. Factor	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	1.00		1.00	0.85		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1555	1761	1262	1555	1521		1606	1337		1691	1599	
Flt Permitted	0.52	1.00	1.00	0.27	1.00		0.58	1.00		0.60	1.00	
Satd. Flow (perm)	848	1761	1262	445	1521		984	1337		1075	1599	
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)	8	463	696	251	417	1	391	1	249	1	7	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	165	0	0	5	0
Lane Group Flow (vph)	8	463	696	251	418	0	391	85	0	1	7	0
Turn Type	Perm	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		Free	6			4			8		
Actuated Green, G (s)	41.0	41.0	110.0	57.0	57.0		37.0	37.0		10.4	10.4	
Effective Green, g (s)	41.0	41.0	110.0	57.0	57.0		37.0	37.0		10.4	10.4	
Actuated g/C Ratio	0.37	0.37	1.00	0.52	0.52		0.34	0.34		0.09	0.09	
Clearance Time (s)	7.0	7.0		3.0	7.0		3.0	9.0		9.0	9.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	316	656	1262	361	788		464	449		101	151	
v/s Ratio Prot		0.26		c0.08	0.27		c0.18	0.06			0.00	
v/s Ratio Perm	0.01		0.55	c0.28			c0.10			0.00		
v/c Ratio	0.03	0.71	0.55	0.70	0.53		0.84	0.19		0.01	0.05	
Uniform Delay, d1	21.8	29.4	0.0	17.8	17.6		32.1	25.9		45.1	45.3	
Progression Factor	0.59	0.65	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	4.2	1.2	5.7	2.5		13.1	0.2		0.2	0.6	
Delay (s)	12.9	23.4	1.2	23.6	20.2		45.1	26.1		45.3	45.9	
Level of Service	B	C	A	C	C		D	C		D	D	
Approach Delay (s)		10.1			21.4			37.7			45.9	
Approach LOS		B			C			D			D	

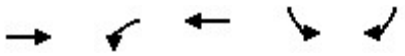
Intersection Summary			
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	841	207	509	232	791
Future Volume (vph)	841	207	509	232	791
Turn Type	NA	pm+pt	NA	Perm	Free
Protected Phases	2	1	6		
Permitted Phases		6		8	Free
Detector Phase	2	1	6	8	
Switch Phase					
Minimum Initial (s)	15.0	10.0	15.0	15.0	
Minimum Split (s)	21.8	13.0	21.8	24.2	
Total Split (s)	47.0	20.0	67.0	43.0	
Total Split (%)	42.7%	18.2%	60.9%	39.1%	
Yellow Time (s)	3.3	3.0	3.3	5.1	
All-Red Time (s)	3.5	0.0	3.5	4.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	3.0	6.8	9.2	
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	
Act Effct Green (s)	53.8	76.3	72.5	21.5	110.0
Actuated g/C Ratio	0.49	0.69	0.66	0.20	1.00
v/c Ratio	0.80	0.72	0.49	0.74	0.61
Control Delay	29.4	27.7	7.1	54.5	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	29.4	27.7	7.1	54.5	1.9
LOS	C	C	A	D	A
Approach Delay	29.4		13.0		
Approach LOS	C		B		

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 108 (98%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 19.9	Intersection LOS: B
Intersection Capacity Utilization 76.8%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 2: Woodlawn Road/Daimler Pkwy & Highway 406 SB Off-Ramp

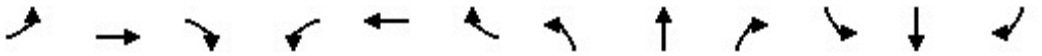




Lane Group	EBT	WBL	WBT	SBL	SBR
Lane Group Flow (vph)	1282	225	553	252	860
v/c Ratio	0.80	0.72	0.49	0.74	0.61
Control Delay	29.4	27.7	7.1	54.5	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	29.4	27.7	7.1	54.5	1.9
Queue Length 50th (m)	111.6	18.5	33.7	51.4	0.0
Queue Length 95th (m)	#197.1	m46.5	76.8	72.6	0.0
Internal Link Dist (m)	458.7		194.3		
Turn Bay Length (m)		25.0			
Base Capacity (vph)	1596	348	1135	535	1415
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	0.80	0.65	0.49	0.47	0.61

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.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	841	339	207	509	0	0	0	0	232	0	791
Future Volume (vph)	0	841	339	207	509	0	0	0	0	232	0	791
Ideal Flow (vphpl)	1900	1776	1535	1651	1776	1900	1900	1900	1900	1651	1900	1498
Lane Width	3.7	3.7	3.7	3.7	3.5	3.5	3.7	3.7	3.7	4.8	3.7	4.8
Total Lost time (s)		6.8		3.0	6.8					9.2		4.0
Lane Util. Factor		0.95		1.00	1.00					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3201		1555	1722					1743		1415
Flt Permitted		1.00		0.10	1.00					0.95		1.00
Satd. Flow (perm)		3201		167	1722					1743		1415
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)	0	914	368	225	553	0	0	0	0	252	0	860
RTOR Reduction (vph)	0	32	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1250	0	225	553	0	0	0	0	252	0	860
Turn Type		NA		pm+pt	NA					Perm		Free
Protected Phases		2		1	6							
Permitted Phases				6						8		Free
Actuated Green, G (s)		53.7		72.5	72.5					21.5		110.0
Effective Green, g (s)		53.7		72.5	72.5					21.5		110.0
Actuated g/C Ratio		0.49		0.66	0.66					0.20		1.00
Clearance Time (s)		6.8		3.0	6.8					9.2		
Vehicle Extension (s)		3.0		3.0	3.0					3.0		
Lane Grp Cap (vph)		1562		309	1134					340		1415
v/s Ratio Prot		c0.39		c0.10	0.32							
v/s Ratio Perm				0.38						0.14		c0.61
v/c Ratio		0.80		0.73	0.49					0.74		0.61
Uniform Delay, d1		23.6		23.0	9.4					41.6		0.0
Progression Factor		1.00		0.98	0.56					1.00		1.00
Incremental Delay, d2		4.4		6.5	1.2					8.4		1.9
Delay (s)		28.1		29.0	6.4					50.1		1.9
Level of Service		C		C	A					D		A
Approach Delay (s)		28.1			12.9			0.0			12.9	
Approach LOS		C			B			A			B	

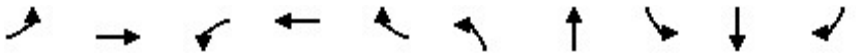
Intersection Summary			
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	751	820	18	925	357	135	217	340	178	657
Future Volume (vph)	751	820	18	925	357	135	217	340	178	657
Turn Type	pm+pt	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2		6		7	4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	7	4	3	8	8
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	10.0	10.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.5	17.9	17.9	17.9	17.9	9.0	15.3	10.5	15.3	15.3
Total Split (s)	45.0	84.0	39.0	39.0	39.0	9.0	24.0	22.0	37.0	37.0
Total Split (%)	34.6%	64.6%	30.0%	30.0%	30.0%	6.9%	18.5%	16.9%	28.5%	28.5%
Yellow Time (s)	3.0	5.4	5.4	5.4	5.4	3.0	4.1	3.0	4.1	4.1
All-Red Time (s)	0.0	2.5	2.5	2.5	2.5	0.0	3.2	0.0	3.2	3.2
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)	3.0	7.9	7.9	7.9	7.9	3.0	7.3	3.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes		
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None
Act Effct Green (s)	81.0	76.1	31.1	31.1	31.1	27.0	16.7	43.0	29.7	29.7
Actuated g/C Ratio	0.62	0.59	0.24	0.24	0.24	0.21	0.13	0.33	0.23	0.23
v/c Ratio	1.53	0.53	0.19	1.29	0.76	0.64	1.30	1.35	0.49	0.96
Control Delay	275.5	17.2	44.9	178.2	23.2	53.3	212.9	209.3	48.6	32.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	275.5	17.2	44.9	178.2	23.2	53.3	212.9	209.3	48.6	32.8
LOS	F	B	D	F	C	D	F	F	D	C
Approach Delay		132.8		133.8			153.6		86.3	
Approach LOS		F		F			F		F	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.53	
Intersection Signal Delay: 122.7	Intersection LOS: F
Intersection Capacity Utilization 131.3%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 3: Brown Road/Primeway Drive & Woodlawn Road



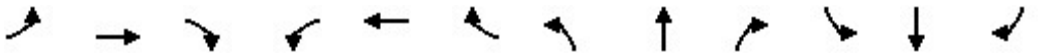


Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	816	1007	20	1005	388	147	249	370	193	714
v/c Ratio	1.53	0.53	0.19	1.29	0.76	0.64	1.30	1.35	0.49	0.96
Control Delay	275.5	17.2	44.9	178.2	23.2	53.3	212.9	209.3	48.6	32.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	275.5	17.2	44.9	178.2	23.2	53.3	212.9	209.3	48.6	32.8
Queue Length 50th (m)	~279.2	76.4	4.1	~171.9	24.6	27.9	~81.6	~108.2	43.3	34.1
Queue Length 95th (m)	#355.4	94.0	11.8	#212.7	66.5	45.8	#134.6	#169.3	67.1	#126.9
Internal Link Dist (m)		178.7		458.7			112.6		86.4	
Turn Bay Length (m)	150.0		100.0		85.0	50.0				
Base Capacity (vph)	534	1890	106	782	511	229	191	275	393	747
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	1.53	0.53	0.19	1.29	0.76	0.64	1.30	1.35	0.49	0.96

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.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	751	820	107	18	925	357	135	217	12	340	178	657
Future Volume (vph)	751	820	107	18	925	357	135	217	12	340	178	657
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1535	1535	1651	1776	1498
Lane Width	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5	3.3	3.5	3.5
Total Lost time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1486	3215		1486	3271	1234	1486	1477		1486	1722	1234
Flt Permitted	0.12	1.00		0.28	1.00	1.00	0.64	1.00		0.20	1.00	1.00
Satd. Flow (perm)	184	3215		445	3271	1234	995	1477		318	1722	1234
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)	816	891	116	20	1005	388	147	236	13	370	193	714
RTOR Reduction (vph)	0	8	0	0	0	216	0	2	0	0	0	466
Lane Group Flow (vph)	816	999	0	20	1005	172	147	247	0	370	193	248
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	76.1	76.1		31.1	31.1	31.1	22.7	16.7		38.7	29.7	29.7
Effective Green, g (s)	76.1	76.1		31.1	31.1	31.1	22.7	16.7		38.7	29.7	29.7
Actuated g/C Ratio	0.59	0.59		0.24	0.24	0.24	0.17	0.13		0.30	0.23	0.23
Clearance Time (s)	3.0	7.9		7.9	7.9	7.9	3.0	7.3		3.0	7.3	7.3
Vehicle Extension (s)	2.8	2.5		2.5	2.5	2.5	2.6	2.5		2.6	2.5	2.5
Lane Grp Cap (vph)	528	1882		106	782	295	196	189		265	393	281
v/s Ratio Prot	c0.50	0.31			0.31		0.03	0.17		c0.20	0.11	
v/s Ratio Perm	c0.41			0.04		0.14	0.10			c0.21		0.20
v/c Ratio	1.55	0.53		0.19	1.29	0.58	0.75	1.31		1.40	0.49	0.88
Uniform Delay, d1	37.0	16.2		39.4	49.4	43.7	49.8	56.6		40.5	43.6	48.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	254.8	1.1		0.6	138.0	2.4	14.3	171.4		199.7	0.7	26.0
Delay (s)	291.7	17.3		40.0	187.4	46.1	64.1	228.1		240.2	44.3	74.4
Level of Service	F	B		D	F	D	E	F		F	D	E
Approach Delay (s)		140.1			146.5			167.2			117.9	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	138.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.56		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	131.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX 16

Sensitivity Analysis #4 – 25% Decrease to Through Volumes along Woodlawn Road/Daimler Parkway – Queueing Analysis Results



Future Total (2051) Conditions Model – Bridge Adjustment (-25%) – No Train – Microsimulation Results				
Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	33
			EBT	54
			EBR	52
			NBL	26
			NBT	25
			NBR	24
			SBL	20
			SBT	27
			SBR	17
			WBL	10
			WBT	68
			WBR	17
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	135
			EBT	136
			SBL	33
			WBL	33
			WBT	52
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1
			EBT	51
			EBR	-
			NBL	46
			NBT	15
			NBR	15
			SBL	0
			SBT	6
			SBR	6
			WBL	41
			WBT	60
			WBR	60
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	28
			EBT	28
			EBR	28
			NBL	15
			SBR	11
			WBT	20
	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	123
			EBT	109
			EBR	109
			NBL	40
			NBT	53
			NBR	53
			SBL	53

PM Peak Hour			SBT	49
			SBR	63
			WBL	17
			WBT	121
			WBR	36
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	175
			EBT	175
			SBL	91
			WBL	46
			WBT	101
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	8
			EBT	153
			EBR	-
			NBL	98
			NBT	49
			NBR	49
			SBL	8
			SBT	9
			SBR	9
			WBL	44
			WBT	54
			WBR	54
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	7
			EBT	7
			EBR	7
			NBL	42
			SBR	8
			WBT	19
eak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	216
			EBT	105
			EBR	105
			NBL	45
			NBT	78
			NBR	77
			SBL	89
			SBT	92
			SBR	98
			WBL	13
			WBT	133
			WBR	43
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	173
			EBT	173
			SBL	64
			WBL	41
			WBT	80
			EBL	5
			EBT	97

SAT P	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBR	-
			NBL	72
			NBT	30
			NBR	30
			SBL	4
			SBT	9
			SBR	9
			WBL	39
			WBT	61
			WBR	61
	4	Rail Crossing	EBT	-
			WBT	-
	5	Daimler Parkway and Street 'A'	EBL	76
			EBT	76
			EBR	76
			NBL	33
			SBR	10
			WBT	24

Future Total (2051) Conditions Model – Bridge Adjustment (-25%) – With Train – Microsimulation Results				
Period	Intersection			Max Queue
	No.	Location	Movement	Metres
AM Peak Hour	1	Woodlawn Road and Primeway Drive / Brown Road	EBL	33
			EBT	54
			EBR	52
			NBL	26
			NBT	25
			NBR	24
			SBL	20
			SBT	27
			SBR	17
			WBL	9
			WBT	68
			WBR	16
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	134
			EBT	135
			SBL	33
			WBL	33
			WBT	61
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	1
			EBT	56
			EBR	-
			NBL	46
			NBT	15
			NBR	15
			SBL	0
			SBT	6
			SBR	6
			WBL	55
			WBT	63
			WBR	63
	4	Rail Crossing	EBT	57
			WBT	90
	5	Daimler Parkway and Street 'A'	EBL	34
			EBT	34
			EBR	34
			NBL	17
			SBR	11
			WBT	21
	1	Woodlawn Road and Primeway	EBL	123
			EBT	109
			EBR	109
			NBL	40
			NBT	53
			NBR	53

PM Peak Hour	1	Drive / Brown Road	SBL	55
			SBT	49
			SBR	65
			WBL	17
			WBT	122
			WBR	37
	2	Woodlawn Road and Highway 406 SB Ramp Terminal	EBR	175
			EBT	176
			SBL	108
			WBL	45
			WBT	101
	3	Daimler Parkway and Highway 406 NB Ramp Terminal	EBL	8
			EBT	206
			EBR	-
			NBL	98
			NBT	84
			NBR	84
			SBL	8
			SBT	9
			SBR	9
			WBL	48
			WBT	55
			WBR	55
	4	Rail Crossing	EBT	59
			WBT	72
	5	Daimler Parkway and Street 'A'	EBL	59
			EBT	59
			EBR	59
			NBL	43
			SBR	9
			WBT	20

Enbridge Gas Inc.
500 Consumers Road
North York, Ontario M2J 1P8
Canada

August 3, 2023

Caitlin Kovacs
Planner
Infrastructure and Development Services
City of Welland
Planning Division
60 East Main Street
Welland, ON L3B 3X4

Dear Caitlin,

Re: Draft Plan of Subdivision – 3 Year Extension
259957 Ontario Limited
289 Daimler Parkway
City of Welland
File No.: 26T-14-18003
Related Applications: OPA 16, 2018-01

Enbridge Gas does not have changes to the previously identified conditions for this extension of draft approval request.

Sincerely,

Willie Cornelio CET
Sr Analyst Municipal Planning
Engineering

ENBRIDGE
TEL: 416-495-6411
500 Consumers Rd, North York, ON M2J1P8
enbridge.com
Safety. Integrity. Respect. Inclusion.

Taylor Meadows

From: Municipal Planning <MunicipalPlanning@enbridge.com>
Sent: February 27, 2025 9:26 AM
To: Taylor Meadows
Subject: RE: Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)
Attachments: 26T-14-18003 - 289 Daimler Pkwy - Revised July 2023.pdf

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Hi Taylor

I can confirm we have no concerns with the removal of condition 92.

Thank you,

Casey O'Neil (she/her)
Sr Analyst Municipal Planning
Engineering

ENBRIDGE
TEL: 416-495-5180
500 Consumers Rd, North York, ON M2J1P8

enbridge.com
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From: Taylor Meadows <taylor.meadows@welland.ca>
Sent: Wednesday, February 26, 2025 7:37 PM
Subject: [External] Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

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Evening,

The applicant for the above subdivision has made a request for a change of conditions; specifically, Condition #92 in the attached 'Conditions of Draft Plan approval'. A TIS has been provided to address this request, it is attached for reference. Please return any comments by **March 26, 2025.**

Let me know if you have any questions.

Regards,

Taylor Meadows
Manager of Development Planning
Planning Division
60 East Main Street, Welland, Ontario L3B 3X4

Phone: 905-735-1700 x2246
welland.ca
engagewelland.ca

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Taylor Meadows

From: Matt Richardson
Sent: April 25, 2025 9:00 AM
To: Taylor Meadows
Cc: Adam Eckhart; Tanya Korolow
Subject: RE: Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

Good Morning, Taylor,

In addition to the previous comments from the fire department, I will add the following:

-The fire department strongly supports the provision of an overpass connecting the development to the 406 and Oxford. This is the best alternative for egress to and from the site for both residents and emergency first responders. Traffic congestion at Daimler and Woodlawn can create challenges in emergency first responders accessing the site in a timely fashion with this influx of development.

-In the absence of an overpass, the fire department strongly recommends an emergency egress gate at the southern portion (in line with Oxford) of this development that connects the site to Highway 406. This gate will need to be satisfactory to fire, police, and ems. This will at least provide access from the south to the site for emergency first responders.

-The fire department also recommends that this southern tier of residential properties be protected by automatic sprinkler systems, which is a common practice in other Niagara municipalities expanding residential development along the Welland Canal with limited egress.

Thank you,

CITY OF Welland

Matt Richardson, B.A., CFEI, CCFI-C, CMM I
Deputy Fire Chief and Alternate CEMC
Fire and Emergency Services
400 East Main Street, Welland, Ontario L3B 3X5

Phone: 905-735-1700 x2402
welland.ca
engagewelland.ca

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From: Taylor Meadows <taylor.meadows@welland.ca>
Sent: April 24, 2025 10:44 AM
To: Matt Richardson <matt.richardson@welland.ca>

Subject: FW: Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

FYI

Taylor Meadows
Manager of Development Planning
Planning Division
60 East Main Street, Welland, Ontario L3B 3X4

Phone: 905-735-1700 x2246
_welland.ca
_engagewelland.ca

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From: Taylor Meadows <taylor.meadows@welland.ca>
Sent: February 26, 2025 7:37 PM
Subject: Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

Evening,

The applicant for the above subdivision has made a request for a change of conditions; specifically, Condition #92 in the attached 'Conditions of Draft Plan approval'. A TIS has been provided to address this request, it is attached for reference. Please return any comments by **March 26, 2025.**

Let me know if you have any questions.

Regards,

Taylor Meadows
Manager of Development Planning
Planning Division
60 East Main Street, Welland, Ontario L3B 3X4

Phone: 905-735-1700 x2246
_welland.ca
_engagewelland.ca

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Taylor Meadows

From: Deluca, Peter (MTO) <Peter.Deluca@ontario.ca>
Sent: June 4, 2025 11:06 AM
To: Taylor Meadows
Cc: Ali, Usama (MTO)
Subject: RE: Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

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Hi Taylor,

I have reviewed this internally.

The MTO's position is to have the condition to remain within the conditions of approval.

Thanks,

Peter DeLuca | Senior Project Manager (Niagara/Hamilton)
Highway Corridor Management Section | Central Operations | Ministry of Transportation
159 Sir William Hearst Avenue, 7th Floor, Toronto, ON. M3M 0B7
Telephone: 647 248-8548| Email: peter.deluca@ontario.ca

From: Taylor Meadows <taylor.meadows@welland.ca>
Sent: Tuesday, June 3, 2025 4:39 PM
To: Deluca, Peter (MTO) <Peter.Deluca@ontario.ca>
Cc: Ali, Usama (MTO) <Usama.Ali@ontario.ca>
Subject: RE: Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

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Hi Peter,

Ontario Following up on this one.

Regards,

Taylor Meadows
Manager of Development Planning
Planning Division
60 East Main Street, Welland, Ontario L3B 3X4

Phone: 905-735-1700 x2246
welland.ca
engagewelland.ca

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From: Taylor Meadows <taylor.meadows@welland.ca>
Sent: May 27, 2025 9:14 AM
To: Deluca, Peter (MTO) <Peter.Deluca@ontario.ca>
Cc: Ali, Usama (MTO) <Usama.Ali@ontario.ca>
Subject: RE: Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

Hi Peter,

Do you have an estimate on when comments will be provided for this file? We are aiming to have a recommendation report to Council at some point in June.

Regards,

Taylor Meadows
Manager of Development Planning
Planning Division
60 East Main Street, Welland, Ontario L3B 3X4

Phone: 905-735-1700 x2246
welland.ca
engagewelland.ca

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From: Taylor Meadows <taylor.meadows@welland.ca>
Sent: May 6, 2025 10:41 AM
To: Deluca, Peter (MTO) <Peter.Deluca@ontario.ca>

Cc: Ali, Usama (MTO) <Usama.Ali@ontario.ca>
Subject: RE: Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

Hi Peter,

Please see the attached file to view the Traffic Brief as provided by the *applicant* in support of their request to delete the condition of draft plan of subdivision conditions.

Additionally, please see the following link to view the public notice page for this file which includes technical information such as the City initiated TIS and DPS: https://www.welland.ca/media/notices/PPI-04-15-2025.asp.

Regards,

Taylor Meadows
Manager of Development Planning
Planning Division
60 East Main Street, Welland, Ontario L3B 3X4

Phone: 905-735-1700 x2246
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engagewelland.ca

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From: Taylor Meadows <taylor.meadows@welland.ca>
Sent: April 30, 2025 1:00 PM
To: Deluca, Peter (MTO) <Peter.Deluca@ontario.ca>
Cc: Ali, Usama (MTO) <Usama.Ali@ontario.ca>
Subject: RE: Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

I will send an invitation for Tuesday at 10:30 a.m.

Regards,

Taylor Meadows
Manager of Development Planning
Planning Division
60 East Main Street, Welland, Ontario L3B 3X4

Phone: 905-735-1700 x2246
welland.ca
engagewelland.ca

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From: Deluca, Peter (MTO) <Peter.Deluca@ontario.ca>
Sent: April 30, 2025 12:59 PM
To: Taylor Meadows <taylor.meadows@welland.ca>
Cc: Ali, Usama (MTO) <Usama.Ali@ontario.ca>
Subject: RE: Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

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Hi Taylor,

I am hoping to gain comments within the next 4-6 weeks. Unfortunately our input offices are receiving an increase in workload, which is cause increased timelines for comments.

I would still like to chat about this file.

Can we set up a meeting early next week to discuss. My Monday and Tuesday are open.

Thanks,

Peter DeLuca | Senior Project Manager (Niagara/Hamilton)
Highway Corridor Management Section | Central Operations | Ministry of Transportation
159 Sir William Hearst Avenue, 7th Floor, Toronto, ON. M3M 0B7
Telephone: 647 248-8548| Email: peter.deluca@ontario.ca

From: Taylor Meadows <taylor.meadows@welland.ca>
Sent: Wednesday, April 30, 2025 9:08 AM
Ontario
To: Deluca, Peter (MTO) <Peter.Deluca@ontario.ca>
Cc: Ali, Usama (MTO) <Usama.Ali@ontario.ca>

Subject: RE: Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hi Peter,

Following up on this one. Could you please confirm when comments are to be expected for this file?

Regards,

Taylor Meadows
Manager of Development Planning
Planning Division
60 East Main Street, Welland, Ontario L3B 3X4

Phone: 905-735-1700 x2246
welland.ca
engagewelland.ca

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From: Taylor Meadows <taylor.meadows@welland.ca>
Sent: March 11, 2025 8:55 AM
To: Deluca, Peter (MTO) <Peter.Deluca@ontario.ca>
Cc: Ali, Usama (MTO) <Usama.Ali@ontario.ca>
Subject: RE: Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

Hi Peter,

Happy to meet to discuss this one further. Would you be able to provide some dates and times that work for you? This file was initiated and processed before my time at the City; however, I've provided two links that include information from the initial submission and what appears to be a resubmission:

- Initial submission: https://acrobat.adobe.com/id/urn:aaid:sc:VA6C2:46204e80-99b7-40b7-9b3a-ece62e5c1b1d
- Resubmission: https://acrobat.adobe.com/id/urn:aaid:sc:VA6C2:06f18314-4a82-4b85-9cba-a828e5837837

Regards,

Taylor Meadows
Manager of Development Planning
Planning Division
60 East Main Street, Welland, Ontario L3B 3X4

Phone: 905-735-1700 x2246
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engagewelland.ca

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From: Deluca, Peter (MTO) <Peter.Deluca@ontario.ca>
Sent: February 27, 2025 1:47 PM
To: Taylor Meadows <taylor.meadows@welland.ca>
Cc: Ali, Usama (MTO) <Usama.Ali@ontario.ca>
Subject: RE: Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

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Hi Taylor,

Can you send me the drawings for the draft plan of subdivision. I am trying to get them internally; however, it may take some time.

Further to this, do you have any MTO correspondence/history based on the proposed overpass condition? I would like to ensure that the MTO did not require this overpass for the subdivision.

Perhaps we can even have a quick meeting about the site and its history to bring me up to speed.

Thanks,

Peter DeLuca | Senior Project Manager (Niagara/Hamilton)
Highway Corridor Management Section | Central Operations | Ministry of Transportation
159 Sir William Hearst Avenue, 7th Floor, Toronto, ON. M3M 0B7
Telephone: 647 248-8548| Email: peter.deluca@ontario.ca

From: Taylor Meadows <taylor.meadows@welland.ca>
Sent: Thursday, February 27, 2025 10:40 AM
To: Ali, Usama (MTO) <Usama.Ali@ontario.ca>

Cc: Deluca, Peter (MTO) <Peter.Deluca@ontario.ca>
Subject: RE: Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

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Thanks, Usama.

Taylor Meadows
Manager of Development Planning
Planning Division
60 East Main Street, Welland, Ontario L3B 3X4

Phone: 905-735-1700 x2246
welland.ca
engagewelland.ca

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From: Ali, Usama (MTO) <Usama.Ali@ontario.ca>
Sent: February 26, 2025 11:16 PM
To: Taylor Meadows <taylor.meadows@welland.ca>
Cc: Deluca, Peter (MTO) <Peter.Deluca@ontario.ca>
Subject: FW: Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

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Good Day Taylor;

This Draft Plan of Conditions for the Hunters Pointe Subdivision approvals is forwarded to Peter Deluca, who is the Senior Project Manager for Hamilton/Niagara and will circulate the TIS to the Traffic Office.

Please co-ordinate the clearance with the Subdivision conditions with Peter.

Kind Regards,

Usama Ali
Corridor Management Planner (Hamilton/Niagara) | Corridor Management Office/Operations Division
Ministry of Transportation (Central Operations) | Ontario Public Service
416-457-8973 | usama.ali@ontario.ca

Ontario

Taking pride in strengthening Ontario, its places and its people

From: Taylor Meadows <taylor.meadows@welland.ca>
Sent: Wednesday, February 26, 2025 7:37 PM
Subject: Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

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Evening,

The applicant for the above subdivision has made a request for a change of conditions; specifically, Condition #92 in the attached 'Conditions of Draft Plan approval'. A TIS has been provided to address this request, it is attached for reference. Please return any comments by **March 26, 2025.**

Let me know if you have any questions.

Regards,

Taylor Meadows
Manager of Development Planning
Planning Division
60 East Main Street, Welland, Ontario L3B 3X4

Phone: 905-735-1700 x2246
welland.ca
engagewelland.ca

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Taylor Meadows

From: Young, Katie <Katie.Young@niagararegion.ca>
Sent: March 11, 2025 11:31 AM
To: Taylor Meadows
Cc: Development Planning Applications; Dunsmore, Susan
Subject: RE: Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

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Hi Taylor,

Regional staff has reviewed this request. It's our understanding that condition 92 was added by Council. Staff has no objection to its removal.

Kind regards,
Katie

Growing Better Together
Niagara Region

Katie Young, MsC (Pl), MCIP, RPP
Senior Development Planner

Niagara Region, 1815 Sir Isaac Brock Way,
Thorold, ON, L2V 4T7, PO Box 1042

P: (905) 980-6000 ext. 3727
W: www.niagararegion.ca
E: katie.young@niagararegion.ca

My workday may look different from your workday. Please do not feel obligated to respond outside of your normal working hours.

From: Taylor Meadows <taylor.meadows@welland.ca>
Sent: Thursday, February 27, 2025 9:01 AM
Subject: RE: Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

Morning,

Following up on this, the request is to *delete* the identified condition. Let me know if you have any further questions.

Regards,

Taylor Meadows
Manager of Development Planning
Planning Division
60 East Main Street, Welland, Ontario L3B 3X4

Phone: 905-735-1700 x2246
welland.ca
engagewelland.ca

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From: Taylor Meadows <taylor.meadows@welland.ca>
Sent: February 26, 2025 7:37 PM
Subject: Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

Evening,

The applicant for the above subdivision has made a request for a change of conditions; specifically, Condition #92 in the attached 'Conditions of Draft Plan approval'. A TIS has been provided to address this request, it is attached for reference. Please return any comments by **March 26, 2025.**

Let me know if you have any questions.

Regards,

Taylor Meadows
Manager of Development Planning
Planning Division
60 East Main Street, Welland, Ontario L3B 3X4

Phone: 905-735-1700 x2246
welland.ca
engagewelland.ca

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Taylor Meadows

From: Taran Lennard <tlennard@npca.ca>
Sent: March 13, 2025 10:35 AM
To: Taylor Meadows
Subject: RE: NPCA Review - Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

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Hi Taylor,

As this modification is not directly related to NPCA, we will not be providing any comments specific to Condition 92 and its removal. We will ask the Traffic Engineers at the City review and respond as they see fit.

NPCA's conditions will remain as presented in the Agreement.

Thank you for including us,

Taran Lennard
Watershed Planner II

Niagara Peninsula Conservation Authority (NPCA)
3350 Merrittville Highway | Unit 9 | Thorold, ON L2V 4Y6

905.788.3135 ext. 277
www.npca.ca
tlennard@npca.ca

For more information on Permits & Planning, please go to the Permits & Planning webpage at https://npca.ca/administration/permits.

For mapping on features regulated by the NPCA please go to our GIS webpage at https://gis-npca-camaps.opendata.arcgis.com/ and utilize our Watershed Explorer App or GIS viewer.

To send NPCA staff information regarding a potential violation of Ontario Regulation 41/24 please go to the NPCA Enforcement and Compliance webpage at https://npca.ca/administration/enforcement-compliance

---

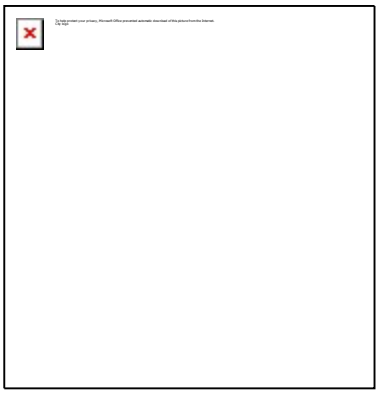
From: Taylor Meadows <taylor.meadows@welland.ca>
Sent: February 26, 2025 7:37 PM
Subject: Draft Plan of Subdivision - Modification to Conditions of Approval - Hunters Pointe Redevelopment (File No. 26T-14-18003)

Evening,

The applicant for the above subdivision has made a request for a change of conditions; specifically, Condition #92 in the attached 'Conditions of Draft Plan approval'. A TIS has been provided to address this request, it is attached for reference. Please return any comments by **March 26, 2025.**

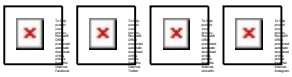
Let me know if you have any questions.

Regards,



Taylor Meadows
Manager of Development Planning
Planning Division
60 East Main Street, Welland, Ontario L3B 3X4

Phone: 905-735-1700 x2246
welland.ca
engagewelland.ca



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COUNCIL MEETING

FINANCE DEPARTMENT

REPORT FIN 2025-16
July 8, 2025

SUBJECT: **2024 Year-End Operating Budget Variance Report and 2024 Capital Progress Report**

AUTHOR: **Anka Vuksan Scott, CPA**
Manager of Budgets and Financial Services/ Deputy Treasurer

APPROVER: **Stephanie Nagel, BBA, CGA, CPA, MPA**
GM Corporate Services and Enterprise Services, Chief Financial Officer

---

RECOMMENDATION:

THAT Council receives for information the 2024 Year-End Operating Budget Variance Report and the 2024 Capital Progress report up to and including December 31, 2024; and further

THAT Council approves the 2024 Tax Supported Operating Budget surplus of $1,541,460 to be allocated to the Operating Surplus Reserve Fund; and further

THAT Council approves the 2024 Water/Wastewater (Rate) Supported Operating Budget Surplus of $1,834,044 to be allocated to the Water/Wastewater Reserve Fund.

RELATIONSHIP TO STRATEGIC

This recommendation is aligned with Council's strategic priority of ensuring "**Economic Growth**" for creating a diverse economy through partnerships and emerging markets to ensure sustainable growth and quality employment.

EXECUTIVE SUMMARY:

The City of Welland ended the fiscal year with an overall operating budget surplus of $1,541,460 and $1,834,044 in the Operating Budget and in the Water/ Wastewater, respectively. Staff recommend allocating the Tax Supported Operating budget surplus to the Operating Budget Surplus Reserve of $1,541,460 and allocating the Rate Supported Operating budget surplus of $1,834,044 to the Water/Wastewater Reserve Fund. It is important to note that

the financial results are still subject to finalization as the annual external audit is underway by the City's external auditors, Grant Thornton.

Within the year-end report, the reserve fund balances increased from 2023 by 11.58%. The deferred revenue reserves established through legislation increased from 2023 by 5.08%. In addition, the investment holdings for the year yielded a 4.68% return. The report for all open capital projects as of December 31, 2024, is attached as Appendix IV.

BACKGROUND:

The City's operating budgets are comprised of a Tax Supported Operating Budget that is primarily funded through the tax levy, user fees, and grants. The Rate Supported Operating Budget is funded through the water/sewer rates and user fees.

Annual operating budgets for all City departments are established and approved by Council. Budgets are established based on existing service levels, professional estimates, current legislative requirements, analysis of trends around commodity pricing, inflationary pressures, interest rates, employment group contracts, and all other information available at the time of the budget. Departments base their budgets on the best estimate for all revenue and expenditure line items. Throughout the year, events and activities occur that impact actual vs. budget. For example, staff recruitment, legislative changes, projection updates, inflation, emergency repair work etc.

Departments are responsible for monitoring budgets on an ongoing basis and projecting to the end of the year. It is common that individual departments may generate a surplus or have a deficit, depending on the circumstances of that department. Since budgets are the best estimate at the time of budget approval. Finance and departments actively monitor the actual performance vs. budget to ensure the overall result is the optimal result base on the current year activities.

Therefore, the overall tax supported operating budget surplus represents approximately 2.03 % of total expenditures of approximately $75.7 million. The Water/Wastewater supported operating budget overall surplus represents approximately 4.91% of the total expenditures of approximately $37.3 million. This is a reasonable outcome from a prudent financial management perspective.

The summary by cost centre is attached as Appendix I. Staff comments on the variances are outlined within the Appendix.

DISCUSSION:

2024 Year-End Operating Budget Variance

In Appendix I, the City is reporting a year-end, unaudited surplus of $1,541,460 in the Tax Supported Operating Budget. This is largely due to an increase in

supplemental tax revenue, investment income, an increase in penalties for overdue accounts, and savings across various expenses that contributed to the surplus.

The City is reporting an overall year-end, unaudited surplus of $1,834,044 in the Water/Wastewater Supported Operating budgets. The water operating budget performed very close to budget, with a deficit of $ (154,160). The wastewater operating budget accounted for an operating surplus of $1,988,205. The majority of the surplus is due to the year-end reconciliation of wastewater by the Niagara Region. This reconciliation compares the budgeted flows (based on a three-year rolling average) vs. the 2024 actual flows for the year. This reconciliation resulted in a rebate for the 2024 year-end. The recommended allocation of the surplus to the reserve will assist in future wastewater capital budgets.

2024 Reserve Funds and Deferred Revenue Reserves

In Appendix II, the total reserve funds set aside for a specific purpose as approved by Council increased approximately 11.58% over 2023, primarily due to the proceeds of Northern Reach received to date in 2024 in the Economic Development Reserve Fund. Annually, many of these reserves are utilized as a funding mechanism for the Operating Budgets and Capital Budgets; however, continuing to use the reserve funds to fund operations and projects is not a sustainable source of funding long term if insufficient contributions are being made to the Reserve Funds.

The portion of reserves that are deferred revenue is set aside for a specific purpose as required through legislation, regulation, or agreement. These reserves are legislated through separate provisions and have differing requirements on how these funds are to be spent. These deferred revenues are collected primarily from Developers (DC's & CIL) and the Federal Government (CCBF). The development charges decreased by approximately 10%, indicating that the DC's were utilized for the eligible expenditures for the various capital projects as determined through the Development Charge background study.

Staff will be bringing forward an updated Reserve Fund By-law and Policy later this year.

2024 Investment Holdings

The City's current investment and cash holdings are outlined in Appendix III. The interest rates for 2024 were comparable to those of 2023 for half of the year at which point in July 2024, rates began to decline. The Bank of Canada issued several rate cuts in 2024. The overall rate of return for all the investments and cash on hand in 2024 was approximately 4.68%. A slight decline in investment income from 2023. Staff continues to monitor market activity to maximize returns for the City as investment income is a budget line item.

2024 Capital Progress Report

The capital progress report attached as Appendix IV outlines all open, outstanding, and completed projects as of December 31, 2024. All departments have provided status comments on the progression of open projects. In addition, there are many projects identified as complete and in warranty that will proceed to a future project close-out report to Council. For a project to proceed to a close-out report, the project must have completed the warranty period and all invoices be paid. At present, there are 184 projects in progress, 8 projects that are on-hold, and 64 have been identified as complete and will be brought forward to a future close-out report.

The capital progress report excludes any projects that are involved in litigation matters, as they are discussed in closed session with Council.

FINANCIAL:

Staff recommend transferring the unaudited Operating Budget Variances to the Operating Surplus reserve and Water/ Wastewater reserve in the amount of $1,541,460 and $1,834,044, respectively.

Transferring the surpluses to the reserves is a fiscally responsible action to mitigate future unforeseen financial impacts that may arise in future fiscal years.

ATTACHMENT:

Appendix I - Q4 - 2024 Year End Operating Budget Variance Report by Costing Centre
Appendix II - Q4 - 2024 Reserve Funds and Deferred Revenue
Appendix III - Q4 - 2024 Investment Holdings
Appendix IV - Q4 - 2024 Capital Progress Report

Q4-2024 Budget Variance by Costing Centre

Costing Centre:	Year End Variance Surplus/(Deficit)	Comment
20-110-MAYOR'S OFFICE	5,052	Underspent in General Administration Expenses such as Mileage & Conferences.
20-111-COUNCILLORS	40,264	Underspent in Conferences & Professional Development.
20-112-CITY MANAGER / CAO	19,452	Underspent in Outside Consulting & Contingencies.
20-120-CLERKS	(1,754)	The Integrity Commissioner Services budget was overspent due to an increase in complaints and requests for assistance related to conflicts of interest. The Professional Development budget was also exceeded, driven by heightened staff engagement in webinars aimed at supporting professional growth and enhancing organizational processes and efficiencies.
20-125-COMMUNICATIONS	(93,140)	Webmaster position from Information Services and part-time contract for Communications from Economic Development allocated to this cost centre for part of the year.
20-130-FINANCE	(7,527)	Increase in activity within the cost centre for services including increase in postage costs for mailings of bills and notices.
20-131-INFORMATION SERVICES	287,992	Some annual service contracts for software support converted into multi-year contracts providing savings, and a vacant position for part of the year contributed to the overall surplus. Webmaster position allocated to Communications cost centre during the year attributing to the cost centre surplus.
20-134-GENERAL REVENUE	2,937,502	City received additional grants from BFF, OCIF, MTO and an AMO Surplus allocation. Investment Income, Penalty on overdue accounts, and Supplemental tax revenues came in higher than budget.

APPENDIX I

Q4-2024 Budget Variance by Costing Centre

Costing Centre:	Year End Variance Surplus/(Deficit)	Comment
20-135-TAXATION EXPENDITURES	(1,198,321)	The additional grants received resulted in an increased transfer to capital for BFF and OCIF. AMO Surplus transfer to Reserve. Post retirement benefits came under budget and the tax write-offs for all appeals through the Assessment Review Board were under budget.
20-139-GRANTS	(9,979)	Additional cost for Holy Trinity Shelter and Welland Food Fest Notice of Motion to allocate permissive grant for 2024.
20-140-LEGAL	(132,435)	The increase is attributed to additional support required from legal counsel to address complex and time-sensitive matters that required specialized legal expertise beyond the scope of in-house resources.
20-150-HUMAN RESOURCES	(109,566)	Increase in advertising for recruitment, and an increase is outside contracts and legal costs with sensitive staffing matters.
20-210-FIRE	662,089	Underspent due to several vacancies while new positions went unfilled. New recruitment took longer than anticipated. Underspent in volunteer compensation because of fewer personnel and operational and training requirements.
20-310-ENGINEERING - ADMINISTRATION	878,707	Underspending attributed to vacancies due to longer than expected vacancies.
20-315-STREETLIGHTING	623	Performed within budget.

Q4-2024 Budget Variance by Costing Centre

Costing Centre:	Year End Variance Surplus/(Deficit)	Comment
20-316-SIDEWALKS	38,316	Reduction in casual staff hours and associated expenses.
20-320-ROADWAYS	328,157	Surplus due to shared pooling resources of salaries and benefits with Fleet (323), Public Works(325), and Roadways (320).
20-321-TRAFFIC CONTROL	(116,367)	Reallocation of Manager of Transportation and Traffic Operations Technician into Traffic Control cost centre from By-laws for part of the year. An increase in paint cost for pavement markings and rail maintenance.
20-322-WINTER CONTROL	186,563	In 2024, the winter was more mild and therefore less salt and sand required.
20-323-FLEET	441,150	Surplus due to shared pooling resources of salaries and benefits with Fleet (323), Public Works(325), and Roadways (320).
20-325-PUBLIC WORKS	(695,453)	Deficit due to shared pooling resources of salaries and benefits with Fleet (323), Public Works(325), and Roadways (320).
20-327-STORM SEWERS	37,860	Catch Basin contract for cleaning did not run for 2024.
20-350-CROSSING GUARDS	163,227	In 2024, 76% of scheduled staff hours used against budget and only a portion of crossing guards opted into OMERS.
20-380-PARKING	98,941	Increased number of tickets issued and reduced cancellation of tickets.

Q4-2024 Budget Variance by Costing Centre

Costing Centre:	Year End Variance Surplus/(Deficit)	Comment
20-402-ROWING CANADA NATIONALS CHAMPIONSHIPS	(14,658)	Participation was lower than expected. Revenue linked to participation based on contract terms.
20-405-RECREATION - PROGRAMS/SERVICES	(304,793)	Exceeded PT wage and OT budgets due to the staff requirements to deliver enhanced programming based on registration and outdoor summer programming needs. Projection for PT wages needs to be adjusted based on trends for actuals. Higher bank service fees related to more point of sale transactions.
20-406-FESTIVALS AND EVENTS	(56,521)	PT wages and OT were underbudgeted and equipment rental rates for event rentals have significantly increased
20-410-PARKS / OPEN SPACES	(1,660)	Overspent on PT Wages and Overtime to meet service levels of grass cutting and winter maintenance. Increased cost for encampment cleanups and there was an increase need for professional development and training for staff.
20-412-PLAYING FIELDS	15,484	Underspent on FT Wages and sport field utilities.
20-415-URBAN FORESTRY	123,919	Underspent on FT wages due to retirements and job vacancies, less spent on PT wages due to other priority work in parks, less need for OT and emergency work.
20-420-CEMETERIES	6,830	Overspent on FT and PT wages to meet burial and grass cutting service levels, additional contract work was required for restoration work - Increased investment income offset any overage.

Q4-2024 Budget Variance by Costing Centre

Costing Centre:	Year End Variance Surplus/(Deficit)	Comment
20-430-FAC-MTCE/LABOUR	82,430	Underspent as FT HVAC technician vacancy all year.
20-432-FAC-ARENA	(84,000)	Outside contracts including HVAC due to above vacancy. Hydro and water consumption was higher than projected.
20-434-FAC-WELLNESS CENTRE	(76,154)	Outside contracts including HVAC due to above vacancy, security enhancements, and pool repair were overspent due to need. Natural gas supply charges increased and consumption was higher than projected.
20-435-FAC-EMPIRE OUTDOOR SPORTS COMPLEX	(13,797)	Over due to PT wages for sport camp. Revenue is trending up annually to offset.
20-436-FAC-MARKET	(89,005)	Overspent as a result of increasing security requirements, vandalism and cleanup.
20-438-FAC-SWIMMING POOL	(358,438)	Water meters for pools and splashpads were not read for 2022 & 2023 therefore three years of water consumption captured in 2024. Aging infrastructure at two pools has increased the need for major leak repairs including reinstatement of concrete decks, water loss and repairs to the circulation system.

Q4-2024 Budget Variance by Costing Centre

Costing Centre:	Year End Variance Surplus/(Deficit)	Comment
20-439-FAC-CIVIC SQUARE	(125,975)	Outside contracts overspent due to complex HVAC repair needs, leak repairs to pond and sump pump replacement. Additional security incurred to address facility needs.
20-442-FAC-COURTHOUSE	0	Courthouse expenses are fully recoverable from the province.
20-444-FAC-SERVICE CENTRE	(64,876)	HVAC repair due to Health & Safety with contracted services due to staff vacancies in cost centre 430.
20-445-FAC-YSP RIVER ROAD	0	YSP expenses are fully recoverable from the Oak View Group.
20-446-FAC-QUAKER RD BALL DIAMONDS	(64,331)	Aging infrastructure requirements at this location - HVAC repair, painting and fence repair. Higher than projected hydro. Advertising revenue recognition delayed due to postal strike.
20-447-FAC-RECREATIONAL CANAL LANDS	(148,730)	Overspent as a result of additional PT & OT staff needs, additional custodial costs from increased events and outside contracts for fire alarm panel replacement, and elevator repair. Water meters were not read for 2022 & 2023 therefore three years of water consumption captured in 2024.
20-448-FAC-COOKS MILLS HALL	(4,288)	PT wages over due to increasing rentals.

Q4-2024 Budget Variance by Costing Centre

Costing Centre:	Year End Variance Surplus/(Deficit)	Comment
20-449-FAC-140 KING ST MUSEUM	20,816	Underspent due to lower needs for utilities and electrical contract service.
20-450-FAC-HOOKER STREET	3,804	Increased rental revenue at this location.
20-452-FAC-C.L. PINARD CTR	17,822	Increased rental revenue at this location.
20-454-FAC-ANCILLARY BLDGS	11,751	Underspent due to less water consumption and fewer contracted services.
20-459-FAC-FIRE HALLS	6,582	Decrease in outside contractor requirements and lower natural gas consumption.
20-461-FAC-CHIPPAWA PK COMMUNITY CTR	(23,969)	Outside Janitorial contract was higher than budget due to rental activity. Overspent in PT wages for showing, prep and opening and closing year-round.
20-462-FAC-FIRE HALL #1 EAST MAIN ST HQ	(17,295)	Overspent as a result of additional cleanings, HVAC repair requirements, and higher hydro consumption.

Q4-2024 Budget Variance by Costing Centre

Costing Centre:	Year End Variance Surplus/(Deficit)	Comment
20-463-FAC-FIRE HALL #2 KING ST	(249)	Performed within budget.
20-510-PLANNING & DEVELOPMENT SERVICE	(412,048)	Reduced application fees due to slower economic conditions. An increase salary and benefit expenses and an increase in legal expenses due to OLT appeals. In addition, an increase in incentives over budget for 2024.
20-520-BUILDING & LICENSING	(889,968)	Decrease in issuance of permits due to slow down in overall construction activity in 2024.
20-525-BY-LAW ENFORCEMENT	202,512	Additional administrative penalties added in 2024 and increased enforcement.
20-710-ECONOMIC DEVELOPMENT	38,914	Underspent in City Promotions, Professional Development, Meetings and Memberships due to staff competing commitments, and scheduling challenges. Savings due to FT staff taking a contract through Communications.
Tax Supported Year-End Variance	**1,541,460**	
25-910-WATER WORKS	(154,161)	Higher water sales then budget offset by an increase in costs to purchase water meters and parts for new developments and additional repairs required on water mains and equipment.

Q4-2024 Budget Variance by Costing Centre

Costing Centre:	Year End Variance Surplus/(Deficit)	Comment
30-330-WASTEWATER	1,988,205	Increase in fixed charges collected due to new water accounts and retail sewer flows performed above budget. The main contributor of the surplus is due to the year end wastewater reconciliation rebate for 2024. This reconciliation compares the budgeted flows vs the actual flows, resulting in a positive rebate for wastewater.
Rate Supported Year-End Variance	**1,834,044**	

CORPORATION OF THE CITY OF WELLAND
SUMMARY OF RESERVE FUNDS AND DEFERRED REVENUE
as at December 31, 2024

	RESERVE FUNDS SET ASIDE FOR SPECIFIC PURPOSES BY COUNCIL:		**2024 Total Balance**	**2024 Uncommitted Balance**	**2023 Total Balance**	**% Balance Increae/Decrease over 2023**
402	ECONOMIC DEVELOPMENT	$	19,352,712.60	14,218,761.60	9,035,842.28	114%
403	FIRE DEPARTMENT		8,336.76	8,336.76	8,336.76	0%
405	ICE RESURFACER		111,443.39	111,443.39	102,264.41	9%
406	SICK LEAVE		40,304.11	40,304.11	40,304.11	0%
410	MUNICIPAL INCENTIVE GRANT		766,994.05	766,994.05	966,994.05	-21%
412	POOL MAINTENANCE		2,288.14	2,288.14	2,288.14	0%
413	WORKERS SAFETY INSURANCE BOARD		691,784.61	691,784.61	668,043.75	4%
425	PARKING		22,656.81	22,656.81	12,656.81	79%
426	COURTHOUSE MAINTENANCE		153,496.61	153,496.61	98,371.56	56%
427	FLEET		799,884.95	799,884.95	558,591.97	43%
430	WATER/SEWER FUND SURPLUS		4,324,009.85	3,166,672.27	5,089,689.18	-15%
433	OPERATING SURPLUS		6,967,981.20	1,576,678.43	7,202,568.20	-3%
442	SPORTS & CULTURE INFRASTRUCTURE		292.00	292.00	905,292.00	-100%
445	RECREATIONAL CANAL LANDS		14,143,562.51	13,818,562.51	14,048,667.01	1%
444	INSURANCE RESERVE		1,490,948.00	1,490,948.00	1,490,948.00	0%
449	AFFORDABLE/ATTAINABLE HOUSING		676,000.00	676,000.00	676,000.00	0%
1401	DOWNTOWN BROWNFIELD		1,109,417.34	1,109,417.34	1,329,417.34	-17%
1402	CAPITAL SURPLUS		4,986,197.23	3,577,197.23	5,080,461.45	-2%
1400	YSP SUSTAINABILITY		7,580,087.64	7,580,087.64	7,314,402.48	4%
1403	TAX REDUCTION		786,928.99	786,928.99	786,928.99	0%
1404	ELECTIONS		231,552.41	231,552.41	184,842.41	25%
1406	ARENA REPLACEMENT RESERVE		50,000.00	50,000.00	-	100%
2017	INFRASTRUCTURE RENEWAL		12,058,760.71	11,504,760.46	12,418,649.39	-3%
2018	ATLAS LANDFILL		3,177,617.60	3,177,617.60	3,260,065.60	-3%
	TOTAL RESERVE FUNDS (UNAUDITED)	**$**	**79,533,257.51**	**65,562,665.91**	**71,281,625.89**	**11.58%**
	DEFERRED REVENUE (RESERVE FUNDS) SET ASIDE FOR SPECIFIC PURPOSES BY LEGISLATION, REGULATION OR AGREEMENT:					
401	PLANNING ACT	$	7,894,370.99	4,434,514.63	6,110,725.56	29%
408	SUBDIVIDERS - FUTURE SERVICES		6,414,672.97	6,414,672.97	6,205,463.86	3%
1407	BUILDING PROVISION		3,146,393.36	3,146,393.36	2,730,508.13	15%
438	FEDERAL GAS TAX REBATE		3,772,581.31	618,884.40	2,746,544.16	37%
	DEVELOPMENT CHARGES		15,048,966.74	2,800,029.57	16,729,738.61	-10%
	TOTAL DEFERRED REVENUE FUNDS (UNAUDITED)	**$**	**36,276,985.37**	**17,414,494.93**	**34,522,980.32**	**5.08%**
	TOTAL RESERVE FUNDS	**$**	**115,810,242.88**	**82,977,160.84**	**105,804,606.21**	**9.46%**

Investment & Cash Holdings of the Corporation of the City of Welland
As of December 31, 2024

Investments		% Total Investment Portfolio	Individual Organization %
Reserves			
National Bank GIC	5,000,000.00	4.02%	7.21%
TD Mortgage Corp GIC	3,815,920.80	3.07%	3.07%
Meridian Cr. Union GICs	6,500,486.81	5.23%	7.93%
Scotiabank Capital Markets	5,500,000.00	4.42%	11.66%
Bank of Montreal Capital Markets	7,000,000.00	5.63%	22.51%
RBC Capital Markets	3,500,000.00	2.81%	10.05%
Desjardins Capital Markets	2,000,000.00	1.61%	12.06%
Canal Lands			
National Bank of Canada Ext Step	1,205,973.67	0.97%	0.97%
NBC Extendible Step Up Deposit	630,618.59	0.51%	0.51%
Scotiabank Capital Markets	1,000,000.00	0.80%	11.66%
Bank of Montreal Capital Markets	2,000,000.00	1.61%	22.51%
Meridian Cr. Union GICs	3,082,633.60	2.48%	7.93%
Desjardins Capital Markets	3,000,000.00	2.41%	12.06%
Operating			
National Bank	1,967,916.41	1.58%	7.21%
National Bank GIC	2,000,000.00	1.61%	7.21%
BMO Wealth Management	3,500,000.00	2.81%	2.81%
Meridian Cr. Union GIC	284,800.00	0.23%	7.93%
Desjardins Capital Markets	10,000,000.00	8.04%	12.06%
Bank of Montreal Capital Markets	19,000,000.00	15.27%	22.51%
DUCA GIC	3,000,000.00	2.41%	2.41%
RBC Capital Markets/GIC	9,000,000.00	7.23%	10.05%
Scotiabank Capital Markets	8,000,000.00	6.43%	11.66%
Total Investments	100,988,349.88		
Loans			
Airport Loan	645,802.07	0.52%	
Hydro Loan	2,000,000.00	1.61%	
Cash			
RBC Cash & Cash Equivalents	20,774,776.71	16.70%	
2024 Draft Unaudited Investment & Cash Holdings	**124,408,928.66**	100.00%	

Category Summary Legend

Corporations

National Bank of Canada Ext Step	1,205,973.67	0.97%
NBC Extendible Step Up Deposit	630,618.59	0.51%
TD Mortgage Corp GIC	3,815,920.80	3.07%
Bruton Investment Group-National Bar	8,967,916.41	7.21%
Meridian Cr Union GICs	9,867,920.41	7.93%
BMO Wealth Management	3,500,000.00	2.81%
Desjardins Capital Markets	15,000,000.00	12.06%
DUCA	3,000,000.00	2.41%
Scotiabank Capital Markets	14,500,000.00	11.66%
Bank of Montreal Capital Markets	28,000,000.00	22.51%
RBC Capital Markets	12,500,000.00	10.05%
Airport Loan	645,802.07	0.52%
Hydro Loan	2,000,000.00	1.61%
RBC Cash & Cash Equivalents	20,774,776.71	16.70%
Total	**124,408,928.66**	

Progress Report for Outstanding Capital Projects 2018 TO 2024
As of the end of December, 2024

Function	Account Number	Capital Approved Budget	Actual Expenditures to the end of December, 2024	Variance	Project Status (Complete/ In Progress/ On-hold)	Additional Comments
2018						
FACILITIES						
WIFC Timing Tower Waterproofing & Drainage Improvements	10-447-18032/**1044718032**	321,000	272,299	48,701	IN PROGRESS	Pending resolution / Litigation. Elite currently completing remediation work at the WIFC
Civic Square Plaza Revitalization Phase 1	10-439-18044/**1043918044**	100,000	45,767	54,233	IN PROGRESS	RFP for detailed design underway, construction pending council approval
TOTAL FACILITIES		**421,000**	**318,066**	**102,934**		
PARKS						
Tree Removal - (EAB) - City Trees	10-410-18051/**1041018051**	150,000	148,889	1,111	IN PROGRESS	Remaining funds to be used for ongoing City ash tree removal
Tree Removal (EAB) - Canal Trails Phase III	10-410-18052/**1041018052**	150,000	105,073	44,927	IN PROGRESS	Remaining funds to be used for City ash tree removal along the canal lands
TOTAL PARKS		**300,000**	**253,962**	**46,038**		
ROADWAYS						
Municipal Standards Update	10-320-18033/**1032018033/1032718033/1033018033/1091018033**	40,000	13,034	26,966	IN PROGRESS	Engineering standards document to be coordinated with new development requirements.
TOTAL ROADWAYS		**40,000**	**13,034**	**26,966**		
WATERWORKS						
Lead Service Replacement (City Side)	10-910-18064/**1091018064**	177,032	172,601	4,431	COMPLETE	In warranty - various projects.
District Meter Installations	10-910-18079/**1091018079**	130,000	28,708	101,292	IN PROGRESS	Project is underway.
TOTAL WATERWORKS		**307,032**	**201,310**	**105,722**		
TOTAL 2018		**1,068,032**	**786,371**	**281,661**		
2019						
ROADWAYS						
South Pelham Road (Top Asphalt - Webber to Gaiser)	10-320-19456/**1032019456**	80,000	43,282	36,718	COMPLETE	Development cost share. In warranty
South Pelham Road (Top Asphalt - Gaiser to South Limit)	10-320-19466/**1032019466**	80,000	18,017	61,983	COMPLETE	Development cost share. In warranty

Progress Report for Outstanding Capital Projects 2018 TO 2024 As of the end of December, 2024						
Function	**Account Number**	**Capital Approved Budget**	**Actual Expenditures to the end of December, 2024**	**Variance**	**Project Status (Complete/ In Progress/ On-hold)**	**Additional Comments**
Memorial Park Drive (Top Asphalt)	10-320-19476/**1032019476**	100,000	86,544	13,456	COMPLETE	Development cost share. In warranty
TOTAL ROADWAYS		**260,000**	**147,843**	**112,157**		
TOTAL 2019		**260,000**	**147,843**	**112,157**		
2020						
BRIDGES & CULVERTS						
Forks Road Bridge Replacement - Phase 1 & 2	10-320-20840/**1032020840/1032021201**	13,784,392	11,222,515	2,561,877	COMPLETE	In Warranty
TOTAL BRIDGES & CULVERTS		**13,784,392**	**11,222,515**	**2,561,877**		
CANAL LANDS						
Updated Concept Plan for Recreational Canal and Waterway	10-447-20702/**1044720702**	200,000	58,035	141,965	IN PROGRESS	Funds have been spent on the CTS Master Plan - project to be reviewed in 2025 for remaining work.
Welland Boat Rental Equipment	10-447-20004/**1044720004**	75,000	65,062	9,938		
TOTAL CANAL LANDS		**275,000**	**123,098**	**151,902**		
GENERAL						
Community Benefits and By-law Study	10-510-20292/**1051020292**	50,000	39,227	10,773	IN PROGRESS	To be considered as part of updated DC By-law 2026
TOTAL GENERAL		**50,000**	**39,227**	**10,773**		
PARKS						
Pre-Approved 2020-Lincoln St Docks/Rotary Park - Phase 2	10-410-20143/**1041020143**	1,200,000	1,157,425	42,575	IN PROGRESS	Remaining Funds to be uses for parks upgrades as per MOU
TOTAL PARKS		**1,200,000**	**1,157,425**	**42,575**		
ROADWAYS						
Gaiser Road Top Asphalt - Sparrow PH3	10-320-20406/**1032020406**	100,000	0	100,000	IN PROGRESS	Development cost share. Work complete, waiting on invoice from developer
TOTAL ROADWAYS		**100,000**	**0**	**100,000**		
STORM SEWERS						
Climate Change Adaptation Planning	10-327-20341/**1032720341**	60,000	19,151	40,849	IN PROGRESS	
TOTAL STORM SEWERS		**60,000**	**19,151**	**40,849**		
TRAFFIC						
Gateway Signage	10-321-20050/**1032120050**	39,398	15,447	23,951	IN PROGRESS	

Progress Report for Outstanding Capital Projects 2018 TO 2024 As of the end of December, 2024						
Function	**Account Number**	**Capital Approved Budget**	**Actual Expenditures to the end of December, 2024**	**Variance**	**Project Status (Complete/ In Progress/ On-hold)**	**Additional Comments**
TOTAL TRAFFIC		**39,398**	**15,447**	**23,951**		
WASTEWATER						
Pre-Approved 2020 Broadway Area	10-330-20222/**1033020222**	381,704	188,227	193,477	COMPLETE	In Warranty
TOTAL WASTEWATER		**381,704**	**188,227**	**193,477**		
WATERWORKS						
Cast Iron Watermain Replacement Program	10-910-20215/**1091020215**	2,406,162	2,404,457	1,706	COMPLETE	In Warranty, Various Projects
TOTAL WATERWORKS		**2,406,162**	**2,404,457**	**1,706**		
TOTAL 2020		**18,296,656**	**15,169,546**	**3,127,110**		
2021						
FACILITIES						
Flooring Replacements	10-430-21452/**1043020183/1043021452**	190,000	145,596	44,404	IN PROGRESS	For general flooring repairs and renewals
WIFC - Roof Remediation Works (Tower & Athlete Centre)	10-447-21455/**1044721455**	60,000	0	60,000	IN PROGRESS	Pending Legal Resolution
Courthouse Sliding Gate Replacement	10-442-21458/**1044221458**	20,000	6,979	13,021	COMPLETE	In Warranty Period
Civic Hall Vestibule Door Replacements	10-439-21459/**1043921459**	30,000	5,999	24,001	IN PROGRESS	Door replacements to be completed in Q2 of 2025
PW Automatic Gate	10-444-21462/**1044421462**	60,000	55,763	4,237	COMPLETE	In Warranty Period
TOTAL FACILITIES		**360,000**	**214,337**	**145,663**		
GENERAL						
OFFICIAL PLAN UPDATE	10-510-21651/**1051019085/1051020290/1051021651**	150,000	123,819	26,181	IN PROGRESS	Additional work needed due changes in Planning Act, goal is to complete in fall of 2025.
Public Works Asset Management (ESRI)	10-131-21021/**1013119669/1013120699/1013121021**	552,000	602,121	(50,121)	IN PROGRESS	Project completion scheduled for Q3 2025
TOTAL GENERAL		**702,000**	**725,940**	**(23,940)**		
MULTI-ASSET						
West Main Area (Niagara to PCD Phase 2-4 Design)(Water)(Multi-Asset)	10-910-21753/**1031621753/1032021753/1032721753/1033021753/1091021753**	150,000	178,317	(28,317)	IN PROGRESS	Region Cost Share (Regional Invoice to be reconciled) - In Design, Tender Q2 2025, Construction Q3 2025
Broadway Area - Construction of Trunk Sanitary Sewer (Roads, Storm, Sewer, Watermain)	10-320-21764/**1032021764/1032721764/1033021764/1091021764**	3,650,000	3,919,348	(269,348)	COMPLETE	In Warranty

Progress Report for Outstanding Capital Projects 2018 TO 2024 As of the end of December, 2024						
Function	**Account Number**	**Capital Approved Budget**	**Actual Expenditures to the end of December, 2024**	**Variance**	**Project Status (Complete/ In Progress/ On-hold)**	**Additional Comments**
Iva Street Construction - Development Agreement (Roads/Sidewalks/Water/Sewer/Storm)	10-320-21766/**1031621766/1032021766/1032721766/1033021766/1091021766**	330,000	255,799	74,201	ON-HOLD	Final asphalt deferred during on-going development.
Clare Ave Extension - East Side Sidewalks & Safety Railing (316/320)	10-320-21171/**1031621171/1032021171**	200,000	173,325	26,675	COMPLETE	In Warranty
Northaven Road Watermain Replacement (Roads/ Water/Sewer/ Sidewalks/Storm)	10-320-21772/**1031621772/1032021772/1032721772/1033021772/1091021772**	1,775,000	1,972,262	(197,262)	COMPLETE	In Warranty
Elizabeth Street West Infrastructure Renewals	10-320-21775/**1031621775/1032021775/1032721775/1033021775/1091021775**	771,500	939,487	(167,987)	COMPLETE	In Warranty
Riverbank Street Watermain Replacement (Roads/Water/Sewer/Sidewalks/Storm)	10-320-21776/**1031621776/1032021776/1032721776/1033021776/1091021776**	750,000	845,773	(95,773)	COMPLETE	In Warranty
Parkdale Place Infrastructure Renewals (Roads/Sidewalks/Storm/Water/Wastewater)	10-320-21778/**1031621778/1032021778/1032721778/1033021778/1091021778**	791,680	781,660	10,020	COMPLETE	In Warranty
Fourth Street Sanitary Sewer Replacement (Roads/Sidewalks/Wastewater)	10-320-21707/**1031621707/1032021707/1033021707**	525,000	519,441	5,559	COMPLETE	In Warranty
Fifth Street Sewer Replacement (Roads/Sidewalks/Wastewater)	10-320-21708/**1031621708/1032021708/1033021708**	575,000	751,095	(176,095)	COMPLETE	In Warranty
Sixth Street Sanitary Sewer Replacement (Roads/Sidewalks/Wastewater)	10-320-21709/**1031621709/1032021709/1033021709**	650,000	771,257	(121,257)	COMPLETE	In Warranty
TOTAL MULTI-ASSET		**10,168,180**	**11,107,765**	**(939,585)**		
PARKS Chaffey Park Playground & Landscaping	10-410-21403/**1041021403**	250,000	250,627	(627)	COMPLETE	In Warranty until summer 2025
MEMORIAL PARK POOL CONSULTING	10-410-21411/**1041021411**	282,893	338,608	(55,715)	COMPLETE	To Be Closed with Memorial Park Pool Capital Project.
TOTAL PARKS		**532,893**	**589,235**	**(56,342)**		

Progress Report for Outstanding Capital Projects 2018 TO 2024 As of the end of December, 2024						
Function	**Account Number**	**Capital Approved Budget**	**Actual Expenditures to the end of December, 2024**	**Variance**	**Project Status (Complete/ In Progress/ On-hold)**	**Additional Comments**
ROADWAYS						
Road Resurfacing Program	10-320-21187/**1032021187**	2,270,088	2,036,364	233,724	COMPLETE	In Warranty, Various Projects
INCREASE 2021 ROAD RESURFACING CAPITAL SPENDING	10-320-21150/**1032021150**	3,282,911	3,188,991	93,920	COMPLETE	In Warranty, Various Projects
TOTAL ROADWAYS		**5,552,999**	**5,225,355**	**327,644**		
SIDEWALKS						
Sidewalks - Condition Related Replacements	10-316-21102/**1031621102**	370,000	308,050	61,950	COMPLETE	In Warranty, Various Projects
Sidewalks - Missing Links Master Plan & Construction	10-316-21103/**1031621103**	250,000	215,064	34,936	COMPLETE	In Warranty, Various Projects
INCREASE 2021 SIDEWALK ADDITIONS/REPLACEMENTS CAPITAL SPENDING	10-316-21100/**1031621100**	1,050,000	852,030	197,970	COMPLETE	In Warranty, Various Projects
TOTAL SIDEWALKS		**1,670,000**	**1,375,143**	**294,857**		
STORM SEWERS						
Climate Change Adaptation Planning	10-327-21352/**1032721352**	20,000	0	20,000	IN PROGRESS	
David Street Area Storm Sewer MSP & Model (Ditch Outlet Review & Design)	10-327-21364/**1032720205/1032721364**	350,000	321,795	28,205	IN PROGRESS	David Street final report received. Ditch design is on-going and construction is dependant on NIF Funding.
Dain City Storm Channel Improvements	10-327-21366/**1032721366**	1,710,000	1,165,339	544,661	COMPLETE	In Warranty
TOTAL STORM SEWERS		**2,080,000**	**1,487,134**	**592,866**		
WASTEWATER						
Hagar Street Sewer Bulkhead Removals	10-330-21717/**1033021717**	100,000	0	100,000	ON-HOLD	On hold until Major St MSP is complete.
Commercial St MSP & Ontario St Trunk Sewer (Phase 1)	10-330-21720/**1033021720**	150,000	202,727	(52,727)	IN PROGRESS	Commercial Street MSP report complete. Phase I Ontario Street Trunk Sewer - In Design, Tender Q2 2025, Construction Q3 2025
Dain City Infiltration/Inflow Reduction Program	10-330-21715/**1033021715**	500,000	18,826	481,174	ON-HOLD	Further remediation work on-hold pending confirmation of DMAF funding.
Sanitary Sewer Separation/Replacements	10-330-21779/**1033021779**	1,609,200	1,711,838	(102,638)	COMPLETE	In Warranty, Various Projects
TOTAL WASTEWATER		**2,359,200**	**1,933,391**	**425,809**		

Progress Report for Outstanding Capital Projects 2018 TO 2024 As of the end of December, 2024						
Function	**Account Number**	**Capital Approved Budget**	**Actual Expenditures to the end of December, 2024**	**Variance**	**Project Status (Complete/ In Progress/ On-hold)**	**Additional Comments**
WATERWORKS						
Lead Service Replacement Program (Private Side)	10-910-21752/**1091021752**	25,000	34,827	(9,827)	IN PROGRESS	Dependant on uptake.
Water Model Updates & Water Master Plan	10-910-21755/**1091021755**	25,000	23,546	1,454	IN PROGRESS	Additional updates to be provided.
Cast Iron Watermain Replacements	10-910-21780/**1091021780**	7,580,062	6,650,831	929,230	IN PROGRESS	In Warranty, Various Projects
TOTAL WATERWORKS		**7,630,062**	**6,709,204**	**920,858**		
TOTAL 2021		**31,055,333**	**29,367,503**	**1,687,831**		
2022						
BRIDGES & CULVERTS						
Inspection of Canal Monolith Walls	10-320-22205/**1032022205**	100,000	84,290	15,710	IN PROGRESS	Final post-construction inspections on-going.
TOTAL BRIDGES & CULVERTS		**100,000**	**84,290**	**15,710**		
FACILITIES						
Flooring Replacement Requirements - City Wide	10-430-22452/**1043022452**	75,000	41,120	33,880	IN PROGRESS	For General Flooring Repairs & Renewals
Courthouse Heating System - Replacements (2021 Based on Condition Assessment)	10-442-22457/**1044222457**	300,000	4,788	295,212	IN PROGRESS	Currently being designed
PW Building - Energy Audit	10-444-22459/**1044422459**	30,000	15,849	14,151	IN PROGRESS	Report being completed
Pre-Approved Memorial Park Pool Revitalization	10-438-22475/**1043822475**	6,570,000	7,035,089	(465,089)	COMPLETE	In Warranty Period
Courthouse Boiler Room Insulation	10-442-22461/**1044222461**	40,000	1,852	38,148	IN PROGRESS	Currently being designed
Asbestos Audit Phase 2 of 2	10-430-22480/**1043022480**	75,000	57,734	17,266	IN PROGRESS	To be used for annual site reassessment
TOTAL FACILITIES		**7,090,000**	**7,156,431**	**(66,431)**		
FIRE						
Air Monitoring Equipment	10-210-22051/**1021022051**	50,000	9,095	40,905	IN PROGRESS	hazardous materials equipment being trialled and tested, ordering to outfit new rescue truck in 2025
Furniture Fixtures & Equipment Stations #1 and #2	10-210-22052/**1021022052**	200,000	118,243	81,757	COMPLETE	project close out planned in 2025
Outbuilding and specialized rescue addition to training field	10-210-22054/**1021022054**	100,000	76,357	23,643	IN PROGRESS	servicing to be completed in Q2 2025
Fire Station # 1 paving parking lot	10-210-22055/**1021022055**	150,000	123,893	26,107	IN PROGRESS	last of paving to be completed after training tower construction
Landscaping at Fire station #1	10-210-22058/**1021022058**	75,000	44,443	30,557	IN PROGRESS	last of landscape to be completed after tower construction and soil conditions support vegetation
TOTAL FIRE		**575,000**	**372,029**	**202,971**		
GENERAL						
New Technology Equipment/Licensing	10-131-22000/**1013122000**	75,000	47,948	27,052	IN PROGRESS	

Progress Report for Outstanding Capital Projects 2018 TO 2024 As of the end of December, 2024						
Function	**Account Number**	**Capital Approved Budget**	**Actual Expenditures to the end of December, 2024**	**Variance**	**Project Status (Complete/ In Progress/ On-hold)**	**Additional Comments**
Pre-Approved Document Management System	10-131-22002/**1013122002**	152,876	142,149	10,727	IN PROGRESS	
TOTAL GENERAL		**227,876**	**190,097**	**37,779**		
MULTI-ASSET						
Patterson Avenue Infrastructure Renewals (Multi-Asset)	10-(320/**316/327/330/910)-22160/1031622160/1032022160/1032722160/1033022160/1091022160**	1,109,600	1,044,287	65,313	COMPLETE	Warranty complete. Reconciliation of accounts. To be closed out in 2025.
Alberta Street Infrastructure Renewals (Multi-Asset)	10-(910/**320/327/316)-22765/1031622765/1032022765/1032722765/1091022765**	625,000	235,860	389,140	IN PROGRESS	Development cost share. Top coat expected this year with invoice from developer to follow for this work
2022 Infrastructure Renewals 2 (Multi-Asset)	10-(320/**316/327/330/910)-22753/1031622753/1032022753/1032722753/1033022753/1091022753**	2,069,706	1,916,956	152,750	COMPLETE	In Warranty
2022 Road Reconstruction 2 (Multi-Asset)	10-(320/**316/327)-22166/1031622166/1032022166/1032722166**	4,141,685	3,898,517	243,168	COMPLETE	In Warranty
2022 Infrastructure Renewals 1 (Multi-Asset)	10-(320/**910/330/316/327)-22743/1031622743/1032022743/1032722743/1033022743/1091022743**	5,524,100	5,257,117	266,983	COMPLETE	In Warranty
2022 Road Reconstruction 1 (Multi-Asset)	10-(320/**316/327)-22167/1031622167/1032022167/1032722167**	5,056,305	5,023,627	32,678	COMPLETE	In Warranty
Asset Management Plan Update & Data Collection	10-(320/**316/910/327/330)-22150/1031622150/1032022150/1032722150/1033022150/1091022150**	200,000	86,952	113,048	IN PROGRESS	Scoping study to meet legislative requirements.
Pre-Approved Dain City Infrastructure Improvements Stage 1 (Multi-Asset)	10-(320/**327/330/910)-22356/1032022356/1032722356/1033022356/1091022356**	2,751,305	0	2,751,305	IN PROGRESS	In Design
Pre-Approved Dain City Redundancy and Security of Water Supply (Multi-Asset)	10-(910/**320)-22757/1032022757/1091022757**	4,869,760	2,792,421	2,077,339	IN PROGRESS	In Construction
TOTAL MULTI-ASSET		**26,347,461**	**20,255,737**	**6,091,725**		
PARKS						
Trail Improvements	10-410-22500/**1041022500**	75,000	13,310	61,690	IN PROGRESS	Bollard/Trail upgrades - scope developed for standardized trail treatments for crossing point - design stage.
Plymouth Park Slow Pitch Lighting Replacement	10-410-22407/**1041022407**	300,000	248,841	51,159	COMPLETE	In warranty

Progress Report for Outstanding Capital Projects 2018 TO 2024 As of the end of December, 2024						
Function	**Account Number**	**Capital Approved Budget**	**Actual Expenditures to the end of December, 2024**	**Variance**	**Project Status (Complete/ In Progress/ On-hold)**	**Additional Comments**
Stop 19 Trail Lighting Design	10-410-22405/**1041022405**	47,302	275	47,027	IN PROGRESS	RFP for design Services to be completed - Summer 2025
General Park Repair & Renewal - Various Locations	10-410-22410/**1041022410**	100,000	42,934	57,066	IN PROGRESS	Remaining funds to be used for Deere Street Park drainage and sidewalk improvements - work to be completed with Playground Renewal Project - summer 2025
Boardwalk Parkette - 2022 Public Realm Program Initiative	10-410-22411/**1041022411**	195,000	179,841	15,159	IN PROGRESS	Ramp, Signage and fencing/post replacements remain - Summer 2025
TOTAL PARKS		**717,302**	**485,200**	**232,101**		
ROADWAYS						
Transportation Master Plan	10-320-22157/**1032022157**	300,000	375,515	(75,515)	COMPLETE	Final invoices to be reconciled.
Kingsway Road Reconstruction Design	10-320-22163/**1032022163**	100,000	99,613	387	IN PROGRESS	In Design, Tender Q2 2025, Construction Q3 2025
Road Needs Study - Urban Area	10-320-22156/**1032022156**	75,000	74,819	181	IN PROGRESS	Reporting under review
TOTAL ROADWAYS		**475,000**	**549,947**	**(74,947)**		
STORM SEWERS						
SWM Pond Cleaning	10-327-22351/**1032722351**	587,500	79,833	507,667	IN PROGRESS	In Design
Climate Change Initiatives/Follow Up to Adaptation Plan	10-327-22390/**1032722390**	50,000	0	50,000	IN PROGRESS	
Storm Sewer Model Update	10-327-22350/**1032722350**	50,000	3,602	46,398	IN PROGRESS	Collecting Flow Data
TOTAL STORM SEWERS		**687,500**	**83,435**	**604,065**		
WASTEWATER						
Broadway Area Infrastructure Renewals Phase II Design	10-330-22744/**1033022744**	214,200	67,211	146,989	IN PROGRESS	In Design
2022 Infrastructure Renewals 3 Design	10-330-22749/**1033022749**	88,600	58,318	30,282	IN PROGRESS	In Design
Lyons Avenue Infrastructure Renewals Design	10-330-22741/**1033022741**	125,000	0	125,000	IN PROGRESS	In Design
TOTAL WASTEWATER		**367,800**	**125,529**	**242,271**		
WATERWORKS						
Lead Service Replacement Program (Private Side)	10-910-22752/**1091022752**	25,000	24,500	500	IN PROGRESS	Dependant on uptake.
Water Model Updates	10-910-22755/**1091022755**	25,000	14,582	10,418	IN PROGRESS	Additional updates to be provided.
TOTAL WATERWORKS		**50,000**	**39,082**	**10,918**		
TOTAL 2022		**36,637,939**	**29,341,777**	**7,296,162**		
2023						
BRIDGES & CULVERTS						
Canal Monolith Wall Maintenance and Inspections	10-320-23205/**1032023205**	325,000	87,215	237,785	IN PROGRESS	In Construction
TOTAL BRIDGES & CULVERTS		**325,000**	**87,215**	**237,785**		

Progress Report for Outstanding Capital Projects 2018 TO 2024 As of the end of December, 2024						
Function	**Account Number**	**Capital Approved Budget**	**Actual Expenditures to the end of December, 2024**	**Variance**	**Project Status (Complete/ In Progress/ On-hold)**	**Additional Comments**
FACILITIES						
Pre-Approved New Washroom - Merritt Park (Section 37 supported)	10-454-23406/**1045423406**	347,300	0	347,300	IN PROGRESS	Scope being developed with Parks
Youngs Sportsplex Repair & Renewal	10-445-23457/**1044523457**	105,000	72,774	32,226	IN PROGRESS	Project to be completed by September 2025
Electrical Upgrade & Renewal	10-430-23458/**1043023458**	110,000	48,494	61,506	IN PROGRESS	Further documentation, mapping and safety upgrades of the electrical systems underway
Museum Restoration & Renewal	10-449-23461/**1044923461**	250,000	232,205	17,795	COMPLETE	In Warranty Period
Facilities Accessibility AODA Compliance	10-430-23465/**1043023465**	108,943	71,950	36,993	IN PROGRESS	Assessments complete, remaining to be used for completion of recommendations
Merritt Island Washroom Renewal - Phase 1 Demo & Design	10-454-23469/**1045423469**	75,000	0	75,000	IN PROGRESS	Demolition and design scope being developed
TOTAL FACILITIES		**996,243**	**425,423**	**570,820**		
FIRE						
Replace Pumper #2	10-210-23050/**1021023050**	1,150,000	2,891	1,147,109	IN PROGRESS	turbulent market and hope to combine purchases for cost savings
Replace Rescue No. 1 - Heavy Rescue/86	10-210-23056/**1021023056**	950,000	737,760	212,240	IN PROGRESS	truck delivered, upfitting and equipping is underway
Fire Portable Radio Communications	10-210-23053/**1021023053**	400,000	177,699	222,301	IN PROGRESS	radio equipment purchase and contract completion in Q2 2025
Additional Safety Equipment - 8 Probationary Firefighters	10-210-23063/**1021023063**	85,000	81,393	3,607	IN PROGRESS	completed in Q1 2025
TOTAL FIRE		**2,585,000**	**999,743**	**1,585,257**		
GENERAL						
New Technology Equipment/Licensing	10-131-23000/**1013123000**	75,000	14,160	60,840	IN PROGRESS	
Appraisal Survey Cost	10-710-23550/**1071023550**	50,000	41,744	8,256	IN PROGRESS	
New Zoning By-law	10-825-23655/**1082523655**	150,000	0	150,000	IN PROGRESS	RFP document is being developed will be released once Official Plan is approved by Council.
Public Works Masterplan	10-825-23653/**1082523653**	150,000	7,021	142,979	IN PROGRESS	
5 Year Master Plan - IS	10-131-23002/**1013123002**	75,000	35,107	39,893	IN PROGRESS	Completed in 2025
Master GIS Plan/ Strategy - 5 Year	10-825-23654/**1082523654**	75,000	4,757	70,243	IN PROGRESS	Project scheduled to be completed Q3 2025
TOTAL GENERAL		**575,000**	**102,790**	**472,210**		
MULTI-ASSET						
Kingsway Road Reconstruction and Watermain Upgrade (Roads) Phase 1 of 2 (316//320/327)	10-320-23163/**1031623163/1032023163/1032723163**	634,000	28,957	605,043	IN PROGRESS	In Design (Budget is Year 1 of 2), Tender Q2 2025, Construction Q3 2025

Progress Report for Outstanding Capital Projects 2018 TO 2024 As of the end of December, 2024						
Function	**Account Number**	**Capital Approved Budget**	**Actual Expenditures to the end of December, 2024**	**Variance**	**Project Status (Complete/ In Progress/ On-hold)**	**Additional Comments**
Asset Management Plan Update (Level of Service) (320/316/327/910/330)	10-320-23150/**1031623150/1032023150/1032723150/1033023150/1091023150**	100,000	57,008	42,992	IN PROGRESS	Final report to be delivered June 2025
Kingsway Watermain Replacement (910/316/320)	10-910-23769/**1031623769/1032023769/1091023769**	235,000	134,151	100,849	COMPLETE	In Warranty, Development Cost Share
2023 Road Reconstruction (Roads) (320/316/327)	10-320-23168/**1031623168/1032023168/1032723168**	2,641,300	2,457,186	184,114	COMPLETE	In Warranty
2023 Road Resurfacing (320/316)	10-320-23169/**1031623169/1032023169**	2,641,600	1,658,944	982,656	COMPLETE	In Warranty
2023-301 Infrastructure Renewals 1 (320/330/327/316)	10-320-23715/**1031623715/1032023715/1032723715/1033023715**	4,766,000	2,995,045	1,770,955	COMPLETE	In Warranty
Pre-Approved Broadway Avenue Sanitary Trunk Sewer Construction (320/330/327)	10-330-23744/**1032023744/1032723744/1033023744**	3,771,290	3,471,317	299,973	COMPLETE	In Warranty
2023-303 Infrastructure Renewals 2 (330/910/320/327/316) Phase 1 of 2	10-330-23745/**1031623745/1032023745/1032723745/1033023745/1091023745**	1,793,750	31,946	1,761,804	IN PROGRESS	In Construction (Budget is Year 1 of 2)
Kingsway Road Reconstruction and Watermain Upgrade (910/330)	10-910-23163/**1033023163/1091023163**	1,122,000	286,806	835,194	IN PROGRESS	In Design (Budget is Year 1 of 2), Tender Q2 2025, Construction Q3 2025
Laugher Avenue (Southworth Subdivision) (320/910/327)	10-320-23772/**1032023772/1032723772/1091023772**	360,000	175,208	184,792	IN PROGRESS	Development Cost Share, Under Construction, first invoice paid in July, with top coat and remainder of payment expected next year
Bradley Street (Waterways Common Phase 3) (320/327)	10-320-23172/**1032023172/1032723172**	124,000	88,635	35,365	COMPLETE	Development Cost Share, In Warranty, Top Asphalt to be Completed in 2024
TOTAL MULTI-ASSET		**18,188,940**	**11,385,204**	**6,803,736**		
PARKS						
Recreational Corridor Improvements	10-410-23402/**1041023402**	200,000	115,776	84,224	IN PROGRESS	Some work completed - remaining funds for SNRC Drainage/pathway repairs. Survey work completed - drainage design work underway - anticipated fall construction work after rowing season is completed

Progress Report for Outstanding Capital Projects 2018 TO 2024 As of the end of December, 2024						
Function	**Account Number**	**Capital Approved Budget**	**Actual Expenditures to the end of December, 2024**	**Variance**	**Project Status (Complete/ In Progress/ On-hold)**	**Additional Comments**
Cemetery Monument Assessment	10-410-23408/**1041023408**	35,000	33,581	1,419	IN PROGRESS	Phase one completed, second round of assessments are underway.
General Parkland Renewal and Restoration	10-410-23410/**1041023410**	300,000	143,655	156,345	IN PROGRESS	Funds for Love MY Park Projects and Parkland Repairs - Summer 2025
Baseball Infield Conversion	10-412-23405/**1041223405**	120,000	0	120,000	IN PROGRESS	CS-2025-18 Baseball infield Conversion Project Changes approved - work to go for quotes summer 2025 with fall construction
Public Art Projects	10-410-23419/**1041023419**	20,000	8,692	11,308	IN PROGRESS	2025-2-21 - Remaining funds for Market PRIP directed toward Public Art for space - scheduled for completion in November
Meritt Park Improvements	10-410-23420/**1041023420**	85,000	0	85,000	IN PROGRESS	Concept design is complete - RFP is being developed - to be combined with Merritt Parks Washroom Project
Woodlawn Cemetery Paving Design	10-410-23421/**1041023421**	25,000	0	25,000	IN PROGRESS	RFP being developed
Pre-Approved Tree Replacement Program	10-410-23422/**1041023422**	400,000	0	400,000	IN PROGRESS	Waiting for FED's for decision on funding - Natural Infrastructure Fund
Pre-Approved Merritt Island Park Renewal- Niagara Region Water Treatment Plant Expansion	10-410-23423/**1041023423**	0	9,057	(9,057)	IN PROGRESS	Agreements with the Region and project funding determined in February 2025.
Parks & Trails Condition Assessment Initiative	10-410-23424/**1041023424**	75,000	0	75,000	IN PROGRESS	Scope of work has been completed - FRP being developed and will be sent out May 2025
Deere St Park Playground Replacement	10-410-23425/**1041023425**	400,000	11,906	388,094	IN PROGRESS	Project underway, final design stage and will go out for tender in May - Construction planned for Summer 2025

Progress Report for Outstanding Capital Projects 2018 TO 2024 As of the end of December, 2024						
Function	**Account Number**	**Capital Approved Budget**	**Actual Expenditures to the end of December, 2024**	**Variance**	**Project Status (Complete/ In Progress/ On-hold)**	**Additional Comments**
St. George Park Playground Replacement	10-410-23426/**1041023426**	400,000	8,650	391,350	IN PROGRESS	Project underway, final design stage and will go out for tender in May - Construction planned for late Summer 2025 St George Family Day
Memorial Park Playground Replacement	10-410-23427/**1041023427**	400,000	29,480	370,520	IN PROGRESS	Project underway, final design stage and will go out for tender in May - Construction planned for Summer 2025
TOTAL PARKS		**2,460,000**	**360,796**	**2,099,204**		
ROADWAYS						
Surface Treatment Program - Rural Roads	10-320-23153/**1032023153**	683,000	666,090	16,910	COMPLETE	Funding to be issued Q3 on the next debenture issuance.
TOTAL ROADWAYS		**683,000**	**666,090**	**16,910**		
SIDEWALKS						
Condition Related Replacements & Missing Links	10-316-23102/**1031623102**	330,000	174,593	155,407	COMPLETE	In Warranty
TOTAL SIDEWALKS		**330,000**	**174,593**	**155,407**		
STORM SEWERS						
Storm Sewer Model Update	10-327-23350/**1032723350**	50,000	0	50,000	IN PROGRESS	Model Update in progress
Pre-Approved David Street Channel Rehabilitation	10-327-23353/**1032723353**	325,000	0	325,000	IN PROGRESS	In Design, Construction dependant on NIF funding
TOTAL STORM SEWERS		**375,000**	**0**	**375,000**		
TRAFFIC						
Digital Parking Permits	10-321-23252/**1032123252**	20,000	7,886	12,114	IN PROGRESS	
TOTAL TRAFFIC		**20,000**	**7,886**	**12,114**		
WASTEWATER						
Canal Bank Street Sewer Removal	10-330-23749/**1033023749**	448,000	455,049	(7,049)	COMPLETE	In Warranty
CSO & Sewer System Flow Level Monitoring (Mandatory)	10-330-23702/**1033023702**	300,000	291,077	8,923	COMPLETE	Awaiting final invoicing.
Sanitary Sewer Model Update	10-330-23722/**1033023722**	50,000	0	50,000	IN PROGRESS	Model Update in progress
Ontario Road Trunk Sanitary Sewer Design	10-330-23720/**1033023720**	100,000	34,111	65,889	IN PROGRESS	Phase I Ontario Street Trunk Sewer - In Design, Tender
Fitch Street SPS Decommissioning Study	10-330-23701/**1033023701**	150,000	0	150,000	IN PROGRESS	RFP to be posted Q3 2025
TOTAL WASTEWATER		**1,048,000**	**780,237**	**267,763**		
WATERWORKS						
Water Model Updates	10-910-23755/**1091023755**	50,000	46,033	3,967	IN PROGRESS	Additional updates to be completed.
Fleet Replacements Water Eng	10-910-23301/**1091023301**	540,000	384,194	155,806	IN PROGRESS	Service truck vehicle outstanding
Lead Service Replacement Program (Municipal Side)	10-910-23753/**1091023753**	1,880,000	1,427,999	452,001	COMPLETE	In Warranty
Sylvan Drive Water Service Replacements	10-910-23754/**1091023754**	210,000	148,400	61,600	COMPLETE	In Warranty

Progress Report for Outstanding Capital Projects 2018 TO 2024 As of the end of December, 2024						
Function	**Account Number**	**Capital Approved Budget**	**Actual Expenditures to the end of December, 2024**	**Variance**	**Project Status (Complete/ In Progress/ On-hold)**	**Additional Comments**
Pre-Approved Quaker Road Watermain Replacement	10-910-23770/**1032023770/1091023770**	1,295,000	0	1,295,000	IN PROGRESS	In Construction, Region Cost Share
Hagar Street Watermain Replacement	10-910-23773/**1091023773**	339,000	0	339,000	ON-HOLD	Development Cost Share, Developer reviewing possible amended design.
TOTAL WATERWORKS		**4,314,000**	**2,006,626**	**2,307,374**		
TOTAL 2023		**31,900,183**	**16,996,604**	**14,903,579**		
2024						
BRIDGES & CULVERTS						
2024 Bridge & Culvert Inspections and Report (Biannual)	10-320-24201/**1032024201**	30,000	6,702	23,298	IN PROGRESS	Final report has been submitted.
TOTAL BRIDGES & CULVERTS		**30,000**	**6,702**	**23,298**		
FACILITIES						
Maple Park Pool Heater	10-438-24474/**1043824474**	335,269	346,442	(11,173)	IN PROGRESS	Project underway and to be completed by the end of June 2025
Welland Community Centre Repair & Renewal	10-434-24482/**1043424482**	255,000	4,445	250,555	IN PROGRESS	Scopes developed and tendered, work to be completed by September 2025
City Hall Repair & Renewal	10-439-24483/**1043924483**	165,000	1,089	163,911	IN PROGRESS	Scopes being developed and tendered
Courthouse Repairs & Renewal	10-442-24484/**1044224484**	685,000	0	685,000	IN PROGRESS	Project currently being designed
Service Centre Repairs & Renewal	10-444-24485/**1044424485**	495,000	11,814	483,186	IN PROGRESS	Scopes developed and being tendered, to be completed in 2025
Museum Repairs & Renewals	10-449-24486/**1044924486**	315,000	2,030	312,970	IN PROGRESS	Project tendered and awarded, to be completed in 2025
Facilities - Ancillary Buildings Repairs & Renewal	10-454-24487/**1045424487**	100,000	18,817	81,183	IN PROGRESS	Scopes developed and tendered
Playfield Repair & Renewal	10-412-24488/**1041224488**	20,000	19,954	46	COMPLETE	Close Account.
Facilities Accessibility Upgrades	10-430-24454/**1043024454**	150,000	0	150,000	IN PROGRESS	Projects scoped and work underway
Rec Rentals Equipment Renewal	10-447-24501/**1044724501**	10,000	0	10,000	IN PROGRESS	For equipment replacements at Rec Rentals. Inventory will be reviewed again in the spring of 2025 to determine if any replacements will be required.

Progress Report for Outstanding Capital Projects 2018 TO 2024 As of the end of December, 2024						
Function	**Account Number**	**Capital Approved Budget**	**Actual Expenditures to the end of December, 2024**	**Variance**	**Project Status (Complete/ In Progress/ On-hold)**	**Additional Comments**
Future Arena Needs & Feasibility Study	10-432-24477/**1043224477**	150,000	53,882	96,118	IN PROGRESS	Project underway and to be completed by July 2025
Youngs Sportsplex Repair & Renewal	10-445-24458/**1044524458**	75,000	3,460	71,540	IN PROGRESS	Project scope developed and work being tendered and completed
Main Arena Repairs & Renewals	10-432-24455/**1043224455**	400,000	57,173	342,827	IN PROGRESS	Project designed and out for tender
Market Repair & Renewal	10-436-24459/**1043624459**	97,500	21,533	75,967	IN PROGRESS	Project scoped and currently being tendered
MSC Stores Area Asbestos Abatement	10-444-24462/**1044424462**	20,000	12,720	7,280	IN PROGRESS	Remaining funds to be used for additional removals in stores area
Facilities Security Consultant	10-430-24465/**1043024465**	73,936	0	73,936	IN PROGRESS	Project underway and to be completed by June 2025
St. George Park Pavilion Replacement	10-454-24466/**1045424466**	350,000	0	350,000	IN PROGRESS	Project scoped and designed as part of the St. George Park Improvements
Cooks Mills Facility Feasibility Study & Design	10-448-24468/**1044824468**	50,000	10,993	39,007	IN PROGRESS	Project underway and to be completed by July 2025
Arena Equipment Upgrades & Renewals	10-432-24470/**1043224470**	95,000	41,765	53,235	IN PROGRESS	Final improvements to be completed in June 2025
TOTAL FACILITIES		**3,841,705**	**606,118**	**3,235,588**		
FIRE						
SCBA Upgrade	10-210-24051/**1021024051**	425,000	300,955	124,045	IN PROGRESS	Council approved the deferral of purchasing to optimize warranty coverage to minimize repairs costs
Uniforms & Clothing	10-210-24060/**1021024060**	65,000	86,610	(21,610)	COMPLETE	Invoices to be reconciled.
Capital Equipment - Fire	10-210-24061/**1021024061**	135,000	115,182	19,818	IN PROGRESS	completed in 2025
Special Operations and Highrise Firefighting	10-210-24054/**1021024054**	95,000	14,396	80,604	IN PROGRESS	staff trialing new equipment to modernize department
Safety Equipment for Probationary Firefighters (7)	10-210-24062/**1021024062**	76,000	52,598	23,402	IN PROGRESS	finalized in 2025, purchasing offset to optimize pricing and warranty coverage
TOTAL FIRE		**796,000**	**569,741**	**226,259**		
FLEET						
Pre-Approved Fleet Rotary Lift Replacement	10-323-24303/**1032324303**	475,000	8,975	466,025	IN PROGRESS	
TOTAL FLEET		**475,000**	**8,975**	**466,025**		

Progress Report for Outstanding Capital Projects 2018 TO 2024 As of the end of December, 2024						
Function	**Account Number**	**Capital Approved Budget**	**Actual Expenditures to the end of December, 2024**	**Variance**	**Project Status (Complete/ In Progress/ On-hold)**	**Additional Comments**
GENERAL						
Capital Equipment - IS	10-131-24001/**1013124001**	240,000	225,585	14,415	IN PROGRESS	
New Downtown Community Improvement Plan	10-825-24650/**1082524650**	110,000	33,496	76,504	IN PROGRESS	To be complete in Fall 2025
Update Brownfield CIP	10-825-24651/**1082524651**	70,000	26,442	43,558	IN PROGRESS	To be complete in Fall 2025
Document Management System - Phase 2	10-131-24652/**1013124652**	100,000	84,885	15,115	IN PROGRESS	To be completed by end of 2025
TOTAL GENERAL		**520,000**	**370,408**	**149,592**		
MULTI-ASSET						
Water Meter Replacements- Phase 1 (Water and Sanitary Sewer)	10-910-24751/**1033024751/1091024751**	2,405,797	2,440,013	(34,217)	IN PROGRESS	
Sanitary Sewer Spot Repairs (Wastewater/Roads)	10-330-24706/**1032024706/1033024706**	585,700	0	585,700	IN PROGRESS	In Construction
West Main Area Phase II Construction (Roads/Storm/Sidewalk/Wastewater/Water)	10-320-24165/**1031624165/1032024165/1032724165/1033024165/1091024165**	3,811,000	0	3,811,000	IN PROGRESS	In Design, Tender Q2 2025, Construction Q3 2025
First Street Infrastructure Renewals (Wastewater/Water/Storm/Sidewalk/Roads)	10-330-24749/**1031624749/1032024749/1032724749/1033024749/1091024749**	1,263,500	0	1,263,500	IN PROGRESS	Phase I In Construction
2024 Road Reconstruction 1 (Roads/Storm/Wastewater/Water/Sidewalks)	10-320-24171/**1031624171/1032024171/1032724171/1033024171/1091024171**	2,201,300	1,854,277	347,023	IN PROGRESS	In Construction
2024 Road Reconstruction 2 (Roads/Sidewalk/Storm/Wastewater)	10-320-24168/**1031624168/1032024168/1032724168/1033024168**	1,789,300	1,047,126	742,174	IN PROGRESS	In Construction
Kingsway Road Reconstruction and Watermain Upgrade (Roads/Storm/Sidewalks) Phase 2 of 2	10-320-24163/**1031624163/1032024163/1032724163**	1,481,000	656,188	824,812	IN PROGRESS	In Design (Budget is Year 2 of 2), Tender Q2 2025, Construction Q3 2025
2023-303 Infrastructure Renewals 2 (Wastewater/Water/Roads/Storm/Sidewalks) Phase 2 of 2	10-330-24745/**1031624745/1032024745/1032724745/1033024745/1091024745**	1,789,450	3,654	1,785,796	IN PROGRESS	In Construction (Budget is Year 2 of 2)
River-Down Industrial Subdivision - New Road (Roads/Storm/Water/Wastewater)	10-320-24155/**1032024155/1032724155/1033024155/1091024155**	2,983,000	0	2,983,000	ON-HOLD	Dependent on development.
Consolidated Linear Infrastructure Requirements (Wastewater/Storm)	10-330-24351/**1032724351/1033024351**	450,000	32,395	417,605	IN PROGRESS	Project in progress

Progress Report for Outstanding Capital Projects 2018 TO 2024 As of the end of December, 2024						
Function	**Account Number**	**Capital Approved Budget**	**Actual Expenditures to the end of December, 2024**	**Variance**	**Project Status (Complete/ In Progress/ On-hold)**	**Additional Comments**
2024 Road Resurfacing (Roads/Storm/Sidewalks/Wastewater)	10-320-24169/**1031624169/1032024169/1032724169/1033024169**	1,125,400	1,001,078	124,322	COMPLETE	In Warranty
TOTAL MULTI-ASSET		**19,885,447**	**7,034,732**	**12,850,715**		
PARKS						
Pre-Approved Maple Park Playground Replacement	10-410-24401/**1041024401**	400,000	0	400,000	IN PROGRESS	Agreement has been signed with consultant - Survey work is completed and concept design is underway - community engagement on the playground renewal to take place in June.
Pre-Approved Manchester Park Replace Park Playground & Related Landscaping	10-410-24421/**1041024421**	400,000	0	400,000	IN PROGRESS	Agreement has been signed with consultant - Survey work is completed and concept design is underway - community engagement on the playground renewal to take place in June
Trail Improvements	10-410-24500/**1041024500**	75,000	0	75,000	IN PROGRESS	Bollard/Trail upgrades - scope developed for standardized trail treatments for crossing point - design stage.
Recreational Corridor Improvements	10-410-24402/**1041024402**	200,000	0	200,000	IN PROGRESS	Funding for Pathway Repairs/small improvements and slope repair - tender being developed for slope repair near train bridge and will be issued in May 2025

Progress Report for Outstanding Capital Projects 2018 TO 2024 As of the end of December, 2024						
Function	**Account Number**	**Capital Approved Budget**	**Actual Expenditures to the end of December, 2024**	**Variance**	**Project Status (Complete/ In Progress/ On-hold)**	**Additional Comments**
Vista Park - Master Plan	10-410-24403/**1041024403**	250,000	0	250,000	IN PROGRESS	Site visit has been completed - report to come to council in June for update on project and next steps - updated concept design and community engagement to follow.
Burger Park Hardball Diamond Light Replacement	10-412-24405/**1041224405**	350,000	0	350,000	IN PROGRESS	RFP to be developed for consulting services.
Cricket Pitch Enhancements(Cooks Mills)	10-412-24407/**1041224407**	60,000	0	60,000	ON-HOLD	On hold due to Cooks Mills Study -
General Parkland Renewal and Restoration	10-410-24406/**1041024406**	300,000	77,921	222,079	IN PROGRESS	Love My Park Projects/ General Park Repairs as needed - awaiting invoices
Rotary Parking Paving and Sand Area Design	10-410-24414/**1041024414**	50,000	0	50,000	IN PROGRESS	Q4-2025
Parks Sanitation Improvements	10-410-24415/**1041024415**	100,000	47,993	52,007	IN PROGRESS	New Standard Garbage Receptacles - parks being reviewed for next round of replacements
Public Art Projects	10-410-24419/**1041024419**	20,000	0	20,000	IN PROGRESS	Toronto Art Restoration scheduled to complete work June 2025 , this work was quoted at $27,000.00, the remaining 7,0000 will be used from the 2025 funding.
Pre-Approved Bemus Park Playground Replacement	10-410-24420/**1041024420**	400,000	0	400,000	IN PROGRESS	Agreement has been signed with consultant - Survey work is completed and concept design is underway - community engagement on the playground renewal to take place in June.

Progress Report for Outstanding Capital Projects 2018 TO 2024 As of the end of December, 2024						
Function	**Account Number**	**Capital Approved Budget**	**Actual Expenditures to the end of December, 2024**	**Variance**	**Project Status (Complete/ In Progress/ On-hold)**	**Additional Comments**
Parks, Recreation & Culture Master Plan - UPDATE	10-410-24469/**1041024469**	25,000	0	25,000	IN PROGRESS	Agreement has been signed with consultant - Survey work is completed and concept design is underway - community engagement on the playground renewal to take place in June.
Pre-Approved Michael Drive Parkette	10-410-24422/**1041024422**	300,000	6,106	293,894	IN PROGRESS	Engagement completed, Designs currently underway.
Dog Park Improvements	10-410-24423/**1041024423**	25,000	0	25,000	IN PROGRESS	Public Engagement to take place Spring 2025 to determine upgrades and priorities
Chippawa Park Paving Repairs	10-410-24425/**1041024425**	150,000	78,399	71,601	COMPLETE	In Warranty - Topcoat completed May 2025 - final invoicing remains.
Chippawa Park Weller Ave Entrance Redesign	10-410-24426/**1041024426**	20,000	0	20,000	IN PROGRESS	Q4-2025
Abbey Road Woodlot Trail	10-410-24427/**1041024427**	75,000	4,999	70,001	IN PROGRESS	Q4-2025
TOTAL PARKS		**3,200,000**	**215,417**	**2,984,583**		
ROADWAYS						
Surface Treatment Program - Rural Roads	10-320-24153/**1032024153**	634,725	535,715	99,010	COMPLETE	In Warranty
Asphalt Patching	10-320-24154/**1032024154**	240,000	156,293	83,707	IN PROGRESS	In Construction
TOTAL ROADWAYS		**874,725**	**692,008**	**182,717**		
SIDEWALKS						
Sidewalks - Condition Related Replacements and Missing Links	10-316-24102/**1031624102**	275,000	177,850	97,150	IN PROGRESS	In Construction
Quaker Road Sidewalk	10-316-24161/**1031624161**	200,000	0	200,000	ON-HOLD	To be included with full road reconstruction.
TOTAL SIDEWALKS		**475,000**	**177,850**	**297,150**		
STORM SEWERS						
Storm Sewer Model Update	10-327-24350/**1032724350**	25,000	0	25,000	IN PROGRESS	Model Update in progress
CCTV Program (Storm)	10-327-24354/**1032724354**	150,000	80,383	69,617	IN PROGRESS	Project in progress
David Street Flow Diversion Study	10-327-24352/**1032724352**	200,000	62,215	137,785	IN PROGRESS	Project in progress
TOTAL STORM SEWERS		**375,000**	**142,599**	**232,401**		
TRAFFIC						
Traffic Control Hardware	10-321-24251/**1032124251**	146,347	69,639	76,708	IN PROGRESS	
Streetlighting _ Wiring & Pole Replacements	10-321-24253/**1032124253**	60,000	39,847	20,153	IN PROGRESS	
Temporary speed signs	10-321-24254/**1032124254**	55,000	33,969	21,032	IN PROGRESS	
2024 Vision Zero - Road Safety Programs	10-321-24299/**1032124299**	124,475	0	124,475	IN PROGRESS	
TOTAL TRAFFIC		**385,822**	**143,455**	**242,368**		
WASTEWATER						
CSO & Sewer System Flow Level Monitoring (Mandatory)	10-330-24702/**1033024702**	300,000	151,351	148,649	IN PROGRESS	
Sanitary Sewer Model Update	10-330-24722/**1033024722**	25,000	8,222	16,778	IN PROGRESS	Model Update in progress
CCTV Program (Wastewater)	10-330-24730/**1033024730**	250,000	190,960	59,040	IN PROGRESS	Project in progress

Progress Report for Outstanding Capital Projects 2018 TO 2024 As of the end of December, 2024						
Function	**Account Number**	**Capital Approved Budget**	**Actual Expenditures to the end of December, 2024**	**Variance**	**Project Status (Complete/ In Progress/ On-hold)**	**Additional Comments**
Plymouth Area Street I/I Investigation and Reduction	10-330-24703/**1033024703**	75,000	51,629	23,371	IN PROGRESS	Awaiting final invoicing.
Sanitary Sewer Lining	10-330-24707/**1033024707**	500,000	0	500,000	IN PROGRESS	In Construction
TOTAL WASTEWATER		**1,150,000**	**402,162**	**747,838**		
WATERWORKS						
Kingsway Watermain Upgrade (Kingsway Subdivision)	10-910-24771/**1091024771**	937,800	10,741	927,059	IN PROGRESS	Development Cost Share - In Design, Tender Q2 2025, Construction Q3 2025
Pre-Approved 2024 Fleet Capital Replacements	10-910-24305/**1091024305**	419,000	0	419,000	IN PROGRESS	
Water Model Updates	10-910-24755/**1091024755**	25,000	0	25,000	IN PROGRESS	
TOTAL WATERWORKS		**1,381,800**	**10,741**	**1,371,059**		
TOTAL 2024		**33,390,500**	**10,380,908**	**23,009,592**		
MULTI-PHASE/ MULTI- BUDGETED YEAR PROJECTS						
FIRE STATIONS #1 (including Training Tower) & #2						
TRAINING FIELD -ENGINEERING COSTS	10-210-17011/**1021017011**	75,000	0	75,000	COMPLETE	part of build project close out scheduled in 2025
Fire Hall & Training Ctre - Study (FCM)	10-710-18182/**1071018182**	109,725	103,442	6,283	COMPLETE	part of build project close out scheduled in 2025
New Fire Stn - Stn #1 Design Fees	10-210-18006/**1021018006**	1,023,600	1,811,650	(788,050)	COMPLETE	part of build project close out scheduled in 2025
Construction New Fire Station #1	10-210-19005/**1021019005**	6,635,862	11,064,521	(4,428,659)	COMPLETE	part of build project close out scheduled in 2025
Construction Fire Station #2	10-210-19006/**1021019006**	3,887,862	5,466,416	(1,578,554)	COMPLETE	part of build project close out scheduled in 2025
CONSTRUCTION FIRE STATIONS #1 & #2 (Additional Funds)	10-210-20601/**1021020601**	4,218,650	0	4,218,650	COMPLETE	part of build project close out scheduled in 2025
Fire Station # 1 - Training Centre	10-210-21050/**1021021050**	2,850,000	0	2,850,000	COMPLETE	part of build project close out scheduled in 2025
Fire Training Tower - Station #1	10-210-23062/**1021023062**	1,600,000	761,739	838,261	IN PROGRESS	construction contracted to be completed in 2025
FIRE STN #1 & #2 - TOTAL		**20,400,699**	**19,207,768**	**1,192,932**		
FIRE STATIONS #3						
New Fire Station #3 - Phase 1 of 2	10-210-22056/**1021022056**	2,970,000	293,083	2,676,917	IN PROGRESS	project progressing well, completion 2025
New Fire Station #3 - Phase 2 of 2	10-210-23057/**1021023057**	3,100,000	3,438,279	(338,279)	IN PROGRESS	project progressing well, completion 2025
Fire Station #3 Environmental & Site Assessment	10-210-21052/**1021021052**	40,000	41,030	(1,030)	IN PROGRESS	project progressing well, completion 2025
Furniture & Fixtures - Fire Station #3	10-210-24058/**1021024058**	65,000	0	65,000	IN PROGRESS	project progressing well, completion 2025
FIRE STN #3 - TOTAL		**6,175,000**	**3,772,392**	**2,402,608**		

Progress Report for Outstanding Capital Projects 2018 TO 2024 As of the end of December, 2024						
Function	**Account Number**	**Capital Approved Budget**	**Actual Expenditures to the end of December, 2024**	**Variance**	**Project Status (Complete/ In Progress/ On-hold)**	**Additional Comments**
WEST MAIN ST AREA						
West Main Street Area - Infrastructure Improvements	10-320-19888/**1031619888/1032019888/1032719888/1033018060/1033018085/1033019888/1091018059/1091019231/1091019888**	4,645,534	4,738,835	(93,301)	COMPLETE	Region Cost Share - In Warranty
TOTAL WEST MAIN ST AREA		**4,645,534**	**4,738,835**	**(93,301)**		
MERRIT ST						
Merritt Street - City Cost Share w/ Region	10-320-21161/**1031618018/1031620241/1032018069/1032021161/1032721161/1033020241/1091018098/1091020241**	2,632,000	7,602	2,624,399	IN PROGRESS	Region Cost Share - Project to be Awarded Q2 2025, Construction Q3 2025
TOTAL MERRIT ST		**2,632,000**	**7,602**	**2,624,399**		
AMPITHEATRE						
Amphitheater Repair & Renewal Phase 2 of 2	10-430-22481/**1043022481**	50,000	47,894	2,106	IN PROGRESS	Structural assessments and designs being completed
Amphitheatre & Stage Rehabilitation - Phase 3 of 3	10-447-23456/**1044723456**	320,000	15,302	304,698	IN PROGRESS	Structural assessments and designs being completed
TOTAL AMPHITHEATRE		**370,000**	**63,195**	**306,805**		
COMMUNITY TRAIL STRATEGY IMPLEMENTATION						
Community Trail Strategy Implementation	10-410-23417/**1041023417**	2,069,162	167,138	1,902,024	IN PROGRESS	
Trail Strategy Implementation	10-410-24408/**1041024408**	300,000	0	300,000	IN PROGRESS	
TOTAL COMMUNITY TRAIL STRATEGY IMPLEMENTATION		**2,369,162**	**167,138**	**2,202,024**		
MEMORIAL PARK PHASES						
Memorial Park Revitalization	10-410-18048/**1041018048**	390,000	211,626	178,374	IN PROGRESS	Project under review, some work has been completed, account to remain open until completion of Phase 7 work. Potentially pool into all accounts for all 7 phases.

Progress Report for Outstanding Capital Projects 2018 TO 2024
As of the end of December, 2024

Function	Account Number	Capital Approved Budget	Actual Expenditures to the end of December, 2024	Variance	Project Status (Complete/ In Progress/ On-hold)	Additional Comments
Memorial Park Rejuvenation PH 2	10-410-19048/**1041019048**	700,000	20,522	679,478	IN PROGRESS	Project under review, some work has been completed, account to remain open until completion of Phase 7 work. Potentially pool into all accounts for all 7 phases.
Memorial Park Ball Diamond Lighting	10-410-20048/**1041020048**	400,000	385,433	14,567	IN PROGRESS	Lighting completed - account to remain open until completion of all 7 phases.
Memorial Park Rejuvenation PH 4	10-410-21401/**1041021401**	700,000	410,075	289,925	IN PROGRESS	Lighting completed - account to remain open until completion of all 7 phases.
Memorial Park Revitalization	10-410-24404/**1041024404**	500,000	0	500,000	IN PROGRESS	Project under review. Survey work summer 2025
TOTAL MEMOIRAL PARK PHASES		**2,690,000**	**1,027,657**	**1,662,343**		
MOU WITH EMPIRE COMMUNITIES - (BRIDGE COMBINED WITH CITY PORTION ABOVE- Year 2020)						
Forks Rd Full (Kingsway- East limit) Infrastructure Renewals	10-320-21199/**1032021199**	5,000,000	198,631	4,801,369	COMPLETE	Forks Road Reconstruction Phase I and II, and Forks Road Bridge Replacement - In Warranty. Projects were completed by Developer through a MOU.
Dain East - Playground & Water Feature	10-410-21407/**1041021407**	1,500,000	95,563	1,404,437	IN PROGRESS	
Former John Deere - Playground & Water Feature	10-410-21408/**1041021408**	1,500,000	95,563	1,404,437	IN PROGRESS	
New Multi-purpose Outdoor Facility	10-443-21499/**1044321499**	2,750,000	138,677	2,611,323	COMPLETE	Close out 2025
TOTAL EMPIRE		**10,750,000**	**528,435**	**10,221,565**		
	GRAND TOTAL:	**202,641,039**	**131,703,573**	**70,937,466**		

COUNCIL MEETING

FINANCE DEPARTMENT

REPORT FIN 2025-17
July 8, 2025

SUBJECT: **2025 Capital Project Close-Out Report #1**

AUTHOR: **Anka Vuksan Scott, CPA**
Manager of Budget and Financial Services, Deputy Treasurer

APPROVER: **Stephanie Nagel, BBA, CGA, CPA, MPA**
General Manager of Corporate and Enterprise Services/CFO

RECOMMENDATION:

THAT Council receive for information the Capital Project Close-out report listed in Appendix I as attached to Report FIN-2025-17; and further

THAT Council approve the recommended transfers to the following reserves in accordance with the capital projects being closed as outlined in Appendix I:

- Economic Development Reserve of $29,850.23
- Water/Wastewater Surplus Reserve of $362,458.69
- Capital Surplus Reserve of $900,652.29

RELATIONSHIP TO STRATEGIC PLAN

This recommendation is aligned to Council's strategic priority of ensuring "**Economic Growth**" for creating a diverse economy through partnerships and emerging markets to ensure sustainable growth and quality employment.

EXECUTIVE SUMMARY:

This report is not meant to provide specific project updates, but rather to present the financial outcomes of the now-closed projects.

Finance staff worked with the appropriate departments to complete and finalize the capital project close-out report. All projects listed in Appendix I are completed. Any surplus/deficit (variance) arising from the completed projects will be either funded through another project, returned to a reserve fund, or transferred to a similar capital project (if applicable). All the details are outlined in Appendix I.

BACKGROUND:

As City staff continue to improve information reporting to Council, the Corporate Leadership Team has approved a process for the close-out of capital projects. The applicable department confirms that a project is to be closed. Finance staff confirm the budget, actual funding, and actual expenditures of each project to identify the surplus/deficit (variance), if applicable. All applicable departments review the projects being closed and provide comments on the capital project close-out report.

DISCUSSION:

The attached close-out report identifies **41** capital projects to be closed. This is a significant number of projects to be closed and attributed by the on-going work of City staff.

FINANCIAL:

Appendix I identifies the net project surplus/deficit (variance) with any applicable explanation for each project. A project surplus and/or deficit will be transferred to the Capital Surplus account or returned to their specific Reserve funds (if applicable).

Below summarizes the Total Net Surplus Transfers to the Reserve Fund.

Total Net Transfer to Economic Development Reserve	$ 29,850.23
Total Net Transfer to Water/Wastewater Surplus Reserve	$ 362,458.69
Total Net Transfer to Capital Surplus Reserve	$ 900,652.29

ATTACHMENT:

Appendix I - 2025 Capital Project Close-Out Report

Item	Project Name	Year of Approval	Project #	Capital Approved Budget	Project Funding	Project Expenditures	Net Project Variance	Comments
1	Waterproof Electrical Panels	2017	10-447-17058	$ 15,000.00	$ 15,000.00	$ 1,831.68	$ 13,168.32	Project scope completed as part of the WIFC remediation project by Elite Construction. Project to be closed
2	Audio/Video Equipment-Council Chambers Phase 2	2019	10-111-19510	$ 75,000.00	$ 75,000.00	$ 73,134.22	$ 1,865.78	Finalizing of the system being conducted. To be completed by Q3 2025.
3	Aqueduct Siphon Cleaning & Inspection	2020	10-320-20841	$ 150,000.00	$ 150,000.00	$ 104,595.03	$ 45,404.97	Inspection and reporting was completed under budget.
4	Emergency Generator City Hall	2020	10-430-20088	$ 30,000.00	$ 30,000.00	$ 17,243.72	$ 12,756.28	Work completed to provide emergency power to the critical areas of City Hall using the existing generator. This strategy kept the costs of the project under budget. Project to be closed
5	Council Chambers Phase 3 of 3	2020	10-430-20090	$ 25,000.00	$ 25,000.00	$ 24,637.70	$ 362.30	Completed within budget.
6	Southworth St Improvements (Multi-Asset) * Note 1 & 2	2020	10-320-20291/ 10-316-20291/ 10-327-20291/	$ 335,000.00	$ 596,250.00	$ 647,423.54	$ (51,173.54)	Warranty period is complete and the project can be closed.
			10-910-20291	$ 460,000.00	$ 460,000.00	$ 411,377.44	$ 48,622.56	Warranty period is complete and the project can be closed.
7	Pre-Approved 2020 Elmwood Playground	2020	10-410-20138	$ 250,000.00	$ 250,000.00	$ 238,450.22	$ 11,549.78	Project Completed within Budget . Account can be closed.
8	Pre-Approved 2020 Cooks Mills Playground	2020	10-410-20139	$ 250,000.00	$ 250,000.00	$ 231,699.55	$ 18,300.45	Project Completed within Budget . Account can be closed.
9	New Waterfront Park Development	2020	10-410-20995	$ 150,000.00	$ 150,000.00	$ 149,933.91	$ 66.09	Project Completed within Budget . Account can be closed.
10	Private side Disconnection (SWAP) Program	2020	10-330-20345	$ 300,000.00	$ 227,730.92	$ 226,924.90	$ 806.02	Expenditures are dependant upon uptake. Applications are complete and account can be closed.
11	Cady St Road & Watermain Replacement (Multi-Asset)	2021	10-320-21767	$ 300,000.00	$ 300,000.00	$ 226,020.29	$ 73,979.71	Warranty period is complete and the project can be closed.

Item	Project Name	Year of Approval	Project #	Capital Approved Budget	Project Funding	Project Expenditures	Net Project Variance	Comments
			10-910-21767	$ 150,000.00	$ 150,000.00	$ 144,087.34	$ 5,912.66	Warranty period is complete and the project can be closed.
12	State St Watermain Replacement (Multi-Asset)	2021	10-320-21777/ 10-316-21777/ 10-327-21777	$ 200,000.00	$ 200,000.00	$ 128,661.41	$ 71,338.59	Warranty period is complete and the project can be closed.
			10-910- 21777/ 10-330-21777	$ 150,000.00	$ 150,000.00	$ 136,710.63	$ 13,289.37	Warranty period is complete and the project can be closed.
13	Canal Trail Improvements	2021	10-447-21500	$ 400,000.00	$ 59,535.00	$ 62,272.53	$ (2,737.53)	Project complete and the account can be closed.
14	Sparrow Meadows Park Ph 1-3	2021	10-410-21402/ 10-410-19131/ 10-410-20131	$ 750,000.00	$ 750,000.00	$ 756,724.45	$ (6,724.45)	Project extract required for mud matt and riprap due to early spring construction, silt fencing, and additional bay of swings, permit fees and concrete footings for pavilion, and tree replacements that were not warrantied.
15	Lincoln / Coventry Area Inflow/Infiltration Reduction Investigation	2021	10-330-21718	$ 150,000.00	$ 120,196.10	$ 118,064.20	$ 2,131.90	Project complete and the account can be closed.
16	Broadway Area Inflow/ Infiltration Reduction Investigation	2021	10-330-21721	$ 150,000.00	$ 97,808.87	$ 51,695.35	$ 46,113.52	Project complete and the account can be closed.
17	Sumbler Road Watermain Replacement	2021	10-910-21771	$ 400,000.00	$ 400,000.00	$ 395,103.26	$ 4,896.74	Warranty period is complete and the project can be closed.
18	Welland River Aqueduct Siphon Cleaning	2022	10-320-22230	$ 1,100,000.00	$ 1,100,000.00	$ 604,854.90	$ 495,145.10	Recent inspections have demonstrated that further cleaning is not warranted. Staff will continue to monitor sediment accumulation. Account can be closed.
19	City Hall HVAC Repair & Renewal	2022	10-439-22467	$ 90,000.00	$ 90,000.00	$ 89,899.39	$ 100.61	Competitive bidding and project planning brought the project in slightly under budget, to be closed
20	Pre-Approved Canadian Tire Accessible Splash Pad	2022	10-410-22412	$ 150,000.00	$ 150,000.00	$ 148,465.00	$ 1,535.00	Project completed as per MOU. Account can be closed.

Item	Project Name	Year of Approval	Project #	Capital Approved Budget	Project Funding	Project Expenditures	Net Project Variance	Comments
21	Condition Related Replacements & Missing Links	2022	10-316-22102	$ 155,000.00	$ 155,168.44	$ 131,095.34	$ 24,073.10	Warranty period is complete and the project can be closed.
22	Private Side Disconnection SWAP Program	2022	10-330-22706	$ 181,600.00	$ 97,987.60	$ 94,986.52	$ 3,001.08	Expenditures are dependant upon uptake. Applications are complete and account can be closed.
23	Sanitary CCTV Program Review	2022	10-330-22703	$ 100,000.00	$ 100,000.00	$ 86,763.62	$ 13,236.38	Project complete and the account can be closed.
24	PCD South I/I Investigation and Reduction	2022	10-330-22745	$ 100,000.00	$ 79,722.40	$ 31,481.58	$ 48,240.82	Project complete and the account can be closed.
25	Lincoln/Empress Area I/I Investigation and Reduction	2022	10-330-22746	$ 100,000.00	$ 106,706.37	$ 77,405.43	$ 29,300.94	Project complete and the account can be closed.
26	Dain/Gordon Area I/I Investigation and Reduction	2022	10-330-22747	$ 100,000.00	$ 104,659.18	$ 95,931.50	$ 8,727.68	Project complete and the account can be closed.
27	Major St Area Wastewater Master Servicing Plan and Renewals Implementation Plan	2022	10-330-22742	$ 150,000.00	$ 143,613.89	$ 143,613.89	$ -	Project complete and the account can be closed.
28	Develop and Inspection & Preventative Maintenance Program	2023	10-430-23460	$ 50,000.00	$ 56,445.25	$ 56,436.10	$ 9.15	Competitive RFP process brought the project in on budget, to be closed
29	Extraction Tools and Stabilization	2023	10-210-23052	$ 175,000.00	$ 175,000.00	$ 171,214.85	$ 3,785.15	group purchasing generated savings, offsetting delivery, testing, and battery chargers costs
30	Crack Sealing	2023	10-320-23151	$ 56,000.00	$ 56,000.00	$ 54,620.69	$ 1,379.31	Warranty period is complete and the project can be closed.
31	Asphalt Patching	2023	10-320-23154	$ 240,000.00	$ 240,000.00	$ 228,582.11	$ 11,417.89	Warranty period is complete and the project can be closed.
32	Traffic Count Study	2023	10-321-23254	$ 30,000.00	$ 30,000.00	$ 30,182.02	$ (182.02)	Project complete and the account can be closed.
33	Sanitary Sewer Spot Repairs	2023	10-330-23707	$ 472,500.00	$ 472,500.00	$ 383,650.77	$ 88,849.23	Warranty period is complete and the project can be closed.
34	Fitch St I/I Investigation and Reduction	2023	10-330-23703	$ 161,987.00	$ 156,410.73	$ 145,480.94	$ 10,929.79	Project complete and the account can be closed.
35	2023-305 Avenue Place Infrastructure Renewals Design	2023	10-330-23747	$ 38,400.00	$ 38,400.00	$ -	$ 38,400.00	Project has been deferred. Account can be closed.

Item	Project Name	Year of Approval	Project #	Capital Approved Budget	Project Funding	Project Expenditures	Net Project Variance	Comments
36	PW Salt Dome	2020-2023	10-430-20091/ 10-444-21466/ 10-444-22465/ 10-444-23455	$ 2,800,000.00	$ 2,799,527.00	$ 2,798,329.05	$ 1,197.95	Competitive RFP process and project planning brought the project in on budget, to be closed
37	General Facilities Maintenance and Renewals	2024	10-430-24451	$ 200,000.00	$ 200,000.00	$ 204,943.35	$ (4,943.35)	Used to deal with emergency and unforeseen repairs and upgrades in 2024. Emergency work resulted in the project going over budget. To be closed
38	Playfield Repair and Renewal	2024	10-412-24488	$ 20,000.00	$ 20,000.00	$ 19,954.34	$ 45.66	Scope completed within budget
39	Fleet Capital Replacement - General * Note 3	2024	10-323-24300	$ 809,151.00	$ 879,569.74	$ 735,758.55	$ 143,811.19	Favorable due to year end clear out incentives and a 10% contingency now reduced to 5% A more expensive tractor was used for budgetary purpose, actual purchase price was lower.
40	Pre-Approved 2024 Fleet Capital Replacement	2024	10-323-24304	$ 1,138,000.00	$ 1,138,000.00	$ 1,073,122.19	$ 64,877.81	Can be closed, all items received. Sweeper negotiation resulted in significant savings.
41	Playground Surface Renewal	2024	10-410-24411	$ 25,000.00	$ 25,000.00	$ 24,906.78	$ 93.22	Project completed and within budget. Account can be closed.
						Total Net Project Variances	**$ 1,292,961.21**	
	Total Net Transfer to/ (from) Economic Development Reserve						**$ 29,850.23**	
	Total Net Transfer to/ (from) Water/ Wastewater Surplus Reserve						**$ 362,458.69**	
	Total Net Transfer to/ (from) Capital Surplus Reserve						**$ 900,652.29**	
						Total Net Project Variances	**$ 1,292,961.21**	

Project Notes:

Note 1- Funding allocation approved through ENG 2021-21- September 7, 2021 -Dain City Foremain Replacement Program Phase 5

Note 2- OCIF allocation reduction in 2021

Note 3- Additional equipment purchase as approved through ENG 2024-09 -April 23, 2024 - Dual -Purpose Equipment Addition- Sidewalk Snow Clearing/Grass Cutting

COUNCIL MEETING

INFRASTRUCTURE SERVICES / ENGINEERING

REPORT ENG-2025-19
July 8, 2025

SUBJECT: **Update to Traffic Bylaw 89-2000**

AUTHOR: **Muhammad Ali Khan, P.Eng.**
Manager Transportation Engineering

APPROVER: **Sherri-Marie Millar, P.Eng.**
Director of Infrastructure Services/City Engineer

RECOMMENDATION:

THAT Council approves REPORT ENG-2025-19 Update to Traffic By-law 89-2000 Schedule "XXVII"; and further

THAT Council directs the City Clerk to amend By-law 89-2000 Schedule "XXVII" as outlined in APPENDIX B.

RELATIONSHIP TO STRATEGIC PLAN:

This recommendation is aligned to Council's strategic priority of ensuring "**Health and Wellbeing**" to promote personal health and well-being by offering an abundance of activities that meet the diverse needs and interests all while, advocating for improved health care throughout the city, and supporting the need for safety and security.

EXECUTIVE SUMMARY:

Amendments to the Highway Traffic Act (HTA) enacted in May 2017 grant municipalities the authority to establish speed limits below 50 km/h.

Further to a recommendation within the 2025 Transportation Master Plan, Council approved funding for the installation of 40 km/h signage on local and minor collector roads. A total of 644 signs will be installed, with completion targeted for October 30, 2025.

The Traffic By-law 89-2000 must be updated to reflect the revised speed limits.

BACKGROUND:

The implementation of a citywide 40 km/h speed limit on local and minor collector roadways was recommended in the Council-endorsed Transportation Master Plan. Council subsequently approved capital funding during the 2025 budget process to support the installation of the necessary signage.

DISCUSSION:

Amendments to the Highway Traffic Act in 2017 allow municipalities to establish designated speed limit areas using gateway signage, thereby eliminating the need for signage on each individual street within the area.

In accordance with this authority, a total of 644 speed limit signs will be installed along local and minor collector roadways. Installation is expected to be completed by October 30, 2025. A sample image of the proposed speed signage is included in Appendix A.

As part of the proposed speed limit bylaw updates, several arterial and major collector roads including Hellems Avenue, Forks Road, and Wellington Street are being removed from the schedule, as they will now fall under the provincial default speed limit of 50 km/h unless otherwise signed. Additionally, Aqueduct Street, currently signed as 40 km/h only "when flashing", will have the flashing condition removed and be designated as a permanent 40 km/h zone.

To enable enforcement, Schedule XXVII of the Traffic By-law 89-2000 must be amended to reflect these speed limit changes as seen in Appendix B.

FINANCIAL:

Council approved $218,000 in capital funding in the 2025 budget for the installation of 40 km/h signage. The lowest bid received through the procurement process is $164,150, which is within the approved budget.

ATTACHMENT:

Appendix A - Example of new 40km/hr area speed sign
Appendix B - By-law 89-2000 Schedule “XXVII” – Speed Limit Schedule

APPENDIX A

40Km Area Signs





SPEED LIMITS ON HIGHWAYS

Schedule "XXVII"

COLUMN 1 HIGHWAY	COLUMN 2		COLUMN 3 MAXIMUM SPEED (KM/HR)
	FROM	TO	
THE FOLLOWING TO BE ADDED			
Abbey Road	Throughout		40
Abbott Road	Throughout		40
Acadia Court	Throughout		40
Acadia Drive	Throughout		40
Achilles Avenue	Throughout		40
Adah Court	Throughout		40
Admiral Road	Throughout		40
Afton Avenue	Throughout		40
Ajax Avenue	Throughout		40
Alan Avenue	Throughout		40
Albert Street	Throughout		40
Alberta Street	Throughout		40
Albina Street	Throughout		40
Alexander Street	Throughout		40
Almond Street	Throughout		40
Alyson Court	Throughout		40
Amelia Lane	Throughout		40
Andora Court	Throughout		40
Ann Street	Throughout		40
Apple Court	Throughout		40
Aquador Drive	Throughout		40
Aqueduct Street	Throughout		40
Argyle Court	Throughout		40
Armour Drive	Throughout		40
Arthur Street	Throughout		40
Ascot Court	Throughout		40
Ash Court	Throughout		40
Asher Street	Throughout		40
Aspen Court	Throughout		40
Auburn Court	Throughout		40
Austin Drive	Throughout		40
Autumn Crescent	Throughout		40
Avenue Place	Throughout		40
Aviron Crescent	Throughout		40
Avon Street	Throughout		40
Bald Street	Throughout		40
Balmoral Avenue	Throughout		40
Balsam Street	Throughout		40
Barber Street	Throughout		40
Barrington Drive	Throughout		40

Barron Street	Throughout		40
Bateau Street	Throughout		40
Bay Avenue	Throughout		40
Beatrice Street	Throughout		40
Beatty Avenue	Throughout		40
Becken Crescent	Throughout		40
Beechwood Avenue	Throughout		40
Bellevue Court	Throughout		40
Belmont Street	Throughout		40
Bentgrass Drive	Throughout		40
Bethune Avenue	Throughout		40
Betts Street	Throughout		40
Beverly Crescent	Throughout		40
Birch Street	Throughout		40
Birchmount Avenue	Throughout		40
Bishop Road	Throughout		40
Blossom Drive	Throughout		40
Bosnich Avenue	Throughout		40
Braden Avenue	Throughout		40
Bradley Avenue	Throughout		40
Brant Avenue	Throughout		40
Briarfield Crescent	Throughout		40
Briarsdale Crescent	Throughout		40
Bridgewater Court	Throughout		40
Bridlewood Drive	Throughout		40
Britannia Avenue	Throughout		40
Brookhaven Court	Throughout		40
Brownleigh Avenue	Throughout		40
Bruce Street	Throughout		40
Bryon Crescent	Throughout		40
Burgar Street	Throughout		40
Burton Lane	Throughout		40
Cabot Street	Throughout		40
Cady Street	Throughout		40
Caithness Drive	Throughout		40
Calais Street	Throughout		40
Calista Drive	Throughout		40
Calla Terrace	Throughout		40
Cameron Avenue	Throughout		40
Camrose Avenue	Throughout		40
Canal Bank Street	Highway 58	Southerly Limit	40
Canora Court	Throughout		40
Canvas Crescent	Throughout		40
Cardinal Crescent	Throughout		40
Carlisle Drive	Throughout		40
Carlton Avenue	Throughout		40
Caroline Street	Throughout		40
Carrol Street	Throughout		40
Cartier Court	Throughout		40
Castlefield Court	Throughout		40
Catharine Street	Throughout		40
Cedar Park Drive	Throughout		40
Cedar Street	Throughout		40
Cedarvale Crescent	Throughout		40
Centennial Drive	Throughout		40

Centre Street	Throughout		40
Chaffey Street	Throughout		40
Champlain Avenue	Throughout		40
Chantal Court	Throughout		40
Chantler Road	Throughout		40
Chapel Hill Crescent	Throughout		40
Charles Avenue	Throughout		40
Charlotte Court	Throughout		40
Chelsea Crescent	Throughout		40
Chippawa Street	Throughout		40
Christina Court	Throughout		40
Church Street	Throughout		40
Churchill Avenue	Throughout		40
Claremount Circle	Throughout		40
Classic Avenue	Throughout		40
Clifford Avenue	Throughout		40
Cohoe Street	Throughout		40
Cola Street	Throughout		40
Colbeck Drive	Throughout		40
College Park Drive	Throughout		40
Colonial Street	Throughout		40
Commando Street	Throughout		40
Commercial Street	Throughout		40
Connaught Avenue	Throughout		40
Cooper Road	Throughout		40
Cope Road	Throughout		40
Corvette Street	Throughout		40
Cottonwood Crescent	Throughout		40
Countryside Drive	Throughout		40
Coupland Court	Throughout		40
Court House Lane	Throughout		40
Courtney Crescent	Throughout		40
Coventry Road	Throughout		40
Coyle Court	Throughout		40
Cozy Street	Throughout		40
Cranbrook Crescent	Throughout		40
Creekside Drive	Throughout		40
Crerar Avenue	Throughout		40
Crescent Drive	Throughout		40
Crew Street	Throughout		40
Crewing Drive	Throughout		40
Cross Street	Throughout		40
Crow Street	Throughout		40
Crowther Avenue	Throughout		40
Cummington Place	Throughout		40
Cutress Avenue	Throughout		40
Dain Avenue	Throughout		40
Daisy Street	Throughout		40
Dana Drive	Throughout		40
Danforth Avenue	Throughout		40
Darte Drive	Throughout		40
Dauphine Crescent	Throughout		40
Dauphine Place	Throughout		40
David Street	Throughout		40
Days Avenue	Throughout		40

Deere Street	Throughout		40
Denistoun Street	West Main Street	Northerly Limit	40
Devon Street	Throughout		40
Dexter Drive	Throughout		40
Dieppe Street	Throughout		40
Diffin Drive	Throughout		40
Dixon Crescent	Throughout		40
Donald Avenue	Throughout		40
Donna Marie Drive	Throughout		40
Dorothy Street	Throughout		40
Dougherty Crescent	Throughout		40
Douglas Avenue	Throughout		40
Dover Court	Throughout		40
Dover Road	Throughout		40
Downriver Drive	Throughout		40
Downs Drive	Throughout		40
Draper's Street	Throughout		40
Drew Street	Throughout		40
Dufferin Street	Throughout		40
Duncan Street	Throughout		40
Dunkirk Court	Throughout		40
Dunkirk Road	Throughout		40
Eastbridge Avenue	Throughout		40
Eastdale Crescent	Throughout		40
Eastwood Drive	Throughout		40
Edgar Street	Throughout		40
Edgewood Avenue	Throughout		40
Edward Street	Throughout		40
Elgin Street	Throughout		40
Elizabeth Street	Throughout		40
Elmview Street	Throughout		40
Elmwood Avenue	Throughout		40
Empire Street	Throughout		40
Empress Avenue	Throughout		40
Endicott Terrace	Throughout		40
Erie Street	Throughout		40
Erin Crescent	Throughout		40
Evan Street	Throughout		40
Exeter Avenue	Throughout		40
Fairlawn Crescent	Throughout		40
Falcon Drive	Throughout		40
Farnham Avenue	Throughout		40
Feather Road	Throughout		40
Fell Street	Throughout		40
Fernwood Terrace	Throughout		40
Fifth Street	Throughout		40
Fin Street	Throughout		40
First Avenue	A point 150 metres south of Cedar Park Drive	Quaker Road	40
First Street	Throughout		40
Fitch Street	Prince Charles Drive	First Avenue	40
Fleet Street	Throughout		40
Forest Ridge Court	Throughout		40
Forest Road	Throughout		40

Forster Avenue	Throughout		40
Foss Road	Throughout		40
Fourth Street	Throughout		40
Foxtail Avenue	Throughout		40
Franklin Street	Throughout		40
Frazer Street	Throughout		40
Gadsby Avenue	Throughout		40
Gaiser Road	Throughout		40
Galloway Trail	Throughout		40
Ganton Trail	Throughout		40
Garner Avenue	Throughout		40
Garon Avenue	Throughout		40
Gate Street	Throughout		40
Gatfield Avenue	Throughout		40
Gladys Avenue	Throughout		40
Glen Park Court	Throughout		40
Glen Park Drive	Throughout		40
Glen View	Throughout		40
Glenayr Place	Throughout		40
Glendale Drive	Throughout		40
Glenwood Parkway	Throughout		40
Golden Boulevard East	Throughout		40
Golden Boulevard West	Throughout		40
Goodwillie Drive	Throughout		40
Gordon Street	Throughout		40
Gould Road	Throughout		40
Gram Avenue	Throughout		40
Grange Avenue	Throughout		40
Grassy Brook Road	Throughout		40
Graystone Crescent	Throughout		40
Green Meadow Crescent	Throughout		40
Green Pointe Drive	Throughout		40
Greenbriar Court	Throughout		40
Greenwood Avenue	Throughout		40
Gretel Place	Throughout		40
Griffith Street	Throughout		40
Gross Avenue	Throughout		40
Grove Street	Throughout		40
Guest Road	Throughout		40
Gunnel Road	Throughout		40
Hagar Street	Throughout		40
Hampton Court	Throughout		40
Hansler Road	Throughout		40
Harcourt Lane	Throughout		40
Harold Avenue	Throughout		40
Harriet Street	Throughout		40
Harrison Avenue	Throughout		40
Harvard Court	Throughout		40
Harvest Oak Drive	Throughout		40
Hatter Avenue	Throughout		40
Haun Road	Throughout		40
Heather Court	Throughout		40
Hendershot Avenue	Throughout		40
Henley Court	Throughout		40
Hennepin Avenue	Throughout		40

Heritage Lane	Throughout		40
Heron Street	Throughout		40
Hester Lane	Throughout		40
Hickory Court	Throughout		40
Highland Gardens	Throughout		40
Highriver Trail	Throughout		40
Hilda Street	Throughout		40
Hildred Street	Throughout		40
Hill Street	Throughout		40
Hillsdale Road	Throughout		40
Hobson Avenue	Throughout		40
Home Street	Throughout		40
Hooker Street	Throughout		40
Hughes Avenue	Throughout		40
Humberstone Road	Throughout		40
Hunter Drive	Throughout		40
Huntington Circle	Throughout		40
Huron Street	Throughout		40
Idylwood Road	Throughout		40
Iron Street	Throughout		40
Iva Street	Throughout		40
Jackson Court East	Throughout		40
Jackson Court West	Throughout		40
James Street	Throughout		40
Jefferson Court East	Throughout		40
Jefferson Court West	Throughout		40
Jennifer Court	Throughout		40
Joanne Court	Throughout		40
John Street	Throughout		40
Jones Lane	Throughout		40
Joshua Court	Throughout		40
Joyce Avenue	Throughout		40
Julia Drive	Throughout		40
Junction Trail	Throughout		40
Juniper Trail	Throughout		40
Justina Court	Throughout		40
Karen Crescent	Throughout		40
Kaywood Court	Throughout		40
Keelson Street	Throughout		40
Kennedy Street	Throughout		40
Kensington Street	Throughout		40
Kent Street	Throughout		40
Keystone Trail	Throughout		40
Kilgour Avenue	Throughout		40
Kingsway	Throughout		40
Kingswood Crescent	Throughout		40
Kline's Avenue	Throughout		40
Lacy Avenue	Throughout		40
Lamont Drive	Throughout		40
Lancaster Drive	Throughout		40
Laporte Boulevard	Throughout		40
Larchwood Circle	Throughout		40
Larraine Street	Throughout		40
LaSalle Street	Throughout		40
Laugher Avenue	Throughout		40

Laughlin Avenue	Throughout		40
Laughlin Place	Throughout		40
Laurent Avenue	Throughout		40
Laval Avenue	Throughout		40
Lea Crescent	Throughout		40
Leaside Drive	Throughout		40
Leonard Avenue	Throughout		40
Lewis Street	Throughout		40
Lillias Street	Throughout		40
Lincoln Street	Wellington Street	Easterly Limit	40
Lindel Crescent	Throughout		40
Line Avenue	Throughout		40
Linrose Avenue	Throughout		40
Linwood Drive	Throughout		40
Lisa Court	Throughout		40
Little John Court	Throughout		40
Lloyd Avenue	Throughout		40
Lock Street	Throughout		40
Locust Street	Throughout		40
Louise Street	Throughout		40
Loyalist Drive	Throughout		40
Lynbrook Lane	Throughout		40
Lyons Avenue	Throughout		40
Lyons Creek Road	Throughout		40
Lyons Creek Road exit to Doans Ridge Road	Throughout		40
MacInnis Street	Throughout		40
MacKenzie Drive	Throughout		40
MacLean Place	Throughout		40
Macoomb Drive	Throughout		40
Madison Court East	Throughout		40
Madison Court West	Throughout		40
Magnolia Lane	Throughout		40
Major Street	Throughout		40
Memorial Park Drive	Throughout		40
Manor Road	Throughout		40
Maple Avenue	Throughout		40
Maplepark Drive	Throughout		40
Maplewood Crescent	Throughout		40
Marc Boulevard	Throughout		40
Marc Court	Throughout		40
Margaret Street	Throughout		40
Margery Road	Throughout		40
Maria Street	Throughout		40
Marigold Street	Throughout		40
Marina Place	Throughout		40
Marshall Avenue	Throughout		40
Martha Court	Throughout		40
Martin Street	Throughout		40
Mary Street	Throughout		40
Mason Court	Throughout		40
Masters Street	Throughout		40
Matthews Road	Throughout		40
Maureen Avenue	Throughout		40
Mayfair Drive	Throughout		40
McAlpine Avenue	Throughout		40

McArthur Avenue	Throughout		40
McCabe Avenue	Throughout		40
McColl Drive	Throughout		40
McCormick Street	Throughout		40
McCrae Drive	Throughout		40
McGill Street	Throughout		40
McLaughlin Street	Throughout		40
McMaster Avenue	Throughout		40
McNab Drive	Throughout		40
McNaughton Road	Throughout		40
Meadowvale Place	Throughout		40
Melissa Crescent	Throughout		40
Melrosi Drive	Throughout		40
Merritt Street	Throughout		40
Michael Drive	Throughout		40
Michelle Court	Throughout		40
Michigan Street	Throughout		40
Midland Place	Throughout		40
Mill Street	Throughout		40
Miranda Court	Throughout		40
Monarch Street	Throughout		40
Montgomery Road	Throughout		40
Montrose Trail	Throughout		40
Moore Road	Throughout		40
Morningstar Avenue	Throughout		40
Morwood Avenue	Throughout		40
Municipal Street	Throughout		40
Murdock Road	Throughout		40
Myrtle Avenue	Throughout		40
Nathalie Court	Throughout		40
Navy Street	Throughout		40
Nelles Court	Throughout		40
Nelles Road	Throughout		40
Netherby Road	Throughout		40
Newleaf Crescent	Throughout		40
Niagara College Boulevard	Throughout		40
Nidel's Crescent	Throughout		40
Nightingale Place	Throughout		40
North Crescent Drive	Throughout		40
North Road	Throughout		40
North Valley Drive	Throughout		40
Northcote Avenue	Throughout		40
Northgate Drive	Throughout		40
Northhaven Road	Throughout		40
Northwood Drive	Throughout		40
Norway Avenue	Throughout		40
Nottingham Court	Throughout		40
Nova Crescent	Throughout		40
Nugent Road	Throughout		40
Nye Avenue	Throughout		40
Oak Court	Throughout		40
Oak Street	Throughout		40
Oakcrest Avenue	Throughout		40
Oakland Avenue	Throughout		40
Oakmount Road	Throughout		40

Old School Trail	Throughout		40
Orchard Avenue	Throughout		40
Oxford Road	Throughout		40
Page Drive	Throughout		40
Park Street	Throughout		40
Parkdale Place	Throughout		40
Parkside Street	Throughout		40
Parkview Crescent	Throughout		40
Parkway	Throughout		40
Patricia Avenue	Throughout		40
Patsy Avenue	Throughout		40
Patterson Avenue	Throughout		40
Paul Street	Throughout		40
Pearson Road	Throughout		40
Pelham Street	Throughout		40
Penrose Road	Throughout		40
Perenack Avenue	Throughout		40
Pietz Avenue	Throughout		40
Pietz Road	Throughout		40
Pine Street	Throughout		40
Pinehurst Drive	Throughout		40
Pinoak Court	Throughout		40
Plazaway	Throughout		40
Pogie Drive	Throughout		40
Poplar Crescent	Throughout		40
Port Crescent	Throughout		40
Portage Trail	Throughout		40
Preston Place	Throughout		40
Price Avenue	Throughout		40
Princess Street	Throughout		40
Promenade Richelieu	Throughout		40
Provincial Street	Throughout		40
Quebec Avenue	Throughout		40
Queen Street	Throughout		40
Railroad Avenue	Throughout		40
Rainbow Court	Throughout		40
Randolph Street	Throughout		40
Raymond Street	Throughout		40
Reaker Road	Throughout		40
Redwood Court	Throughout		40
Regatta Drive	Throughout		40
Regent Place	Throughout		40
Regent Street	Throughout		40
Riceholme Place	Throughout		40
Rices Lane	Throughout		40
Richmond Street	Throughout		40
Ridgewood Drive	Throughout		40
Ridley Avenue	Throughout		40
Ring Road	Throughout		40
Rita Street	Throughout		40
River Road	Woodlawn Road	East Main Stret	40
Riverbank Street	Throughout		40
Riverview Drive	Throughout		40
Roach Avenue	Throughout		40
Robert Street	Throughout		40

Robin Hood Lane	Throughout		40
Roger Drive	Throughout		40
Rolling Acres Drive	Throughout		40
Rollins Drive	Throughout		40
Roosevelt Avenue	Throughout		40
Rose Avenue	Throughout		40
Rosedale Place	Throughout		40
Roselawn Crescent	Throughout		40
Rosemount Circle	Throughout		40
Rosemount Drive	Throughout		40
Rosewood Avenue	Throughout		40
Ross Street	Throughout		40
Rowlock Street	Throughout		40
Royal Oak Drive	Throughout		40
Rudder Road	Throughout		40
Rusholme Road	Throughout		40
Sager Avenue	Throughout		40
Santone Avenue	Throughout		40
Sauer Avenue	Throughout		40
Sayles Avenue	Throughout		40
Schneider Avenue	Throughout		40
Scholfield Avenue	Throughout		40
Seaway Drive	Throughout		40
Second Street	Throughout		40
Seeley Street	Throughout		40
Semley Avenue	Throughout		40
Seneca Trail	Throughout		40
Seventh Street	Throughout		40
Sharon Avenue	Throughout		40
Sharpe Avenue	Throughout		40
Sherwood Forest Trail	Throughout		40
Shipview Court	Throughout		40
Shoreview Drive	Throughout		40
Shotwell Street	Throughout		40
Silvan Court	Throughout		40
Silvan Drive	Throughout		40
Silverstar Court	Throughout		40
Silverthorn Court	Throughout		40
Silverthorn Street	Throughout		40
Silverwood Avenue	Throughout		40
Simcoe Street	Throughout		40
Simpson Avenue	Throughout		40
Sixth Street	Throughout		40
Skulling Drive	Throughout		40
Skying Street	Throughout		40
Smith Street	Throughout		40
Somerville Avenue	Throughout		40
Sorel Crescent	Throughout		40
Southgate Street	Throughout		40
Southworth Street	Throughout		50
Sparrow Drive	Throughout		40
Spencer Street	Throughout		40
Springfield Street	Throughout		40
Springhead Gardens	Throughout		40
Spruce Crescent	Throughout		40

St. Andrews Avenue	Throughout		40
St. Augustine Avenue	Throughout		40
St. Clair Drive	Throughout		40
St. George Street	Throughout		40
St. Lawrence Drive	Throughout		40
Stanley Street	Throughout		40
Starboard Crescent	Throughout		40
State Street	Throughout		40
Station Street	Throughout		40
Stauth Road	Throughout		40
Steel Street	Throughout		40
Stefanie Crescent	Throughout		40
Stern Drive	Throughout		40
Steven Street	Throughout		40
Stoneybrook Crescent	Throughout		40
Stormm Court	Throughout		40
Strata	Throughout		40
Strathmore Crescent	Throughout		40
Strawn Road	Throughout		40
Sumbler Road	Throughout		40
Summerlea Avenue	Throughout		40
Summit Avenue	Throughout		40
Summit Circle	Throughout		40
Sunflower Place	Throughout		40
Superior Street	Throughout		40
Surrey Place	Throughout		40
Susan Street	Throughout		40
Sutherland Avenue	Throughout		40
Sutherland Place	Throughout		40
Sycamore Street	Throughout		40
Sydney Place	Throughout		40
Talbot Avenue	Throughout		40
Taliesin Trail	Throughout		40
Tamarack Street	Throughout		40
Tanguay Avenue	Throughout		40
Terrace Avenue	Throughout		40
The Boardwalk	Throughout		40
Third Street	Throughout		40
Thomas Street	Throughout		40
Thomson Road	Throughout		40
Thornton Avenue	Throughout		40
Timberview Crescent	Throughout		40
Topham Boulevard	Throughout		40
Towpath Road	Throughout		40
Trailwood Drive	Throughout		40
Trelawn Parkway	Throughout		40
Trent Avenue	Throughout		40
Trillium Avenue	Throughout		40
Trufal Avenue	Throughout		40
Tulip Street	Throughout		40
Tumblewood Place	Throughout		40
Udine Avenue	Throughout		40
University Lane	Throughout		40
Valencourt Drive	Throughout		40
Valerie Court	Throughout		40

Vanier Drive	Throughout		40
Vanjo Drive	Throughout		40
Varsity Drive	Throughout		40
Vaughan Road	Throughout		40
Vega Court	Throughout		40
Verne Avenue	Throughout		40
Vernon Street	Throughout		40
Victoria Street	Throughout		40
Victory Avenue	Throughout		40
Viger Drive	Throughout		40
Village Court	Throughout		40
Virginia Street	Throughout		40
Wade Street	Throughout		40
Wallace Avenue	Throughout		40
Walnut Street	Throughout		40
Walts Street	Throughout		40
Waterleaf Trail	Throughout		40
Waterview Court	Throughout		40
Watt Avenue	Throughout		40
Wavell Court	Throughout		40
Welland Street	Throughout		40
Wellandvale Drive	Throughout		40
Wellbrook Boulevard	Throughout		40
Weller Avenue	Throughout		40
West Creek Court	Throughout		40
Westbridge Avenue	Throughout		40
Westcott Road	Throughout		40
Westdale Drive	Throughout		40
Westmount Crescent	Throughout		40
Westwood Crescent	Throughout		40
White Avenue	Throughout		40
Whiteoak Crescent	Throughout		40
Wilkes Drive	Throughout		40
Willoughby Court	Throughout		40
Willow Court	Throughout		40
Willow Street	Throughout		40
Willowbrook Drive	Throughout		40
Willowlanding Court	Throughout		40
Willson Road	Throughout		40
Willsonway	Throughout		40
Wilton Avenue	Throughout		40
Wiltshire Boulevard	Throughout		40
Windermere Court	Throughout		40
Windsor Street	Throughout		40
Winter Drive	Throughout		40
Woodbine Avenue	Throughout		40
Woodcroft Crescent	Throughout		40
Woodgate Drive	Throughout		40
Woodington Place	Throughout		40
Woodland Drive	Throughout		40
Woodrush Avenue	Throughout		40
Woodside Avenue	Throughout		40
Wrangler Road	Throughout		40
Wright Street	Throughout		40
Wychwood Road	Throughout		40

York Street	Throughout		40
Zimmer Lane	Throughout		40

THE FOLLOWING TO BE DELETED

Aqueduct Street	Thorold Road	Pine Street	40 when flashing
Hellems Avenue	Division Street Niagara Road #527	Lincoln Street Niagara Road #29	40
Forks Road	220 metres west of elm Street	366 metres east of Elm Stret	60
Wellington Street	Promenade Richelieu	Lincoln Street	40
Wellington Street	East Main Street	Lincoln Street	40

COUNCIL MEETING

COMMUNITY SERVICES DEPARTMENT

FACILITIES DIVISION

REPORT CS-2025-26
July 8, 2025

SUBJECT: **Civic Square Revitalization Detailed Design RFP Award**

AUTHOR: **Frank Pearson, B. Tech – Arch. Sci.**
Manager of Facilities, Operations and Development

APPROVER: **Jessica Ruddell, M.P.A., M.B.A., B.S.**
Director of Community Services

RECOMMENDATION:

THAT Council receive REPORT CS-2025-26 for information; and

THAT Council award to The MBTW Group Inc. for the provision of the Design, Consulting, Tendering and Contract Administrations Services for the Civic Square Plaza Revitalization.

RELATIONSHIP TO STRATEGIC PLAN:

This recommendation is aligned with Council's strategic priority of ensuring "**Liveability**" by creating a sense of belonging while enhancing mobility by improving access to recreation and community events, ensuring adequate housing options, encouraging job growth, and improving ways to efficiently move people throughout the city.

EXECUTIVE SUMMARY:

The purpose of this report is to award RFP25-09 Detailed Design for City of Welland Civic Square Revitalization to The MBTW Group Inc. As per the City of Welland Purchasing Policy, professional services over the amount of $150,000 must be approved by Council. The MBTW Group Inc. is the highest-scoring proponent through a competitive RFP process. Approval will ensure a timely completion of the detailed design for the project.

BACKGROUND:

Civic Square, which should be a vibrant focal point of downtown Welland, has aged significantly and no longer meets the functional, aesthetic, safety, or

accessibility expectations of a modern public space. Originally constructed in 2005, Civic Square has experienced considerable wear and tear since construction and its outdated infrastructure and limited amenities do not support contemporary programming or community use. Issues such as deteriorating hardscaping, insufficient lighting, barriers to accessibility, and health and safety concerns have been noted by staff, residents, and user groups.

Through report CS-2022-03 – Civic Square Final Design (Appendix 1), Council approved the final concept design presented by Adesso Design Inc. The next step of the process is to create working construction drawings from the concepts that are ready for tender and construction. The successful consultant will use the approved concept design and prepare a comprehensive, detailed design package that is tender and construction ready.

This design will guide future capital investment decisions, support accurate costing, and serve as the foundation for phased construction planning. Approval of the detailed design by Council is necessary to initiate the revitalization of the Welland Civic Square.

DISCUSSION:

The City of Welland issued RFP25-09 Detailed Design for City of Welland Civic Square Revitalization competitively on Biddingo on April 9, 2025. The proposal closed on May 14, 2025, and the City of Welland received three compliant proposal submissions:

Bidder	Scoring
1. The MBTW Group Inc.	1st
2. Adesso Design Inc.	2nd
3. GSP Group	3rd

Staff from Community Services evaluated the compliant proposals based on requirements, project understanding, methodology, work plan, experience, and price. Based on these criteria, staff recommend The MBTW Group Inc. for approval.

FINANCIAL:

As noted above, The MBTW Group Inc. is the highest-scoring proponent and is recommended for the award.

Vendor Name	**Total Cost (pre-tax)**	**Inclusive of City Tax**
The MBTW Group Inc. – Base Bid	$ 149,485.00	$ 152,115.94
Provision Costs – Design concepts for the side and back areas of City Hall	$ 19,540.00	$ 19,883.90
TOTAL	**$ 169,025.00**	**$ 171,999.84**

The design of the side and back of City Hall was included in the RFP as a provisional item due to the similar condition of the existing infrastructure and the opportunity to address several key goals: improving flow and connectivity, creating a unified visual identity, making efficient use of space, enhancing user experience, integrating environmental considerations, increasing design flexibility, and establishing a stronger spatial hierarchy. Since this provisional work is within budget, it will be included in the project scope due to its cost-effectiveness, operational efficiency, and the design benefits it offers the City.

Funding for the detailed design will be provided through the Capital Project, as detailed below:

Capital Project	**Funding Available**
10-439-25460 - Civic Square Plaza Revitalization	$ 175,000.00

ATTACHMENT:

Appendix 1 – CS-2022-03 Civic Square Final Design

APPROVALS	
DIRECTOR	
CFO	
CAO	

GENERAL COMMITTEE

COMMUNITY SERVICES DEPARTMENT

FACILITIES DIVISION

REPORT CS 2022-03
FEBRUARY 8, 2022

SUBJECT: **CIVIC SQUARE – FINAL DESIGN**

AUTHORS: **FRANK PEARSON, MANAGER OF FACILITY OPERATIONS & DEVELOPMENT (ACTING)**

APPROVING DIRECTOR: **ROB AXIAK, DIRECTOR OF COMMUNITY SERVICES**

RECOMMENDATION:

THAT THE COUNCIL OF THE CITY OF WELLAND approve the final design of Civic Square presented in Report CS-2022-03 and related Appendix A, and to authorize staff to proceed with detailed design, costing, and the subsequent issuance of a tender.

BACKGROUND:

In the Fall of 2021, staff brought forward various design concepts for Civic Square to be discussed with council. Council provided staff with several ideas, suggestions, and recommendations to further refine the design. Below is a summary of the common comments heard by council:

Design Considerations from Committee Meeting (September 21st, 2021 R&C-2021-17):

- Consider fountain or feature to draw families into the space
- Focus on lighting and shade areas
- Create design opportunities with the Bridge and Courthouse
- Flexible but defined space to allow for various uses
- Purposeful and vibrant space for enjoyment
- Stage area for civic engagement and performances
- More open space for better opportunities to host events
- Consider four season use
- Consider the removal of a café / facility from this design citing view concerns and added competition in the downtown for another food establishment.

It should also be noted that some members of council were also interested in a basic design model, with only basic repairs to some of the notable areas of concern as opposed to a total redesign of the space. As these suggestions did not capture that majority of comments provided, a basic plan was not designed or costed at this time.

Civic Square should be a place where the community can come together for civic pride and recreation. Essentially, this project is introducing an urban park into the downtown as a key feature to help rejuvenate the downtown core. When completing the preliminary design and costing for this project, the design principles noted below were used to help guide the overall design. This includes 'defining the purpose' of the space.

Design Guiding Principles:

- To create a public space for civic engagement and social gathering
- To create a comfortable urban park plaza where people want to spend time
- Space should allow for animation, entertainment and civic engagement including a stage area, and temporary seating configurations
- A flexible, yet defined and purposefully vibrant space
- 4-season use
- Inclusion of public art potential and beautification of space
- Features and amenities to draw families into the space
- Safety and Security including lighting, open spaces, and roadway safety
- Focus on lighting and making a connection to the East Main Street Bridge and Court House
- Ensure ease of access and accessibility

As identified in section 4.3.2 of the council approved, Parks, Recreation & Culture Master Plan, 2019, an opportunity to further enhance civic square for better community use and animation was noted in the parks section of the master plan.

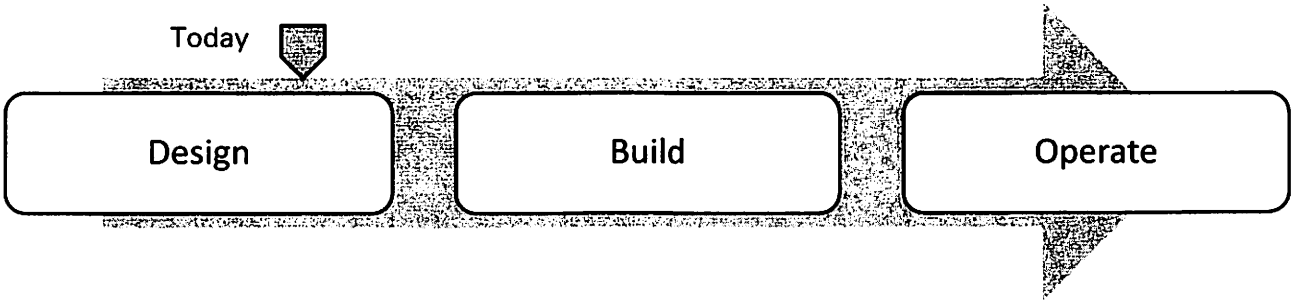
Civic Square Revitalization

"The City's vision to revitalize Civic Square (City Hall) includes a gathering space for many of Welland's special events such as movie nights, outdoor skating, Santa Claus Parade, and more. Revitalizing Civic Square can improve overall quality of life through "placemaking", which is the concept of reimagining and reinventing public spaces as the heart of the community. The vision for revitalizing Civic Square centres on improving pedestrian environments including enhancing signage, seating, lighting, and shade."

COMMENTS AND ANALYSIS:

The proposed design has been created and is shown in Appendix A of this report. Staff sought feedback from various stakeholders, including city council within the approved guiding principles noted above. The design before council as part of this report represents the collection of all feedback received to date in anticipation of finalizing a design that meets the needs of the majority, allowing staff to proceed into the next phase of detail design and costing. As shown in the diagram below, this project is in the preliminary

design and costing stage, should this design be approved by council, completing the detailed design and costing would occur, allowing staff to proceed to the tender process.



Recommended Design:

Shown in Appendix A, each drawing is unique and aligns with the design principles highlighted in this report. The proposed concept creates more socialization nodes which allows people to come together naturally. This concept also allows for more opportunities to animate the space through the potential of small performances, viewing movies or sporting events, or live music. Lastly, flexible seating configuration also allows for a grander area for city announcements, proclamations, and civic engagement. Various uses and flexibility of the space was key to this final design. The deletion of the potential café facility allowed for greater attention to be placed on functional and usable amenities such as the stage area and water feature. Seating area under natural shade, enhanced lighting and feature portable fire tables were also introduced to support year-round use.

Staff believe that this concept best aligns with the design principles noted in this report and reflects the vision of the overall use of this unique space. This design concept reimagines and reinvents this public space as the heart of the community.

Proposed Timelines:

Following the approval of the proposed conceptual design, adesso design inc. would commence the process of detailed design development, working drawings, specification creation, value engineering, costing and a subsequent tender. A tender award report would be brought to council prior to award. This process will take the remainder of 2022 to complete, with a proposed construction start date of early Q2 of 2023.

FINANCIAL CONSIDERATIONS:

Presently, there is a capital project with approved funding - Civic Square Plaza Revitalization - 10-439-18044. This account is used to support the soft costs which includes the design and administration costs for this project. The balance of funding is stated below and will be utilized for detailed design.

Account Title	Funds Available / Allotted	Funds Used to Date	Balance Available
Civic Square Design	$150,000	$45,767	$104,233

The estimated total project cost prepared by the design consultant *'Adesso Design Inc, Landscape Architecture'* is **$1,212,250.00 +HST** which includes a 30% contingency, site furnishings, site servicing, lighting, and the potential for public art. The funding source for the construction portion of this project has been earmarked in the Strategic Initiatives Capital account, 10-710-17095. Adesso Design Inc will continue with this project's deliverables and act as a consultant between the city and contractor once a tender award is approved. Adesso has been exceptional throughout this process, listening to input from all and creating a high-quality urban park design in Welland's downtown core.

CONCLUSION

This project is an exciting opportunity for the city and the downtown with the introduction of the city's first urban park. This type of investment into the downtown core will create a new vision for the space and attract a variety of uses and animation. This location will truly become the heart of the city. Should council approve this report, staff will proceed into detail design and subsequent costing and tender. An exciting opportunity exists to bring vision into reality with this unique project, and fulfill a direction put forth as part of the council approved 2019 Parks, Recreation & Culture Master Plan for civic square.

ATTACHMENTS:

Appendix A – Final Design Overview Presentation

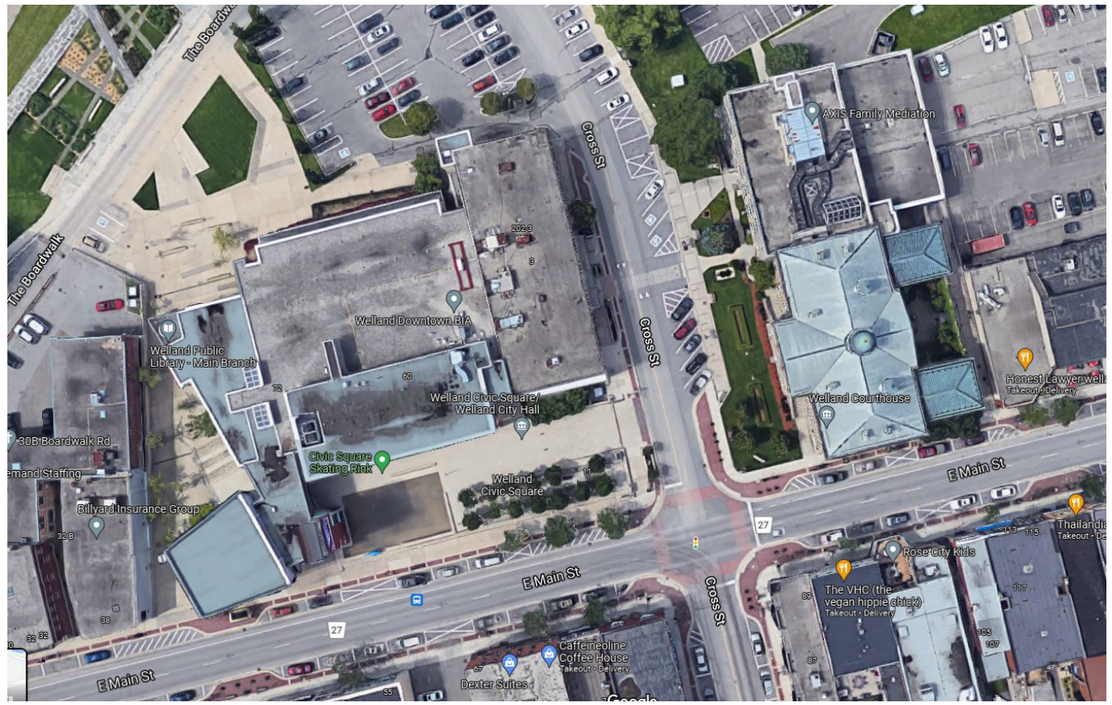
Welland Civic Square

Final Concept February 1st, 2022

adesso design inc
landscape architecture

Precedent Imagery

Welland Civic Square



Design Considerations from Committee Meeting

- No Container for Café and placement blocks views to Court House
- Café – Consider Seasonal Use / Mobile Vendors
- Consider Fountain or Feature to Draw families into the space
- Focus on Lighting and making a connection to the Bridge and Courthouse with lighting
- Flexible but Defined Space
- Purposeful Vibrant Space
- Stage Area for Civic Engagement / Performances
- More Open for Events
- Four Season Interest

Precedent Imagery

Welland Civic Square



Place Canotiers – Quebec City



Ground Sprays



Ground Sprays/Lights



Lounge Seating around Feature Tables



Seasonal Gatherings







Flexible Event Space

Preliminary Landscape Concept

Welland Civic Square



Final Concept – Plan View (Summer)

adesso design inc
landscape architecture

Preliminary Landscape Concept

Welland Civic Square



Final Concept – Birds Eye View from East Main St

adesso design inc
landscape architecture

Preliminary Landscape Concept

Welland Civic Square

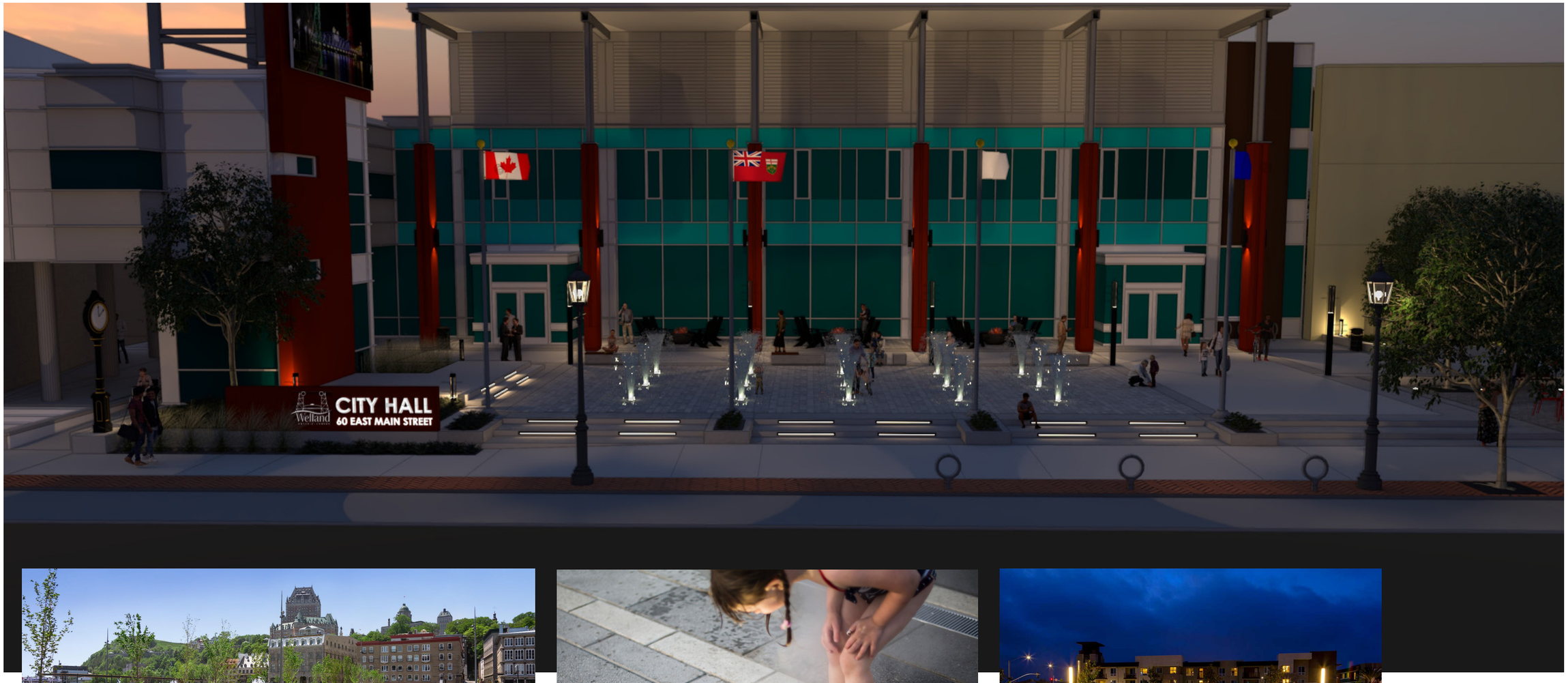


Final Concept – Birds Eye View from Corner of East Main St & Cross St

adesso design inc
landscape architecture

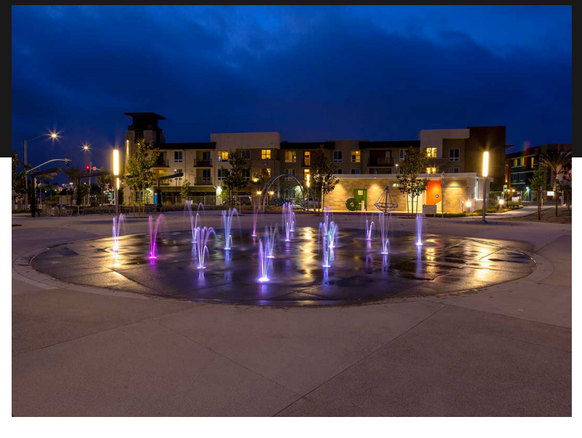
Preliminary Landscape Concept

Welland Civic Square









Final Concept – Water Feature(Dusk)

Preliminary Landscape Concept

Welland Civic Square









Final Concept – Flexible Event Space

adesso design inc
landscape architecture

Preliminary Landscape Concept

Welland Civic Square



Final Concept – Social Seating Space

adesso design inc
landscape architecture

Preliminary Landscape Concept

Welland Civic Square









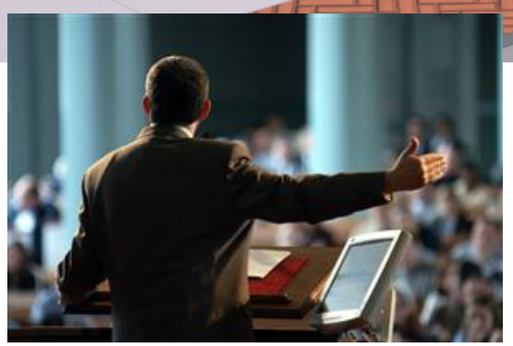
Final Concept– Flexible Event Space

Preliminary Landscape Concept

Welland Civic Square







Final Concept – Public Gathering / Civic Engagement

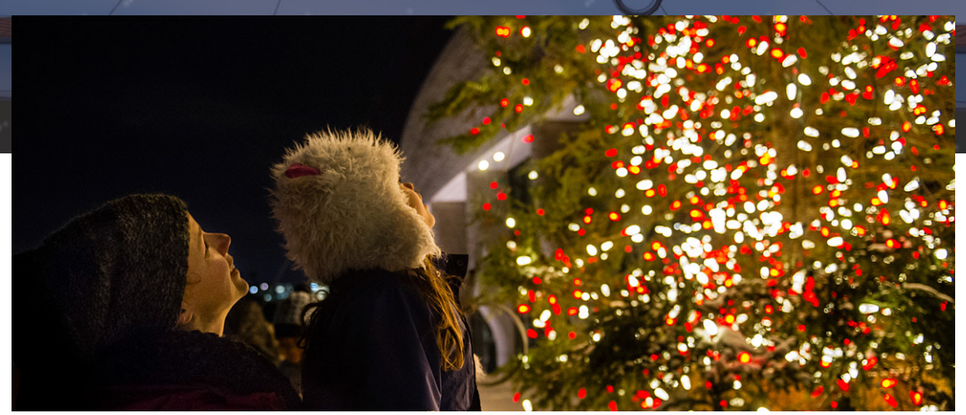
adesso design inc
landscape architecture

Preliminary Landscape Concept

Welland Civic Square







Final Concept – Tree Lighting

adesso design inc
landscape architecture

Preliminary Landscape Concept

Welland Civic Square



Final Concept – Tree Lighting

adesso design inc
landscape architecture

Preliminary Landscape Concept

Welland Civic Square

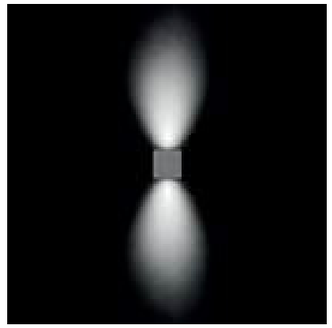


Final Concept – Plaza / Water Feature (Night View)

adesso design inc
landscape architecture

Lighting
Welland Civic Square

Column/Wall Lighting





2 Direction Wall Mount

Bollards

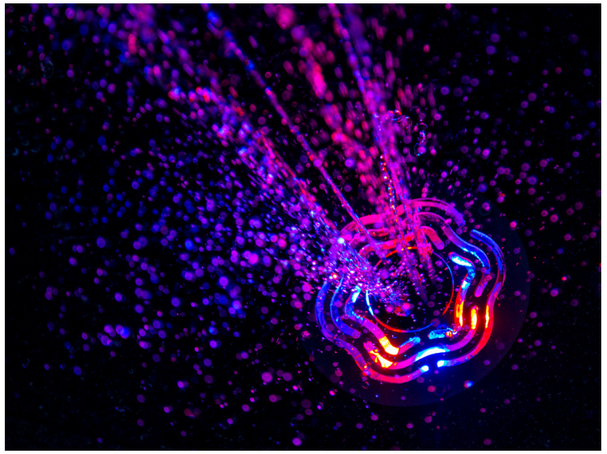


8ft Columns (Open Plaza)



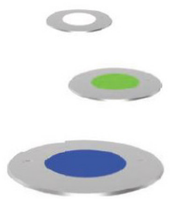
Bollards (around Stage and among lowered seating space)

Lighting at Splash Feature



Integrated lighting with ground sprays







Lighting at Stairs



Recessed Stair Lights

Lighting at Flag Poles



Landscape Flood Lights

Lighting in Lower Plaza Space



In Ground Lighting

COUNCIL MEETING

PLANNING AND DEVELOPMENT SERVICES
PLANNING DIVISION

REPORT P&B-2025-27
July 8, 2025

SUBJECT:	**Applications for Official Plan Amendment, Zoning By-Law Amendment, and Draft Plan of Subdivision for 210 and 276 Quaker Road**
AUTHOR:	**Caitlin Kovacs, B.URPl** **Development Planner**
APPROVING SUPERVISOR:	**Taylor Meadows, B.URPI, CPT, RPP, MCIP** **Manager of Development Planning**
APPROVING MANAGER:	**Michael Greenlee, RPP, MCIP** **Manager of Planning Services**
APPROVING DIRECTOR:	**Grant Munday, B.A.A, RPP, MCIP** **Director, Planning And Development Services**

RECOMMENDATION:

THAT Council adopts Official Plan Amendment No. 53 to redesignate 210 and 276 Quaker Road from Low Density Greenfield Residential, Open Space, and Environmental Conservation Area to Low Density Residential, Medium Density Residential, Open Space, and Environmental Conservation Area; and,

THAT Council approves an amendment to Zoning By-law 2017-117 for 210 and 276 Quaker Road from Agricultural – A1 and Environmental Conservation Overlay – EC to Site-Specific Residential Low Density 2 – RL2-131, Site-Specific Residential Medium Density – RM-132, and Environmental Conservation Overlay; and further,

THAT Council approves the application for the Draft Plan of Subdivision for 210, 276 Quaker Road, subject to the schedule of Conditions attached in Appendix IV; and further,

THAT no additional meetings under the *Planning Act* are required in accordance with Section 34(17) of the *Planning Act*.

RELATIONSHIP TO STRATEGIC PLAN

This recommendation is aligned to Council's strategic priority of ensuring "**Liveability**" by creating a sense of belonging while enhancing mobility by improving access to recreation and community events, ensuring adequate housing options, encouraging job growth, and improving ways to efficiently move people throughout the city.

EXECUTIVE SUMMARY:

Applications for Official Plan Amendment, Zoning By-law Amendment, and Draft Plan of Subdivision were submitted by Upper Canada Consultants on behalf of Ashton Homes (Western) Limited. The applications are required to permit the proposed development consisting of a total of three-hundred and forty-four (344) dwelling units, a park and two parkette/walkways, public roads, lands for the environmental conservation of the Towpath Drain, and lands for stormwater management.

Staff support the requested Official Plan designation and Zoning By-law amendment with site-specific provisions as they conform with provincial and regional policies. The amendments maintain the general intent and purpose of the Official Plan and Zoning By-law 2017-117, as amended.

Staff support the proposed Draft Plan of Subdivision as it will make efficient use of the subject lands and conforms to provincial, regional and local policies.

BACKGROUND:

On October 22, 2024, applications for Official Plan Amendment, Zoning By-law Amendment and Draft Plan of Subdivision were submitted by Upper Canada Consultants on behalf of Ashton Homes (Western) Limited for the subject lands known as 210, and 276 Quaker Road.

On November 5, 2024, the applications were deemed complete.

On May 21, 2025, a resubmission was made that proposed an additional five (5) lots for single-detached dwellings which increases the total number of units from 339 to 344. An updated stormwater management report and functional servicing report were included in the resubmission which have been reviewed by the appropriate authorities.

The Lands

The subject lands are located on the north side of Quaker Road, west of Niagara Street and east of First Avenue. The subject lands are within Welland's Urban Boundary and the Northwest Welland Secondary Plan Area, and are greenfield lands.

The subject lands are generally rectangular in shape. 238 and 232 Quaker Road are not included in the proposed development. The subject lands are approximately 19.5 hectares in size with 338.45 metres of frontage on Quaker road. The subject lands are currently vacant. 238 and 232 Quaker Road are not included in the proposed development.

Surrounding Land Uses

The surrounding land uses include:

- North: Vacant lands within Thorold that are zoned Future Development – FD and Environmental Protection Two – EP2, are designated Residential Areas and Open Space in the City of Thorold Official Plan and are within the Port Robinson West Secondary Plan.
- East: A townhouse development, commercial lands, and a recreational institution being the Welland Stadium, home to the Welland Jackfish.
- South: Low density residential and recreational lands being Trelawn Park.
- West: Vacant residential development lands.

DISCUSSION:

The Proposal

The proposed development consists of a total of three-hundred and forty-four (344) dwelling units, a park and two parkette/walkways, public roads, lands for the environmental conservation of the Towpath Drain, and lands for stormwater management.

Two types of housing are being proposed; single-detached dwellings and street townhouse dwellings. There are two-hundred and sixty-eight (268) single-detached dwellings, each fronting onto a road and each having a private driveway and attached garage. There are also seventy-six (76) townhouse dwellings, each fronting onto a public road and each having a private driveway and attached garage.

The proposed development includes a centrally located park that is approximately 0.68 hectares in size. The park is adjacent to the Towpath Drain environmental lands that run across the midsection of the site. The Towpath Drain environmental lands continue to the northeast corner of the site. The two

stormwater management ponds are located adjacent to the environmental lands with one pond to the north and one to the south.

The proposed development is connected throughout by 20 metre public roads, 1.5 metre sidewalks, and a 3 metre multi-use trail. The proposed development includes two public road connections to Quaker Road, one being at Goodwillie Drive, and the second being an intersection approximately 221 metres to the east of Goodwillie Drive. A third public road connection is proposed on the western boundary of the site which anticipates a connection through to First Avenue as part of the future development of 294 Quaker Road. A fourth connection is proposed on the northern boundary of the site; there are no current plans with the City of Welland for this connection as the adjacent lands are in Thorold.

Description of Applications

Applications for Draft Plan of Subdivision (26T- 14-24004), Official Plan Amendment (OPA No. 53), and Zoning By-law Amendment (2024-06) have been made to permit the proposed residential development.

Draft Plan of Subdivision

The application for Draft Plan of Subdivision has been made to permit the development of the subject lands for the proposed residential development. The Draft Plan of Subdivision (Appendix V) proposes two-hundred and sixty-eight (268) single-detached dwellings, seventy-six (76) street townhouse dwellings, a 0.698 hectare public park, walkways, public roads, lands for environmental conservation, and lands for stormwater management.

Official Plan Amendment

The Official Plan Amendment proposes to redesignate the subject lands from Low Density Greenfield Residential, Open Space & Recreation, and Environmental Conservation Area to Low Density Greenfield Residential, Medium Density Residential, Open Space & Recreation, and Environmental Conservation Area. No special policies are being requested.

Zoning By-law Amendment

The Zoning By-law Amendment proposes to rezone the subject lands from Agricultural – A1 and Environmental Conservation Overlay – EC to Site-Specific Residential Low Density 2 – RL2-131, Site-Specific Residential Medium Density – RM-132, Community Open Space – O2, and Environmental Conservation Overlay – EC. The following site-specific provisions are proposed:

- Residential Low Density 2 – RL2-131
    - All provisions of the RL2 zone are to apply save and except:

- Regulations for Single-Detached Dwelling:

Single-Detached Dwelling		
	Proposed	**Required**
Lot Area	No change	270.2m^2
Lot Frontage	No change	9.0m
Front Yard	3.0m (to dwelling) 5.8m (to garage)	4.5m (to dwelling) 6.0m (to garage)
Side Yard (interior)	0.6m on one side and 1.2m on the other, or 1.0m	1.0m
Side Yard (exterior)	No change	1.0m
Rear Yard	No change	6.0m
Building Height	13.5m	11.0m
Lot Coverage	65%	50%
Landscaped Area	15%	20%

- Residential Medium Density – RM-132
    - All provisions of the RM zone are to apply save and except:
        - Regulations for Street Townhouse Dwelling with Garage Facing Front Lot Line:

Street Townhouse Dwelling with Garage Facing Front Lot Line		
	Proposed	**Required**
Lot Area	No change	n/a
Lot Frontage	No change	6.0m
Front Yard	3.0m (to dwelling) 5.8m (to garage)	4.5m (to dwelling) 6.0m (to garage)
Side Yard (interior)	No change	1.0m (except where the lot line is the dividing line between attached units)
Side Yard (exterior)	No change	1.0m
Rear Yard	No change	6.0m
Building Height	14.5m	11.0m
Lot Coverage	65%	55%
Landscaped Area	15%	20%

        - Regulations for Street Townhouse Dwelling with Garage Access from Laneway/Rear:

Street Townhouse Dwelling with Garage Access from Laneway/Rear		
	Proposed	**Required**
Lot Area	No change	n/a
Lot Frontage	No change	5.0m
Front Yard	3.0m (to dwelling) 5.8m (to garage)	3.0m
Side Yard (interior)	No change	1.0m (except where the lot line is the dividing line between attached units)
Side Yard (exterior)	No change	1.0m

Rear Yard	No change	6.0m
Building Height	14.5m	11.0m
Lot Coverage	65%	55%
Landscaped Area	15%	20%

- General Provisions for Site-Specific Residential Low Density 2 – RL2-131 and Site-Specific Residential Medium Density – RM-132:
    - Notwithstanding Section 4 That the front lot line for Block 269, Block 270, Block 277, and Block 278 is to be Quaker Road.
    - Notwithstanding Section 5.7 (b), A temporary sales office, or a model home, used for the sale of residential, industrial or commercial lots or units in a Plan of Subdivision which has received Draft Approval or has been Zoned to permit the development shall be permitted for a maximum of five years. A temporary sales office, or model home, shall comply with the applicable setbacks for the Zone in which the office is located and will be subject to the necessary Development Agreements to the satisfaction of the City.
    - Notwithstanding Section 5.10.5 – Decks Porches Steps, an open or roofed porch and stair may project 0.9 metres into an interior side yard which has a minimum depth of 1.2 metres, applicable only to a single detached or street townhouse (including facing front lot line and/or access from laneway/rear).
    - A walkway or retaining wall shall be permitted within a required planting strip;
    - Notwithstanding Section 6.1.6 c) where a parking space is abutting or near a wall, column or other similar surface that obstructs the opening of the doors, the minimum width shall be 2.75 metres;
    - Notwithstanding Section 6.9.2 a) the required parking space for a street townhouse dwelling including facing front lot line and/or access from laneway/rear). shall be located a minimum of 0 metres from a street line.

<u>Agency Comments Summary</u>

The applications were circulated to internal divisions and external agencies for detailed technical review and comments. The review included a detailed analysis including but not limited to:

- site plan
- traffic circulation and road widths
- parking provisions and active transportation infrastructure
- natural environment
- greenspace/parkland/landscaping
- archeological potential
- water/sanitary service requirements

- waste collection

Technical comments have been addressed by the applicant throughout the planning review process. Conditions of approval have been included in this approval. The conditions are intended to promote the appropriate development of the subject lands. All detailed comments are contained in Appendix VI.

Public Engagement

On December 4, 2024, a Public Information Open House was held for the public to provide comments on the proposed applications. Ten (10) members of the public attended the in-person meeting and, and four (4) members of the public attended the virtual meeting. The following comments/concerns were raised:

- Noise impacts as a result of increased traffic and development;
- Road connections onto Quaker Road, their configurations and traffic volumes;
- Increased traffic on Goodwillie Drive and the future of the intersection of Quaker Road and Goodwillie Drive;
- The urbanization of Quaker Road as it relates to the overall development of the Northwest Welland Secondary Plan area;
- The location of parks;
- Concerns about a potential decrease in privacy; and
- Stormwater management and drainage for the proposed development and any impacts on the existing homes.

On January 14, 2025, the statutory public meeting under the *Planning Act* was held. The public meeting provided an opportunity for the applicant to present the applications to Council. Interested parties were also invited to provide comments. There were no public oral submissions at the meeting and no written submissions have been received.

Planning Analysis

Provincial Policy

Section 51(24) of the *Planning Act* requires that all proposals for Plans of Subdivision shall have regard for the health, safety, convenience, accessibility for persons with disabilities and the welfare of the present and future inhabitants of the municipality and have regard to:

The effect of development of the proposed subdivision on matters of provincial interest as referred to in Section 2;	
(a) The protection of ecological systems,	• The proposed Draft Plan of Subdivision provides appropriate accommodation for

	including natural areas, features, and functions;	the protection of ecological systems and natural areas. The proposed development is within the NWSP and has had comprehensive ecological studies completed to map the natural areas, features, and functions. The resulting areas are being appropriately zoned for protection.
(b)	The protection of the agricultural resources of the Province:	• The subject lands have been used for commercial purposes for the past several decades, with the remainder of the site becoming overgrown. There are no agricultural resources on the subject lands.
(c)	The conservation and management of natural resources and the mineral resource base;	• There are no identified natural or mineral resources on the subject lands.
(d)	The conservation of features of significant architectural, cultural, historical, archaeological, or scientific interest;	• A Stage 1 and Stage 2 Archaeological Assessment was completed on the subject lands. The subject lands were not recommended to proceed to a Stage 3 Archaeological Investigation. • There are no identified features of architectural, cultural, historical, or scientific interest on the subject lands.
(e)	The, supply efficient use and conservation of energy and water;	• The proposed development does not include any information regarding energy and water conservation methods that will be implemented at the time of construction. • The construction of the homes will be required to meet the Ontario Building Code which contains energy efficiency requirements.
(f)	The adequate provision and efficient use of communication, transportation, sewage and water services	• The property is within the City's Urban Area and can be supplied with municipal infrastructure. There are no capacity issues that will be created as a result of this development.

and waste management systems;	• The development is located in proximity to transit lines (Route 509 and Route 70/75) and is in proximity to transit hubs via these routes. It is close to active transportation corridors and will contain a pedestrian trail.
(g) The minimization of waste;	• The proposed development can be serviced by regional waste collection should regional standards be achieved.
(h) The orderly development of safe and healthy communities;	• The subject lands are within the Urban Boundary and will not require an Urban Area expansion. The subject lands were brought into the Urban Boundary a part of the NWSP which has been comprehensively planned.
(h.1) The accessibility for persons with disabilities to all facilities, services and matters to which this Act applies;	• The proposed development will include paved sidewalks. All other accessibility measures related to the dwellings will be the responsibility of individual homeowners.
(i) The adequate provision and distribution of educational, health, social, cultural, and recreational facilities;	• The local school boards were circulated for comments as part of the planning process and no objections have been received. • A three metre multi-use trail, and a park are being provided and are anticipated to serve as recreational, active transportation and social facilities.
(j) The adequate provision of a full range of housing, including affordable housing;	• The proposed development does not include any affordable housing units; however, the proposed development does include a variety of dwelling types.
(k) The adequate provision of employment opportunities;	• The proposed development is entirely residential and as such does not directly offer any employment opportunities. However, the construction of this development may support local companies and contractors. The City permits home-occupations which can operate out of the

		new dwellings. This development provides opportunity for employees to work-from-home
(l)	The protection of the financial and economic well-being of the Province and its municipalities;	• Development of the subject lands will lead to an increase in tax revenues to the City which will contribute to overall municipal financial wellbeing.
(m)	The coordination of planning activities of public bodies;	• All relevant agencies have been circulated the applications and their comments have been included, where appropriate.
(n)	The resolution of planning conflicts involving public and private interests;	• The public has been provided all required opportunities for comments and questions to be submitted. At this time, no written comments have been received.
(o)	The protection of public health and safety;	• There are no identified risks to public health for the proposed development.
(p)	The appropriate location of growth and development;	• The proposed development is within the NWSP area, which is within Welland's Urban Boundary. The NWSP area is being planned to be transit supportive and provide active transportation infrastructure. • The proposed development has consideration for the local neighbourhood characteristics, transportation networks and connectivity. Connectivity with future developments will create an interconnected and accessible neighbourhoods.
(q)	The promotion of development that is designed to be sustainable to support public transit and be oriented to pedestrians	• The proposed development is located in proximity to the bus stops at the corner of Quaker Road and Niagara Street for both Route 509 Niagara Street and intra-regional Route 70/75 that connects Welland and St. Catharines. • Niagara Regional Transit is circulated on all planning applications.

(r) The promotion of built form that, is well designed, encourages a sense of place, and provides for public spaces that are of high quality, safe, accessible, attractive, and vibrant;	• The proposed development will contain high quality design and is compatible with the surrounding neighbourhood built form. • The proposed development includes greenspace and landscaping, and a public park. The park is anticipated to have some programming to be determined at a future planning stage.
(s) The mitigation of greenhouse gas emissions and adaptation to a changing climate.	• The proposed development provides protected lands for environmental conservation, protecting the tree canopy and shrub coverage supporting climate change principles.
Whether the proposed subdivision is premature or in the public interest;	• The subject lands are within the Urban Boundary and the NWSP area. The NWSP was approved by City Council and the Region to guide development of the northwest area of the city. • A number of studies were undertaken in support of the NWSP to ensure comprehensive, efficient and orderly development of the NWSP area. • Additional supporting studies were submitted as part of the subject planning applications. • The City is working with the land owners to coordinate new infrastructure and infrastructure upgrades in the NWSP area. • The proposed development offers new housing opportunities, green space and recreational space; and, will contribute to the city's economic development.
Whether the plan conforms to the official plan and adjacent plans of subdivision, if any;	• It is the intention of the requested Official Plan Amendment to realign the existing designations on the subject lands to bring the proposed development into conformity. No alternative designations or special policies are being sought.

	• The proposed development is anticipated to align with the adjacent proposed plans of Draft Plans of Subdivision. • Several of the land owners in the NWSP have committed to improving local connectivity and maintaining a sense of place by ensuring appropriate massing of building between sites. There will be well - planned road and active transportation connections. Parkland dedication will be in accordance with the NWSP.
The suitability of the land for the purposes for which it is to be subdivided;	• The subject lands are within the Urban Boundary and have been slated for residential uses, open space and recreation, and environmental conservation in the NWSP.
If any affordable housing units are being proposed, the suitability of the proposed units for affordable housing;	• The proposed development does not include any affordable housing.
The number, width, location and proposed grades and elevations of highways, and the adequacy of them and the highways linking the highways in the proposed subdivision with the established highway system in the vicinity and the adequacy of them;	• The proposed development includes seven (7) public roads, each having a 20 metre right-of-way width. The road cross section will be confirmed via the Subdivider's Agreement but will generally contain the paved roadway, sidewalks along one side, boulevards, trees, and potentially other active transportation infrastructure. • The site connects to Quaker Road, and is within a five (5) minute drive of Highway 406.
The dimensions and shapes of the proposed lots;	• The proposed development is consistent with other plans of subdivision within the City. The lots are of a consistent and appropriate size and shape for each dwelling type.
The restrictions or proposed restrictions, if any, on the land proposed to be subdivided or	• No restrictions are proposed.

the buildings and structures proposed to be erected on it and the restrictions, if any, on the adjoining land;	
Conservation of natural resources and flood control;	• A Functional Servicing Report and a Stormwater Management Plan have been reviewed by the Engineering Division. • The environmental resources on the subject lands, being the Towpath Drain, are maintaining their environmental conservation designation and zoning. They are to be dedicated to the City for long-term preservation.
The adequacy of utilities and municipal resources;	• New infrastructure is to be built as part of the proposed development. The proposed infrastructure's connection into the existing system is supported and any required upgrades to the existing infrastructure will be the responsibility of the developer. • The proposed new infrastructure has been reviewed by the Engineering Division and is subject to final review prior to registration of the Subdivider's Agreement.
The adequacy of school sites;	• There are several school sites in proximity to the lands, being: ○ Nouvel Horizon French Elementary School ○ Alexander Kuska Catholic Elementary School ○ Quaker Road Public School ○ Welland Centennial Secondary School ○ Niagara College Welland Campus • The school boards are circulated on all planning applications for their enrolment projections and construction planning purposes.
The area of land, if any, within the proposed subdivision that, exclusive of highways, is to be	• The development will be subject to parkland dedication in accordance with the *Planning Act*.

conveyed or dedicated for public purposes;	
The extent to which the plan's design optimizes the available supply, means of supplying, efficient use and conservation of energy; and	• The Ontario Building Code includes requirements for energy conservation, which will be incorporated at the time of Building Permit.
The interrelationship between the design of the proposed plan of subdivision and the site plan control matters related to any development on the land, if the land is also located within a site plan control area designated under section 41(2) of the *Planning Act.*	• The property is being developed through a Plan of Subdivision which will create developable lots and blocks. The future residential dwellings are anticipated to be single-detached dwellings and street townhouse dwellings. Proposed development is within the City's site plan control area but is not subject to site plan control. They will be subject to building review and require the applicable building permits prior to construction.

Provincial Policy Statement

The Provincial Planning Statement, 2024 (PPS) is a policy document issued under Section 3 of the *Planning Act* and came into effect on October 20, 2024. The PPS contains policies addressing settlement areas and settlement area boundary expansions. The subject lands are part of the Northwest Welland Secondary Plan area, which was brought into Welland's urban boundary as part of a settlement area boundary expansion. These policies are found in Subsection 2.3.1, and they encourage:

- land use patterns that efficiently use resources and land,
- optimizing existing and planned infrastructure,
- active transportation-supportive development,
- transit-supportive development,
- supporting complete communities, through the provision of a range and mix of housing options,
- meeting established minimum density targets.

Policy 2.3.1.2 states that land use patterns with in settlement areas should be based on densities and a mix of land uses that:

Efficiently use land and resources;	• The proposed development is suitable for the site and provides a suitable density level to support local municipal infrastructure and resources. The proposed development protects and enhances the

	natural features on the subject lands and provides greenspace and recreational space.
Optimize existing and planned infrastructure and public service facilities;	• The proposed development includes plans for addressing infrastructure. Where required new infrastructure shall be constructed at the expense of the Owner. The NWSP has been studied and planned comprehensively to provide services and infrastructure to the planned developments in an efficient and forward-looking manner.
Support active transportation;	• The proposed development supports bicycle parking by providing private garages. There are sidewalks and a three (3) metre trail that run throughout the site with active transportation connections to Quaker Road and First Avenue (via a future public road).
Are transit-supportive, as appropriate; and	• The proposed development may support transit usage and future routes. The subject lands are in proximity to existing routes, being: ○ Route 509 Niagara Street ○ Regional Rout 70/75 St. Catharines to Welland (and return)
Are freight-supportive.	• The subject lands are located adjacent to a municipal road and have direct access to a municipally maintained road.

Niagara Official Plan

The Niagara Official Plan (NOP) identifies the subject lands as being within the Built-Up area of the City of Welland. The policies in the NOP are consistent with the policies found in the PPS. The NOP promotes growth and development within urban areas with active transportation and transit use, and with access to municipal services. These principles are used to analyze proposed developments in order to ensure efficient growth and orderly land use development.

As part of the changes enacted through Bill 23, the Niagara Region's planning authority was removed, and the NOP Policies are now the responsibility of local municipalities.

The subject lands are located in proximity to local transit Route 509 and regional transit Route 70/75. Route 509 Niagara connects to Quaker Road to the Downtown Terminal making connections at Niagara College and Seaway Mall. These transit hubs provide connections to local and regional transit lines. Route 75 and Route 70 connect Welland and St. Catharines with major stops at Niagara College and Brock University. The closest stops for all three lines is at Niagara Street and Quaker Road. The proposed development has the potential to increase transit ridership and support the expansion of existing transit routes and/or support new future transit routes. Niagara Regional Transit is notified of development applications in the City of Welland.

The proposed development is considered to be consistent with both the provincial and regional policies. It will deliver new types of residential development, make efficient use of land and planned infrastructure; and, provide active transportation and pedestrian infrastructure.

<u>City of Welland Official Plan</u>
The Official Plan Amendment proposes to redesignate the subject lands from Low Density Greenfield Residential, Open Space & Recreation, and Environmental Conservation Area to Low Density Greenfield Residential, Medium Density Residential, Open Space & Recreation, and Environmental Conservation Area. No special policies are being requested.

The Official Plan provides direction for growth and development for the City as a whole, and provides specific policies for greenfield areas, new neighbourhoods, Low Density Greenfield Residential and Medium Density Residential designations.

3.4.5 Greenfield Development	
Policy	Analysis
Greenfield Areas are lands which are outside of the city's Built Boundary but are within the Urban Boundary. Greenfield lands are planned to accommodate future growth. The Official Plan encourages greenfield development that is comprehensively planned, that	• The subject lands are within the NWSP area which was brought into Welland's Urban Boundary in January 2021. This resulted in the lands becoming Greenfield Areas. The proposed development conforms to the existing density rates of the Low Density Greenfield Residential and Medium Density Residential designations. The proposed development provides the minimum required

provides compact new neighbourhoods, that will be transit supportive, and that is planned to achieve a density target of 50 residents and jobs per hectare.	lot frontage for each type of dwelling. Each dwelling has a private garage and driveway, and sidewalks are provided on one side of all local roads. These design features aim to provide a compact neighbourhood. The proposed development is located in proximity to transit lines and can support future transit use. The proposed development has been planned to provide 59.23 residents and jobs per hectare and is considered to conform to the Greenfield Area policies.

4.2.2.2 Low Density Greenfield Residential	
Policy	Analysis
This designation permits single-detached dwellings, semi-detached dwellings, triplexes, townhouses, duplex dwellings, and home-based occupations. Low Density Residential areas are to be planned at a minimum density of 15 units per hectare to a maximum density of 24 units per hectare. The scale and design of buildings shall be low-rise and do not cause significant issues with the casting of shadows or obstruction of views, and are encouraged to have front porches, attached garages, front yards that are predominated by landscaping, architectural features and interesting façades.	• The proposed development provides single-detached dwellings in the Low Density Greenfield Residential designation areas. The proposed development is within the density requirements of this designation. The single-detached dwellings are planned to be consistent in height and massing and are not expected to cause significant shadowing issues, reduce privacy, or obstruct views. The proposed development has regard for the City's urban design guidelines and the design provisions of this designation as the dwellings are planned to each have a private garage that is setback further from the street to provide a stronger relationship between the street and the front face of the dwelling. The portions of the lots not used for driveways/walkways and the dwelling are to be landscaped. The proposed development is considered to conform with the Low Density Greenfield Residential designation.

4.2.2.3 Medium Density Residential

Policy	Analysis
This designation permits townhouse dwellings, accessory recreational amenities, and home based occupations. Medium Density Residential areas are to be planned at a minimum density of 15 units per hectare to a maximum density of 24 units per hectare. The scale and design of the Medium Density Residential designation encourages low-rise dwellings that do not cause significant issues with the casting of shadows or obstruction of views, the inclusion of attached garages, covered entrances, front yard landscaping and additional landscaped areas to buffer between the lot and adjacent lots	• The proposed development is providing townhouse dwellings in the Medium Density Residential designation areas. The proposed development is within the density requirements of this designation. The proposed townhouses are planned to be consistent in height and massing and are not expected to cause significant shadowing issues, reduce privacy, or obstruct views. They are anticipated to be compatible with the single-detached dwellings to the north as they are similar in height and to the south as there is a road separating the established residential neighbourhood. The proposed development has regard for the City's urban design guidelines and the design provisions of this designation as the dwellings are planned to each have a private garage that is setback further from the street to provide a stronger relationship between the street and the front face of the dwelling. The portions of the lots not used for driveways/walkways and the dwelling are to be landscaped. The proposed development is considered to conform with the Medium Density Residential designation

4.2.3.2 Design Policies For New Neighbourhoods	
Policy	Analysis
New neighbourhoods are to be planned to meet the density target of 50 residents and jobs per hectare on greenfield lands. They are to create a clearly defined character through built form and landscaping, including energy efficient materials, landscaping treatments, and lighting.	• The proposed development is a greenfield site and has been planned to provide 59.23 residents and jobs per hectare. The proposed development has been planned to provide a distinct neighbourhood character. It has regard for the design policies of each designation and the City's urban design guidelines. Landscaping is to be provided on all lots, sidewalks are to be provided on one side of all local roads, including a wider multi-use trail where appropriate. Street lighting and street treatments will follow the

	municipal standards. The dwellings along Quaker Road will front onto Quaker Road with garage access from the local roads within the subject lands. The design qualities of the proposed development are considered to be consistent with the City's urban design policies.

Policy 7.15.1.1 of the Official Plan provides criteria for the evaluation of Official Plan Amendments.

Provincial and regional policies and plans;	• The subject lands are within the urban area and meets the minimum density targets for greenfield development. • The proposed development conforms to the applicable provincial plans and is consistent with the applicable NOP policies. • The proposed development makes efficient use of municipal infrastructure where possible and does not inflict undue financial stress on the municipalities where new infrastructure is to be constructed. • The proposed development is transit supportive and provides active transportation infrastructure.
The vision, strategic directions, and goals of this Plan;	• The proposed development supports the City's Strategic Directions as outline in Section 2 of the Official Plan through the following: ○ The planning process has included the Town of Pelham and the City of Thorold as they are located in proximity to the development. ○ The proposed development is part of the policy goals set out in the NWSP to encourage complete communities including providing a range of housing, access to public transit, providing attractive residential developments

	that cater to a range of needs and lifestyles. ○ Providing density levels that support the local economy. ○ The proposed development provides protections for environmental lands that will be dedicated to the City for long term environmental stewardship. ○ The proposed development will contribute to greater accessibility and safety throughout the NWSP area through the provision of roadways, sidewalks, and barrier-free parking options. ○ Due diligence to identify and protect any archaeological resources on the subject lands has been undertaken.
Whether the amendment creates and inappropriate precedent; and,	• The amendment meets the general intent and goals of the Official Plan, and does not set an inappropriate precedent.
The city, neighbourhood, and immediate area impacts of the proposed land use change.	• The proposed development is not anticipated to create any negative impacts on the surrounding lands. The proposed development is anticipated to be compatible with the surrounding development. • The proposed development is planned to provide new infrastructure and recreational resources that may be accessed by the existing residents and area users, being a community trail, public roadways, sidewalks, and parkland.

Policy 7.6.2 of the Official Plan provides minimum criteria for the evaluation of a plan of subdivision.

Availability of servicing without undue financial commitment by the City;	• The servicing for the proposed development will be the responsibility of the developer.

Suitable provision of municipal services including, but not limited to, public streets, water, storm and sanitary sewers, waste collection and disposal, public and/or private facilities, fire and police protection, parks, schools, and other community facilities;	• The proposed development includes plans for new public streets and their associated services and infrastructure. • It includes active transportation facilities, public recreational trails and parkland. • Waste collection will be conducted by Niagara Region and Recycling is conducted by Circular Materials. • There are a range of schools and public recreational options in the surrounding area.
Exposure to noise, air pollution and other negative impacts, along with suitable mitigation measures;	• Noise and other pollutants are being mitigated via the recommendations of the study completed by HGC Engineering.
Integration with surrounding land uses;	• The proposed development is residential and no conflicts with the surrounding lands are anticipated.
Integration with the transportation network;	• The proposed development includes two connections onto Quaker Road and another connection which will be through to First Avenue as part of the future development of 294 Quaker Road. A fourth connection is proposed on the northern boundary of the site. There are no current plans with the City of Welland for this connection as the adjacent lands are in the Town of Thorold.
Impacts to, and mitigation of, negative impacts on the natural environments;	• The proposed development is part of an active work permit that is authorized by the Niagara Peninsula Conservation Authority for the realignment of the Towpath Drain. The subject lands associated with this project are being designated and zoned for long term environmental protection.
Optimization of the supply, means of supplying, efficient use and conservation of energy;	• The works associated with the proposed development will undergo further site plan review and building permit review and the associated energy use will be consistent

	with the regulations of the Ontario Building Code.
The provision of appropriate urban design and landscaping for the proposed development;	• The residential lots provided will be sodded and have appropriate landscaping included as part of the development of the subdivision. Further landscaping of the lots is subject to the future land owners. • Greenspace and parkland is provided within the site, and the naturalization of the environmental lands will be subject to NPCA review and approval. • The proposed public roads are anticipated to have landscaped boulevards and street trees.
Compliance with applicable City Guidelines; and	• The proposed development complies with the applicable City guidelines and other by-laws.
Exposure to nearby air pollution and mitigation of impacts.	• There are no identified air pollutants nearby the subject lands.

The proposed development is considered to be consistent with the Official Plan policies. It will provide:

- a functional road layout that includes pedestrian and active transportation infrastructure;
- dedicated motor vehicle parking in the form of attached garages and private driveways;
- greenspace and environmental lands;
- general site and front yard landscaping;
- recreational trails and parkland areas;
- anticipated distinct low-rise built form that is not expected to cause significant issues with the casting of shadows; and
- the density requirements of the NOP and the Official Plan.

Northwest Welland Secondary Plan

On October 27, 2020, the Northwest Welland Secondary Plan (NWSP) was adopted by Welland City Council. On June 14, 2021, it was approved with modifications by Niagara Regional Council. The purpose of the NWSP is to provide a comprehensive plan that is intended to accommodate future growth within Welland. The NWSP encourages growth that is orderly, supports complete communities, integrates into the surrounding areas, has proximity to parks and

trails, maintains a low density residential character; and protects and enhances natural heritage features.

The proposed development is considered to be consistent with the policies of the NWSP. It has a defined architectural form and is compatible with the neighbouring low density built form. The lots along Quaker Road will front onto Quaker Road improving the streetscape and providing a sense of place. It is anticipated to satisfactorily integrate into the overall transportation and road network of the NWSP area. The development provides landscaping, greenspace, and recreation areas.

Comprehensive Zoning By-law 2017-117

The Zoning By-law Amendment proposes to rezone the subject lands from Agricultural – A1 and Environmental Conservation Overlay – EC to be Site-Specific Residential Low Density 2 – RL2-131, Site-Specific Residential Medium Density – RM-132, Community Open Space – O2, and Environmental Conservation Overlay – EC. The requested Site-Specific provisions can be found above with 'The Proposal' section of this report.

The total area of the Lands is composed of lots for single-detached dwellings (54.41%), lots for townhouses (11.64%), one lot for a future access (0.37%), roadways (28.42%), lands for a road widening along Quaker Road (0.48%), parkland (4.34%), lands for walkways (0.33%), stormwater management ponds (7.18%), lands for a 0.3 metre reserve (0.01%), and lands for environmental and watercourse protection (10.33%).

The lots for single-detached dwellings are proposed to have a maximum lot coverage of 65% where 50% is the maximum, and provide 15% of landscaped area where the minimum is 20%. The lots for townhouses are proposed to have a maximum lot coverage of 65% where 55% is the maximum, and provide 15% of landscaped area where the minimum is 20%. The site overall will be approximately 21% greenspace/park land/environmental lands. The remaining lot area is composed of dwellings, roadways, and sidewalks.

The requested site-specific provision related to projections is supportable as they facilitate the intended built form of the proposed development, and provides flexibility depending on the grading of the lot to still provide certain amenities and building accesses like porches, stairs, and decks. The requested site-specific provision for interior side yards is supportable as it reflects the minimum distance requirements of the Ontario Building Code for unprotected openings and may increase privacy by controlling where windows/doors can be located on adjacent buildings.

The requested zone and site-specific provisions are supported by Staff as they are considered to maintain the general intent and purpose of the Zoning By-law.

Municipal Housing Pledge

On June 16, 2023, the Minister of Municipal Affairs and Housing asked the City of Welland to demonstrate its commitment to accelerate housing supply by developing a Municipal Housing Pledge. At its meeting of June 27, 2023, Welland City Council approved a housing pledge of 12,257 new dwelling unit starts by 2031 in the City of Welland for the purposes of accessing the Building Homes Faster Fund.

On August 22, 2023, it was confirmed by the Ministry of Municipal Affairs and Housing that the City of Welland would need to complete a minimum target of 4,300 dwelling units by 2031. The City remains committed to the growth and development of its communities and is striving to reach its pledge of 12,257 dwelling unit starts by 2031. The proposed development will aid in the City reaching its Municipal Housing Pledge by contributing an anticipated 344 dwelling units.

FINANCIAL:

There are no financial impacts resulting from the recommendations in this report.

ATTACHMENT:

Appendix I	-	Key Map
Appendix II	-	Aerial Photo of Subject Lands
Appendix III	-	Colour Demonstration Plan
Appendix IV	-	Conditions of Approval
Appendix V	-	Draft Plan of Subdivision
Appendix VI	-	Agency Comments

Appendix I

OPA No. 53, 2024-06, 26T-14-24004



KEY MAP

N

SUBJECT LANDS

CITY OF Welland

Appendix II



AERIAL MAP OF SUBJECT LANDS

210 & 276 QUAKER ROAD

N

Scale: 1:5,000

SUBJECT LAND

WELLAND BOUNDARY LINE

CITY OF Welland

Appendix III



Planning Division
Planning and Development Services
905-735-1700 x2257
devserv@welland.ca

File Number: 26T-14-24004

210 and 276 Quaker Road Subdivision Conditions of Draft Approval

(Council Approval Granted <Date>)

1. That the Owner enter into a Subdivision Agreement with the City of Welland.
2. That no grading or on-site works commence prior to the registration of a subdivision agreement on the property unless the Owner obtains a Site Alteration Permit from the City of Welland.
3. That all necessary easements required for utility purposes be granted to the appropriate Authority free and clear of all encumbrances.
4. That all necessary easements required for utility purposes be granted to the appropriate Authority free and clear of all encumbrances. All costs for providing the necessary survey plan and all related documents are the responsibility of the owner.
5. That the Owner pay a tree planning fee of $712.31+HST for each developable Lot/Block (344 Lots/Blocks) at the time of subdivision agreement.
6. That Blocks 283 and 284 be dedicated to the City of Welland free and clear of all encumbrances for parkland purposes. All costs for providing the necessary documents are the responsibility of the owner.
7. That lands known as Part Township Lot 229 Thorold as in RO690045 Except Easement Therein, Welland, being all of PIN 64423-0015 (LT) be dedicated to the City of Welland free and clear of all encumbrances for parkland purposes. All costs for providing the necessary documents are the responsibility of the Owner.
8. That any over-dedication of parkland be reimbursed in accordance with the land values as determined by Section 5.4 – 'Low Density Development' as per By-law 2022-149.

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9. That Blocks 287, 288, 289, and 290 be dedicated to the City of Welland free and clear of all encumbrances for road widening purposes. All costs for providing the necessary documents are the responsibility of the Owner.

10. That Blocks 292 and 293 be dedicated to the City of Welland free and clear of all encumbrances for walkway purposes. All costs for providing the necessary documents are the responsibility of the Owner.

11. That Blocks 294 and 295 be dedicated to the City of Welland free and clear of all encumbrances for environmental purposes. All costs for providing the necessary documents are the responsibility of the owner.

12. That Blocks 296 and 297 be dedicated to the City of Welland free and clear of all encumbrances for stormwater management facility purposes. All costs for providing the necessary documents are the responsibility of the owner.

13. That the Owner agrees to dedicate to the City of Welland the lands legally described as PT RDAL BTN TWP LT 225 & 226 THOROLD , PT TWP LT 226 THOROLD , AS IN RO160832; S/T INTEREST OF MUNICIPALITY ; THOROLD, known municipally as 1043 Niagara Street, free and clear of all encumbrances, for the purposes of the Towpath Drain channel and stormwater management.

14. That Construction fencing is required in accordance with the City of Welland Building By-law 2020-140.

15. That the Owner agrees to implement the mitigation measures and recommendations found throughout the Environmental Impact Study (EIS) prepared by Beacon Environmental Limited (dated August 2024, Project 221055) including but not limited to:

    a. The design of the new corridor will conform with the measures outlined in Section 5.1.1 and 5.1.2 of the EIS.

    b. The design brief outlining the details of tree planting plans and enhanced ecological conditions for the corridors is submitted to the City of Welland for review and comment.

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c. That permanent post construction fencing, being a 1.5 metre tall chain link fence is installed along the perimeter of the corridor. No gates shall be permitted along this fence.

d. That the storing of equipment, materials, and the fueling of equipment is not permitted within 30 metres of the boundary of Blocks 127, 128, and 130. And Ontario Provincial Standard Specification 180 is to be followed for the management of excess materials.

e. That the Owner agrees that any required removal of trees and shrubs will be conducted between October 1 and March 31.

f. That a Fish Salvage Plan be undertaken by the MNRF.

g. That all construction and development related activities are confined to the established limit of development, except for areas subject to naturalization where landscaping works are permitted.

16. That the Subdivision Agreement between the Owner and City of Welland include the following warning clause:

"If deeply buried or previously undiscovered archaeological remains/resources are found during development activities on the subject lands, all activities must stop immediately. If the discovery is human remains, contact the police and coroner to secure the site. If the discovery is not human remains, the area must be secured to prevent site disturbance. The project proponent must then follow the steps outlined in the Niagara Region Archaeological Management Plan: Appendix C

https://niagararegion.ca/culture-and-environment/pdf/archaeological-management-plan.pdf."

17. That the Owner shall submit full engineering design drawings to the City of Welland's Engineering Division for review and approval, including Site Servicing, Site Grading, General Notes and Details, Plan and Profile, Sediment Erosion and Control Plan, Storm Pond Design Details, Storm Drainage Area, Sanitary Drainage Area, and Landscaping Plans.

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18. That a Functional Servicing Study Report indicating that the sanitary sewers can accommodate the additional flows, that adequate fire flows can be provided to the development, and that the servicing is consistent with the overall Northwest Secondary Area Plan conceptual design, be submitted to the City of Welland for review to the satisfaction of the Director of Infrastructure Services/City Engineer.

19. That the Owner submit to the City of Welland for review and approval by the Director of Infrastructure Services/City Engineer, a detailed stormwater management plan for the subdivision.

20. That water modelling be completed to ensure adequate capacity and fire flow exist for this development prior to the full construction of other watermains in the area. The Owner agrees that water modelling will be completed by the City at the Owner's expense. Should the water modelling identify that external watermains are required to achieve the required fire flow and/or pressure for this development, the design and construction of those watermains will be at the Owner's expense if they wish to proceed before other development in the area. Where these watermains are identified in the City's development charge by-law, subject to the Development Charges Act, the Owner will be entitled to a credit or to a cash payment for this work, the choice of which will be at the City's sole discretion. The Owner must enter into an agreement with the City to receive such credit or payment.

21. That the Owner agrees that construction shall not commence until all required external storm and sanitary works are constructed.

22. The City is completing the preliminary design of Quaker Road adjacent to the development. The Owner's Engineer shall coordinate with the City as necessary.

23. The detailed design and reconstruction of Quaker Road from the east limit of Rice Road intersection to Niagara Street, including urbanization, sanitary sewer, and storm sewer, shall be completed by the Owner. The design shall be submitted to the City for review and approval. The construction is to be completed within 2 years of draft plan approval. This work is identified in the City's development charge-by law and, subject to the Development Charges Act, the Owner will be entitled to a credit or to a cash payment for this work, the

choice of which will be at the City's sole discretion. The Owner must enter into an agreement with the City to receive such credit or payment.

24. That the cross section for Street 'C' will incorporate on-street parking on one side of the road, a 3m asphalt multi-use trail on one side of the road, and a 1.5 m sidewalk on the other side of the road.

25. That prior to any site alteration, approval from the Director of Infrastructure Services/City Engineer is required. The Owner shall submit all supporting materials and engineering design, prepared by a qualified professional, as required by the City or any applicable authority, and shall agree to implement the recommendations of the reports, studies, and plans.

26. That prior to registration of this plan, the Owner must obtain Consolidated Linear Infrastructure - Environmental Compliance Approval from the City of Welland for sanitary sewer, storm sewer, and storm water management works needed to service the proposed development.

27. That prior to registration of this plan, the Owner must submit Ministry of Environment 'Form 1' Record of Watermains Authorized as a Future Alteration.

28. That the Owner shall be responsible for the construction of all primary and secondary services in accordance with the City of Welland Municipal Standards, Ontario Provincial Standards, the Issued for Construction Engineering drawing set, and any other standards that may apply.

29. That at the end of the project, the design engineer shall certify that all grading, storm sewers, and stormwater management controls have been constructed in conformity with the approved plans. Copies of the certification shall be circulated to the City of Welland and the Regional Municipality of Niagara.

30. That foundation drains will not be connected to sanitary sewer systems.

31. That roof water drainage from any structure or building shall be directed via downspouts either discharging to splash pads (concrete or other suitable material) or with extensions onto grass surfaces. Flows must be directed away from the building, not onto sidewalks or driveways, and not toward adjacent properties.

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32. That the storm water management ponds on Block 296 and Block 297 will be assumed separate from the remainder of the Subdivision. These storm water management ponds will be assumed once all Phases of the Subdivision are assumed and either 90% of all contributing areas to that pond have been developed or it has been 3 years since the assumption of the last Phase of the Subdivision. The Owner agrees to pay their share of any post-construction monitoring of the receiving storm water management ponds required by the consolidated linear infrastructure compliance approval, and for the cleaning of the storm water management ponds prior to assumption. The Owner's share shall be calculated based on contributing land area. Securities for the monitoring and pond cleaning will be held until assumption of the storm water management ponds.

33. That the Towpath drain outlet from the Northwest Secondary Plan Area to Niagara Street be re-aligned in accordance with the Northwest Welland Stormwater Management Implementation Plan prepared by Upper Canada Consultants in conjunction with the completion of the stormwater management works for this Subdivision. This work is identified in the City's development charge-by law and, subject to the Development Charges Act, the Owner will be entitled to a credit or to a cash payment for this work, the choice of which will be at the City's sole discretion. The Owner must enter into an agreement with the City to receive such credit or payment.

34. That the owner provides a written acknowledgement to Niagara Region stating that draft approval of this subdivision does not include a commitment of servicing allocation by Niagara Region as servicing allocation will not be assigned until the plan is registered and that any pre-servicing will be at the sole risk and responsibility of the owner.

35. That the owner provides a written undertaking to Niagara stating that all Offers and Agreements of Purchase and Sale or Lease, which may be negotiated prior to registration of this subdivision shall contain a clause indicating that servicing allocation for the subdivision will not be assigned until the plan is registered, and a similar clause be inserted in the subdivision agreement between the owner and the City.

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36. That prior to final approval for registration of this plan of subdivision, the owner shall submit the design drawings [with calculations] for the sanitary and storm drainage systems required to service this development to confirm capacity in the Regional system prior to the City signing off the CLI ECA

37. That the City obtain, on behalf of the owner, approval from the Regional Municipality of Niagara to connect to the Region's trunk sanitary sewer.

38. That prior to approval of the final plan or any on-site grading, the owner submit a stormwater management report for the subdivision, and the following plans designed and sealed by a qualified professional engineer in accordance with the Ministry of the Environment, Conservation and Parks documents entitled Stormwater Management Planning and Design Manual, March 2003 and Stormwater Quality Guidelines for New Development, May 1991, or their successors to the Niagara Region for review and approval:

    a. Detailed lot grading, servicing and drainage plans, noting both existing and proposed grades and the means whereby overland flows will be accommodated across the site.

    b. Detailed erosion and sedimentation control plans.

    c. Prior to final approval for registration of this plan of subdivision, the owner shall submit confirmation that the stormwater management facilities required to service this development are thru City CLI-ECA process.

39. That the Subdivision Agreement between the owner and the City contain provisions whereby the owner agrees to implement the approved plans required in accordance with the above-noted condition.

40. That the owner ensure that all streets and development blocks can provide an access in accordance with the Regional Municipality of Niagara Corporate Policy and By-laws relating to the curbside collection of waste and recycling throughout all phases of development. Where a through street is not maintained, the owner shall provide a revised draft plan to reflect a proposed temporary "T" turnaround or cul-de-sac designed to Regional standards.

41. that the owner/developer ensure that all streets and development blocks can provide an access in accordance with the Niagara Region's Corporate Policy and By-laws relating to the curbside collection of waste and recycling.

42. That the owner/developer shall comply with the Niagara Region's Corporate Policy for Waste Collection and complete the Application for Commencement of Collection and Indemnity Agreement.

43. That the Developer submits to the Niagara Peninsula Conservation Authority for review and approval, grading, storm servicing, stormwater management, staging and sequencing, and construction sediment control drawings. The Owner agrees that all Sediment and Erosion Control Measures shall be maintained in good condition for the duration of construction until all disturbed surfaces have been stabilized.

44. That prior to the commencement of any works or site alterations, the Owner shall obtain Work Permits from the NPCA for any works associated with the construction of the proposed stormwater outlet to the Towpath Drain. In support of the application, the following information will be required:

    a. Detailed design plans respecting the outlet, with associated riprap.

        i. Outfalls and riprap should not be perpendicular to flows and an updated design to align with the watercourse flow should be included for the works permit.

    b. Any other information as may be determined necessary by the NPCA.

45. That the Developer provides a 1.5 metre high (minimum) chain link fence along the lot lines of Blocks 1 to 21, 143, 223 to 233 (lot lines along the Towpath Drain) to the satisfaction of the Niagara Peninsula Conservation Authority.

46. That the Towpath Drain Block be zoned Environmental Conservation; Hazard; or similar zone categories that appropriately protect the features within these Blocks, to the satisfaction of the Niagara Peninsula Conservation Authority

47. That Conditions 43 to 46 above be incorporated into the Subdivision Agreement between the Developer and the City of Welland, to the satisfaction of the Niagara Peninsula Conservation Authority. The City of Welland shall circulate the draft Subdivision Agreement to the Niagara Peninsula Conservation Authority for its review and approval.

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48. Include on all offers of purchase and sale, a statement that advises the prospective purchaser:

    a. That the home/business mail delivery will be from a designated Centralized Mail Box.

    b. That the developers/owners be responsible for officially notifying the purchasers of the exact Centralized Mail Box locations prior to the closing of any home sales.

49. The owner further agrees to:

    a. Work with Canada Post to determine and provide temporary suitable Centralized Mail Box locations which may be utilized by Canada Post until the curbs, boulevards and sidewalks are in place in the remainder of the subdivision.

    b. Install a concrete pad in accordance with the requirements of and in locations to be approved by Canada Post to facilitate the placement of Community Mail Boxes

    c. Identify the pads above on the engineering servicing drawings. Said pads are to be poured at the time of the sidewalk and/or curb installation within each phase of the plan of subdivision.

    d. Determine the location of all centralized mail receiving facilities in co-operation with Canada Post and to indicate the location of the centralized mail facilities on appropriate maps, information boards and plans. Maps are also to be prominently displayed in the sales office(s) showing specific Centralized Mail Facility locations.

50. Canada Post's multi-unit policy, which requires that the owner/developer provide the centralized mail facility (front loading lockbox assembly or rear-loading mailroom [mandatory for 100 units or more]), at their own expense, will be in effect for buildings and complexes with a common lobby, common indoor or sheltered space.
51. The Owner acknowledges and agrees to convey any easement(s) as deemed necessary by Bell Canada to service this new development. The Owner further

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agrees and acknowledges to convey such easements at no cost to Bell Canada.

52. The Owner agrees that should any conflict arise with existing Bell Canada facilities where a current and valid easement exists within the subject area, the Owner shall be responsible for the relocation of any such facilities or easements at their own cost. Upon receipt of this comment letter, the Owner is to provide Bell Canada with servicing plans/CUP at their earliest convenience to planninganddevelopment@bell.ca to confirm the provision of communication/ telecommunication infrastructure needed to service the development.

    The Owner acknowledges and agrees that it is the responsibility of the Owner to provide entrance/service duct(s) at their own cost from Bell Canada's existing network infrastructure to service this development. In the event that no such network infrastructure exists, in accordance with the Bell Canada Act, the Owner shall be required to pay for the extension of such network infrastructure.

    If the Owner elects not to pay for the above noted connection, Bell Canada may decide not to provide service to this development.

53. That prior to granting Approval for the Final Plan, the City of Welland will require written notice from the following upon their respective conditions having been met satisfactorily:

    Region of Niagara: 34-42

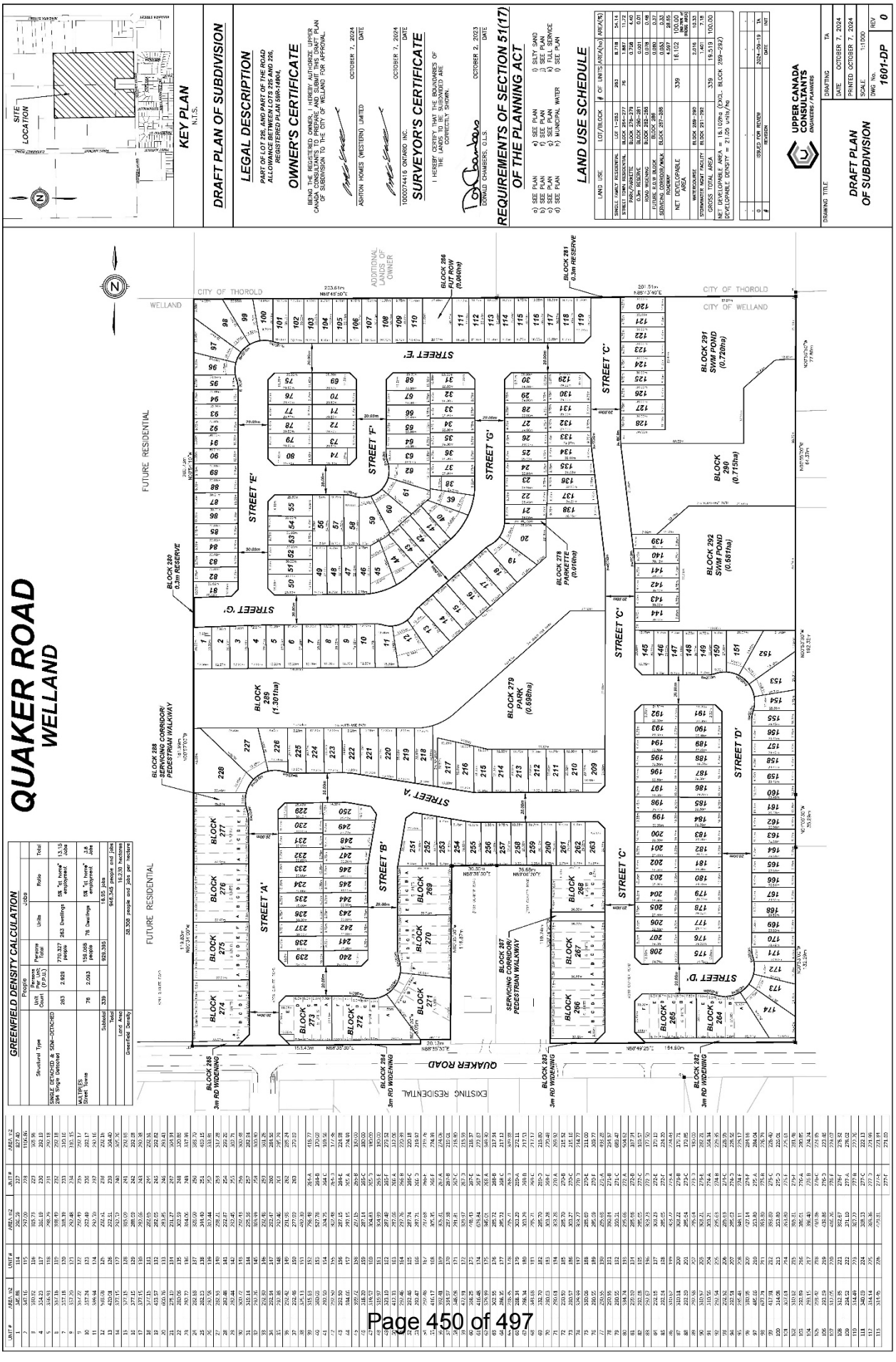
    Niagara Peninsula Conservation Authority: 43-47

    Canada Post: 48-50

    Bell Canada: 51-52

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Appendix V


QUAKER ROAD
WELLAND
DRAFT PLAN OF SUBDIVISION
LEGAL DESCRIPTION
OWNER'S CERTIFICATE
SURVEYOR'S CERTIFICATE
REQUIREMENTS OF SECTION 51(17) OF THE PLANNING ACT
LAND USE SCHEDULE
KEY PLAN
GREENFIELD DENSITY CALCULATION
DRAFT PLAN OF SUBDIVISION
UPPER CANADA CONSULTANTS
1601-DP
CITY OF THOROLD
CITY OF WELLAND
FUTURE RESIDENTIAL
EXISTING RESIDENTIAL
ADDITIONAL LANDS OF OWNER
STREET 'A'
STREET 'B'
STREET 'C'
STREET 'D'
STREET 'E'
STREET 'F'
STREET 'G'
BLOCK 291 SWM POND (0.720ha)
BLOCK 292 SWM POND (0.561ha)
BLOCK 290 (0.715ha)
BLOCK 279 PARK (0.698ha)
BLOCK 278 PARK (0.010ha)
BLOCK 265 (1.301ha)
BLOCK 220 0.3m RESERVE
BLOCK 251 0.3m RESERVE
BLOCK 286 PUT ROW (0.066ha)
BLOCK 288 SERVICING CORRIDOR/ PEDESTRIAN WALKWAY
BLOCK 287 SERVICING CORRIDOR/ PEDESTRIAN WALKWAY
BLOCK 281 3m RD WIDENING
BLOCK 284 3m RD WIDENING
BLOCK 283 3m RD WIDENING
BLOCK 282 3m RD WIDENING

Infrastructure Services
Office of the City Engineer
Phone: 905-735-1700 | Fax: 905-735-7184
Email: eng@welland.ca | www.welland.ca

MEMORANDUM

TO: **Taylor Meadows, CPT, BURPl, RPP, MCIP Manager of Development Planning**

FROM: **Tolga Aydin, C.E.T., Development Technologist**

CC: **Samantha McCauley, P.Eng., Manager of Development Engineering**

DATE: **December 20, 2024**

SUBJECT: 210 276 Quaker Road
Official Plan, Zoning By-law Amendment, and Draft Plan of Subdivision Review

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A complete application for Official Plan, Zoning By-Law Amendment, and Draft Plan of Subdivision was submitted by Upper Canada Consultants and circulated for review. Engineering has reviewed this application for any anticipated concerns related to the proposed servicing and stormwater management plans. Please note that a comprehensive design review was not completed at this time. A detailed review of the engineering design would be completed when/if a complete application for clearance of conditions for Draft Plan of Subdivision is made. Additional comments may be forthcoming at that time.

The following documents were reviewed:

- Functional Servicing Report, dated October, 2024, prepared by Upper Canada Consultants
- Stormwater Management Plan, dated October 2024, prepared by Upper Canada Consultants
- Draft Plan of Subdivision, revision 0, dated September 19, 2024, prepared by Upper Canada Consultants
- Traffic Impact Assessment, dated September, 2024, by Associated Engineering

After review, Engineering has the following comments:

1. The proposed water layout in the FSR does not include the east-west connection to Woodlawn Road that is included in the latest Associated Engineering Municipal Servicing Conceptual Design Report (June 2024) and includes upsized proposed watermain (from 200 to 300 mm) east-west to First Avenue. Modelling will be required to confirm if this loop can be eliminated and that the selected watermain size change is appropriate. If this loop cannot be eliminated, the servicing plans will need to be updated accordingly. This work will be undertaken by the City's modelling consultant and the current cost for this work is

$2,500 + HST per the 2024 fees bylaw (fee is for reference and the actual fee will be as per the applicable bylaw at the time of application). The Applicant is responsible for the cost of this work and payment must be received before the work is authorized. This modelling can be completed either prior to draft plan approval or as part of clearance of draft plan conditions.

2. Depending on the extent of other future external watermains that have been constructed at the time the development of this site proceeds, other additional water modelling may also be required to confirm that adequate pressure and fire flow can be supplied to this development without those watermains.
3. Figure 4 in the Stormwater Management Brief for this property, shows areas A20a and A20 being directed to a SWM facility before outletting to the Towpath Drain; however, it is the City's understanding that no SWM facility is proposed for these areas. This figure and the modelling (if the modelling included a SWM facility) should be updated to reflect what is being proposed for that drainage area.
4. The percent impervious used for drainage area A21 shown in Figures 3 and 4 does not match with the percent impervious used for this area in the approved Northwest Welland Stormwater Management Implementation Plan or Figure 3 (existing drainage area plan) . The percent impervious for this area should be revised from 5% to 9%.
5. There are outstanding comments on the overall TIS update submitted for the CIHA that need to be addressed. Please note that approval of the updated TIS is required to proceed with the development of this parcel.
6. Sanitary connections from external properties (on Street G and Street A) may not be required, with the alternative being that these properties will connect to a sanitary sewer on First Avenue – this is to be confirmed with the City prior to detailed design.
7. Approval from the Niagara Region will be required for the proposed sanitary connection to the Regional 750mm sanitary sewer on Quaker Road.

After review, Engineering has the following conditions:

1. That the Owner shall submit full engineering design drawings to the City of Welland's Engineering Division for review and approval, including Site Servicing, Site Grading, General Notes and Details, Plan and Profile, Sediment Erosion and Control Plan, Storm Pond Design Details, Storm Drainage Area, Sanitary Drainage Area, and Landscaping Plans.

2. That a Functional Servicing Study Report indicating that the sanitary sewers can accommodate the additional flows, that adequate fire flows can be provided to the development, and that the servicing is consistent with the overall Northwest Secondary Area Plan conceptual design, be submitted to the City of Welland for review to the satisfaction of the Director of Infrastructure Services/City Engineer.

3. That the Owner submit to the City of Welland for review and approval by the Director of Infrastructure Services/City Engineer, a detailed stormwater management plan for the subdivision.

4. That water modelling be completed to ensure adequate capacity and fire flow exist for this development prior to the full construction of other watermains in the area. The Owner agrees that water modelling will be completed by the City at the Owner's expense. Should the water modelling identify that external watermains are required to achieve the required fire flow and/or pressure for this development, the design and construction of those watermains will be at the Owner's expense if they wish to proceed before other development in the area. Where these watermains are identified in the City's development charge by-law, subject to the Development Charges Act, the Owner will be entitled to a credit or to a cash payment for this work, the choice of which will be at the City's sole discretion. The Owner must enter into an agreement with the City to receive such credit or payment.

5. That the Owner agrees that construction shall not commence until all required external storm and sanitary works are constructed.

6. The City is completing the preliminary design of Quaker Road adjacent to the development. The Owner's Engineer shall coordinate with the City as necessary.

7. The detailed design and reconstruction of Quaker Road from the east limit of Rice Road intersection to Niagara Street, including urbanization, sanitary sewer, and storm sewer, shall be completed by the Owner. The design shall be submitted to the City for review and approval. The construction is to be completed within 2 years of draft plan approval. This work is identified in the City's development charge-by law and, subject to the Development Charges Act, the Owner will be entitled to a credit or to a cash payment for this work, the choice of which will be at the City's sole discretion. The Owner must enter into an agreement with the City to receive such credit or payment.

8. That the cross section for Street 'C' will incorporate on-street parking on one side of the road, a 3m asphalt multi-use trail on one side of the road, and a 1.5 m sidewalk on the other side of the road.

9. That prior to any site alteration, approval from the Director of Infrastructure Services/City Engineer is required. The Owner shall submit all supporting materials and engineering design, prepared by a qualified professional, as required by the City or any applicable authority, and shall agree to implement the recommendations of the reports, studies, and plans.

10. That prior to registration of this plan, the Owner must obtain Consolidated Linear Infrastructure - Environmental Compliance Approval from the City of Welland for sanitary sewer, storm sewer, and storm water management works needed to service the proposed development.

11. That prior to registration of this plan, the Owner must submit Ministry of Environment 'Form 1' Record of Watermains Authorized as a Future Alteration.

12. That the Owner shall be responsible for the construction of all primary and secondary services in accordance with the City of Welland Municipal Standards, Ontario Provincial Standards, the Issued for Construction Engineering drawing set, and any other standards that may apply.

13. That at the end of the project, the design engineer shall certify that all grading, storm sewers, and stormwater management controls have been constructed in conformity with the approved plans. Copies of the certification shall be circulated to the City of Welland and the Regional Municipality of Niagara.

14. That foundation drains will not be connected to sanitary sewer systems.

15. That roof water drainage from any structure or building shall be directed via downspouts either discharging to splash pads (concrete or other suitable material) or with extensions onto grass surfaces. Flows must be directed away from the building, not onto sidewalks or driveways, and not toward adjacent properties.

16. That the storm water management ponds on BLOCK 291 and BLOCK 292 will be assumed separate from the remainder of the Subdivision. These storm water management ponds will be assumed once all Phases

of the Subdivision are assumed and either 90% of all contributing areas to that pond have been developed or it has been 3 years since the assumption of the last Phase of the Subdivision. The Owner agrees to pay their share of any post-construction monitoring of the receiving storm water management ponds required by the consolidated linear infrastructure compliance approval, and for the cleaning of the storm water management ponds prior to assumption. The Owner's share shall be calculated based on contributing land area. Securities for the monitoring and pond cleaning will be held until assumption of the storm water management ponds.

17. That the Towpath drain outlet from the Northwest Secondary Plan Area to Niagara Street be re-aligned in accordance with the Northwest Welland Stormwater Management Implementation Plan prepared by Upper Canada Consultants in conjunction with the completion of the stormwater management works for this Subdivision. This work is identified in the City's development charge-by law and, subject to the Development Charges Act, the Owner will be entitled to a credit or to a cash payment for this work, the choice of which will be at the City's sole discretion. The Owner must enter into an agreement with the City to receive such credit or payment.

18. That all necessary easements required for utility and services purposes be granted to the appropriate Authority free and clear of encumbrances.

19. That the Owner agrees to dedicate to the City of Welland, BLOCK 285, BLOCK 284, BLOCK 283 and BLOCK 282, free and clear of all encumbrances, for the purposes of future road widening.

20. That the Owner agrees to dedicate to the City of Welland, BLOCK 291 and BLOCK 292, free and clear of all encumbrances, for the purposes of storm water management facilities.

Infrastructure Services
Office of the City Engineer
Phone: 905-735-1700 | Fax: 905-735-7184
Email: eng@welland.ca | www.welland.ca

MEMORANDUM

TO: **Taylor Meadows, CPT, BURPl, RPP, MCIP Manager of Development Planning**

FROM: **Tolga Aydin, C.E.T., Supervisor of Development Engineering**

CC: **Kelly Walsh, P.Eng., Manager of Development Engineering**

DATE: **May 27, 2025**

SUBJECT: 210 276 Quaker Road
Official Plan, Zoning By-law Amendment, and Draft Plan of Subdivision Review

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A complete application for Official Plan, Zoning By-Law Amendment, and Draft Plan of Subdivision was submitted by Upper Canada Consultants and circulated for review. Engineering has reviewed this application for any anticipated concerns related to the proposed servicing and stormwater management plans. Please note that a comprehensive design review was not completed at this time. A detailed review of the engineering design would be completed when/if a complete application for clearance of conditions for Draft Plan of Subdivision is made. Additional comments may be forthcoming at that time.

The following documents were reviewed:

- Functional Servicing Report, dated May 2025, prepared by Upper Canada Consultants
- Draft Plan of Subdivision, revision 0, dated April 22, 2025, prepared by Upper Canada Consultants
- Covering Letter and Comment Response, dated May 21, 2025, prepared by Upper Canada Consultants

After review, Engineering has the following comments:

1. As indicated during the previous review, watermain modelling will be required to confirm if the loop to Niagara Street can be eliminated and that the selected watermain size change is appropriate. If this loop cannot be eliminated, the servicing plans will need to be updated accordingly. This work will be undertaken by the City's modelling consultant and the current cost for this work is $5,000 + HST per the 2024 fees bylaw (fee is for reference and the actual fee will be as per the applicable bylaw at the time of application). The Applicant is responsible for the cost of this work and payment must be received before the work is authorized. It is acknowledged that it is the preference of the Applicant to complete this work as a condition of approval.

After review, Engineering has the following conditions:

1. That the Owner shall submit full engineering design drawings to the City of Welland's Engineering Division for review and approval, including Site Servicing, Site Grading, General Notes and Details, Plan and Profile, Sediment Erosion and Control Plan, Storm Pond Design Details, Storm Drainage Area, Sanitary Drainage Area, and Landscaping Plans.

2. That a Functional Servicing Study Report indicating that the sanitary sewers can accommodate the additional flows, that adequate fire flows can be provided to the development, and that the servicing is consistent with the overall Northwest Secondary Area Plan conceptual design, be submitted to the City of Welland for review to the satisfaction of the Director of Infrastructure Services/City Engineer.

3. That the Owner submit to the City of Welland for review and approval by the Director of Infrastructure Services/City Engineer, a detailed stormwater management plan for the subdivision.

4. That water modelling be completed to ensure adequate capacity and fire flow exist for this development prior to the full construction of other watermains in the area. The Owner agrees that water modelling will be completed by the City at the Owner's expense. Should the water modelling identify that external watermains are required to achieve the required fire flow and/or pressure for this development, the design and construction of those watermains will be at the Owner's expense if they wish to proceed before other development in the area. Where these watermains are identified in the City's development charge by-law, subject to the Development Charges Act, the Owner will be entitled to a credit or to a cash payment for this work, the choice of which will be at the City's sole discretion. The Owner must enter into an agreement with the City to receive such credit or payment.

5. That the Owner agrees that construction shall not commence until all required external storm and sanitary works are constructed.

6. The City is completing the preliminary design of Quaker Road adjacent to the development. The Owner's Engineer shall coordinate with the City as necessary.

7. The detailed design and reconstruction of Quaker Road from the east limit of Rice Road intersection to Niagara Street, including urbanization, sanitary sewer, and storm sewer, shall be completed by the Owner. The design shall be submitted to the City for review and approval. The construction is to be completed within 2 years of draft plan approval. This work is identified in the City's development charge-by law and, subject to the Development Charges Act, the Owner will be entitled to a credit or to a cash payment for this work, the choice of which will be at the City's sole discretion. The Owner must enter into an agreement with the City to receive such credit or payment.

8. That the cross section for Street 'C' will incorporate on-street parking on one side of the road, a 3m asphalt multi-use trail on one side of the road, and a 1.5 m sidewalk on the other side of the road.

9. That prior to any site alteration, approval from the Director of Infrastructure Services/City Engineer is required. The Owner shall submit all supporting materials and engineering design, prepared by a qualified professional, as required by the City or any applicable authority, and shall agree to implement the recommendations of the reports, studies, and plans.

10. That prior to registration of this plan, the Owner must obtain Consolidated Linear Infrastructure - Environmental Compliance Approval from the City of Welland for sanitary sewer, storm sewer, and storm water management works needed to service the proposed development.

11. That prior to registration of this plan, the Owner must submit Ministry of Environment 'Form 1' Record of Watermains Authorized as a Future Alteration.

12. That the Owner shall be responsible for the construction of all primary and secondary services in accordance with the City of Welland Municipal Standards, Ontario Provincial Standards, the Issued for Construction Engineering drawing set, and any other standards that may apply.

13. That at the end of the project, the design engineer shall certify that all grading, storm sewers, and stormwater management controls have been constructed in conformity with the approved plans. Copies of the certification shall be circulated to the City of Welland and the Regional Municipality of Niagara.

14. That foundation drains will not be connected to sanitary sewer systems.

15. That roof water drainage from any structure or building shall be directed via downspouts either discharging to splash pads (concrete or other suitable material) or

with extensions onto grass surfaces. Flows must be directed away from the building, not onto sidewalks or driveways, and not toward adjacent properties.

16. That the storm water management ponds on BLOCK 296 and BLOCK 297 will be assumed separate from the remainder of the Subdivision. These storm water management ponds will be assumed once all Phases of the Subdivision are assumed and either 90% of all contributing areas to that pond have been developed or it has been 3 years since the assumption of the last Phase of the Subdivision. The Owner agrees to pay their share of any post-construction monitoring of the receiving storm water management ponds required by the consolidated linear infrastructure compliance approval, and for the cleaning of the storm water management ponds prior to assumption. The Owner's share shall be calculated based on contributing land area. Securities for the monitoring and pond cleaning will be held until assumption of the storm water management ponds.

17. That the Towpath drain outlet from the Northwest Secondary Plan Area to Niagara Street be re-aligned in accordance with the Northwest Welland Stormwater Management Implementation Plan prepared by Upper Canada Consultants in conjunction with the completion of the stormwater management works for this Subdivision. This work is identified in the City's development charge-by law and, subject to the Development Charges Act, the Owner will be entitled to a credit or to a cash payment for this work, the choice of which will be at the City's sole discretion. The Owner must enter into an agreement with the City to receive such credit or payment.

18. That all necessary easements required for utility and services purposes be granted to the appropriate Authority free and clear of encumbrances.

19. That the Owner agrees to dedicate to the City of Welland, BLOCK 287, BLOCK 288, BLOCK 289 and BLOCK 290, free and clear of all encumbrances, for the purposes of future road widening.

20. That the Owner agrees to dedicate to the City of Welland, BLOCK 296 and BLOCK 297, free and clear of all encumbrances, for the purposes of storm water management facilities.

Niagara Region

Public Works Growth Management & Planning Division
1815 Sir Isaac Brock Way, Thorold, ON L2V 4T7
905-980-6000 Toll-free:1-800-263-7215

Via Email Only

December 19, 2024

File Number: PLSD202401516
PLOPA202401523
PLZBA202401522

Caitlin Kovacs
Development Planner
City of Welland
60 East Main Street
Welland, ON L3B 3X4

Dear Ms. Kovacs:

Re: Regional and Provincial Comments
Proposed Draft Plan of Subdivision Application
Proposed Official Plan Amendment Application
Proposed Zoning By-law Amendment Application
City Files: 26T-14-24004; OPA no. 53; 2024-06
Applicant: Ashton Homes
Agent: Upper Canada Consultants
210, 276 Quaker Road
City of Welland

Staff of the Regional Public Works Growth Management and Planning Division has reviewed the proposed Official Plan Amendment (OPA), Zoning By-law Amendment (ZBA), and Draft Plan of Subdivision (DPS) applications circulated by the City for lands on 210 and 276 Quaker Road located in the City of Welland. Regional staff received notice of these applications on November 12, 2024.

The OPA seeks to modify the existing mapping of the Northwest Welland Secondary Plan (NWSP). The modification intends to adjust a number of land use designations that affect the subject lands to recognize the realignment of the approved Towpath Drain that resulted in the shift of boundaries of the Environmental Conservation Area, Low Density Greenfield Residential, Medium Density Residential, and the Open Space and Recreation Area designations.

The subject land is currently zoned A1 - Agricultural and the natural heritage resources on the property are zoned as EC – Environmental Conservation Overlay. The ZBA application proposes to rezone the subject lands to:

- Residential Low Density (RL-2-XX)
- Residential Medium Density (RM-XX)
- Open Space (OS)
- Environmental Conservation Overlay (EC)

The draft plan consists of 292 lots/blocks as shown on the 'Draft Plan of Subdivision' drawing prepared by Upper Canada Consultants (dated October 7, 2024) for a mix and range of dwelling types and densities for a total of 339 residential dwelling units, and other associated land uses as follows:

- 263 lots for low density residential (single family residential)
- 13 blocks for medium density residential (street town residential)
- Two (2) blocks for Park / Parkette
- Two (2) blocks for 0.3 metre reserve
- Four (4) blocks for Future R.O.W Block
- Two (2) blocks for servicing corridor / walk
- Two (2) blocks for watercourse
- Two (2) blocks for Stormwater Management Facility

A pre-consultation meeting was held recently on May 16, 2024, with City, Regional staff, NPCA, and agent in attendance.

The following comments are provided from a Provincial and Regional perspective to assist the City of Welland with their review of the proposed DPS, OPA and ZBA applications.

Regional staff are not in a position to provide final comments and support for these applications at this time as additional information is required to confirm that the proposal will not have a negative impact on the Region's Natural Heritage System as discussed below. Updated comments and recommended draft plan conditions to address Regional and Provincial interests will be provided upon review and approval of an EIS Addendum.

Provincial and Regional Policies

The property is located within the 'Settlement Area' under the *Provincial Planning Statement, 2024* (PPS), and within the 'Designated Greenfield Area' of the Welland Urban Area under the Niagara Official Plan (NOP).

The PPS directs growth to Settlement Areas, which are the focus of growth and development, and encourage the efficient use of land, resources, infrastructure, and public service facilities that are planned or available.

The PPS and NOP direct development to take place in urban areas to support intensified development where appropriate servicing and infrastructure exists. Both Provincial and Regional policy place an emphasis on intensification and infill to foster the development of complete communities that have a mix of diverse land uses and housing choices, improve social equity and quality of life, expand access to multiple forms of transportation, and provide spaces that are vibrant and resilient in their design.

A full range of residential uses are permitted generally within the Urban Area designation, subject to the availability of adequate municipal services and infrastructure and other policies relative to land use compatibility and environmental conservation. Within urban areas, forecasted population growth is to be accommodated primarily through intensification in Built-Up Areas.

The intensification target identified with Table 2-2 of the NOP for the City of Welland is 75%. Designated Greenfield Areas shall achieve a minimum density of 50 residents and jobs combined per hectare as measured across the entire region. The NOP requires that local official plans achieve the minimum greenfield density target across the entire municipality and are encouraged to exceed this minimum. Staff note the subject land is located within Welland's Northwest Secondary Plan (NWSP) area.

The applicant has indicated through the submitted Planning Justification Report, prepared by Upper Canada Consultants (dated October 18, 2024) that the development will have a density of 58 residents and jobs per hectare, which exceeds the minimum target as set out within the NOP.

The City is to monitor developments to ensure that the overall Greenfield density target will be achieved on a municipal-wide basis and should be satisfied that the proposal conforms to the neighbourhood density targets in the City's Official Plan. Therefore, provided the City is satisfied that the neighbourhood density target will be achieved, the proposed development is consistent with and conforms to Regional growth management policies for Designated Greenfield Areas, subject to the discussion below. Regional staff further acknowledge that local compatibility considerations and interface with neighbouring land uses are local planning matters to be addressed by City staff and Council.

Northwest Welland Secondary Plan

The NWSP was approved by City Council on October 27, 2020, with the intent to accommodate future urban growth within the City through orderly, sequential, and contiguous DGFA development with infill in the Built-Up Area.

Archaeological Potential

The PPS and NOP state that development and site alteration is not permitted within areas of archaeological potential unless significant archaeological resources have been conserved. The subject lands are mapped as an area of archaeological potential on Schedule K of the NOP.

Regional staff reviewed the Stage 1 & 2 Archaeological Assessments conducted by Detritus Consulting Ltd. (dated November 11, 2021) and received the associated Ministry of Citizenship and Multiculturalism letter of acknowledgement (dated December 9, 2024). The Stage 1 Background Study indicated that the Study Area exhibited moderate to high potential for the identification and recovery of archaeological resources. As such a Stage 2 Archaeological Assessment was recommended.

The Stage 2 Archaeological Assessment identified 60% of the study area was accessible to ploughing and pedestrian surveys. 10% of the study area comprised of a seasonal tributary of the Welland Canal that was inaccessible to ploughing but subject to test put surveying. No material culture was uncovered, and no additional assessment methods were employed.

The remaining 30% was subject to judgmental test pit surveying. The pedestrian survey of the remainder treed, and agricultural land resulted in the documentation of Findspot 1 (isolated flake of Onondaga Chert). No other artifacts were observed and given the isolated nature of the artifact, Findspot 1 and the study area were not recommended for a Stage 3 Archaeological Assessment.

Recognizing that no archaeological assessment, regardless of intensity, can entirely negate the possibility of discovering deeply buried archaeological materials, staff will recommend the inclusion of a standard archaeological warning clause in the future subdivision agreement should any resources be encountered through future construction works.

Appropriate conditions of draft plan approval will be included in a future resubmission to address these requirements.

Site Condition

The PPS policy 5.3.2 and NOP Policy 4.2.4.2 state that sensitive land uses shall be planned and developed to avoid, or if avoidance is not possible, minimize and mitigate any potential adverse effects from odour, noise, and other contaminants, and minimize risk to public health and safety.

A Phase One Environmental Site Assessment (ESA) was referenced in the Phase Two ESA Conceptual Site Model (no date; Project: E16-26-2) prepared by Hallex Environmental Ltd. and was circulated with this submission. The Phase One ESA

identified 15 Potentially Contaminating Activities (PCAs) which resulted in four (4) onsite Areas of Potential Environmental Concern (APEC).

The test pits, boreholes, and monitoring wells across the site resulted in one (1) identified impacted area at the eastern property boundary (APEC-4). The contaminated soil was excavated and disposed of at a Ministry of Environment, Conservation and Parks (MECP) licensed landfill. The report indicated that no groundwater impact was noted throughout the site and, as such, no target contaminants were identified associated with APEC-1, 2, and 3.

Staff note that a Record of Site Condition has been submitted and filed to the MECP Environmental Site Registry (filed August 16, 2018).

As such, staff offer no further comments regarding site condition standards.

Land Use Compatibility

The PPS and NOP state that sensitive land uses (including residential) shall be planned and developed to avoid, or if avoidance is not possible, minimize and mitigate any potential adverse effects from odour, noise, and other contaminants.

Regional staff reviewed the ‘Noise Feasibility Study’ prepared by HGC Engineering (dated July 5, 2024), which evaluated the primary noise source from Quaker Road (local road), the secondary noise source from Niagara Street (Regional Road 50), as well nearby stationary noise sources. Specifically, the NFS recommends the following:

- Forced air ventilation is required for Blocks 265 & 266, Block 267 unit A, Block 272 unit C, Blocks 273 & 274, Block 275 unit A, and Lot 174

- Blocks 265 & 266, Block 267 unit A, Block 272 unit C, Blocks 273 & 274, Block 275 unit A, and Lot 174, and Lots 139 – 173, 120 – 128 require exterior walls and double-glazed windows to meet Ontario Building Code minimum requirements.

- NFS provided an alternative for the rear yards adjacent to Quaker Road that a 2.0 metre noise wall would reduce noise levels below 55 dBA.

- Warning clauses are also required to inform future occupants of potential adverse noise impacts from nearby increasing transportation sources.

The above noted measures will be incorporated as conditions through a future resubmission should there be no changes to the development proposal.

Natural Heritage

The subject property is impacted by the Region's Natural Environment System (NES), consisting of Significant Woodland, Other Woodland and Other Wetlands as well as a permanent/intermittent stream. As such, consistent with NOP policies, Regional staff requested an Environmental Impact Study (EIS) to confirm the extent of designated NES features and assess impacts associated with the proposed development.

Staff have reviewed the EIS prepared by Beacon Environmental Limited (dated August 2024), which confirms the presence of a permanent/intermittent stream associated with Towpath Drain and wetland communities. Staff note that the subject properties were extensively cleared of vegetation between 2020 and 2021. As the clearing occurred before approval of the 2022 NOP, NOP policy 3.1.18 requiring restoration of mapped NES features that were removed without authorization in advance of making an application for development is not applicable.

Although Regional staff are generally in agreement that development can be accommodated on the subject property without significant impact to the NES, several concerns were identified that should be addressed in an EIS Addendum to satisfy the Region that the conclusions of the EIS are valid.

As such, Regional staff is not in a position to recommend conditions of draft approval at this time as additional information is requested to confirm that the proposal will not have significant negative impacts to the Region's NES. An EIS Addendum (with changes clearly identified to facilitate review) is requested to address the concerns summarized above. Upon receipt of the updated report, we anticipate being able to provide revised comments in support of the application and conditions of approval.

Please note that the Niagara Peninsula Conservation Authority (NPCA) continues to be responsible for the review and comment on planning applications related to their regulated features. As such, the NPCA should be consulted with respect to requirements under the NPCA Regulations.

Regional staff are open to meeting to further discuss our comments, if desired. Please contact Adam Boudens, Senior Environmental Planner at 905-980-6000 (ext. 3770) or adam.boudens@niagararegion.ca should you have any questions or seek to arrange a meeting. Alternatively, please contact Cara Lampman, Manager, Environmental Planning at 905-980-6000 (ext. 3430) or cara.lampman@niagararegion.ca.

Stormwater Management

Regional staff reviewed the submitted 'Stormwater Management (SWM) Plan', dated October 2024 (prepared by Upper Canada Consultants), which proposes stormwater from the subject development be directed to two (2) SWM facilities, namely P30 and P3, prior to discharge to Towpath Drain. The facilities are sized to provide an Enhanced Level of water quality control, peak flow control, and erosion control, and the report indicates that the peak flow at Niagara Street will not exceed the existing level.

As such, staff offer no objection to the development SWM plan. The SWM and engineering plan details are subject to the review and approval from City staff to ensure their 'Northwest Welland SWM Implementation Plan (2022)' and local storm infrastructure requirements are adequately addressed, and the future SWM facilities will be subject to the City's Consolidated Linear Infrastructure Environmental Compliance Approval (CLI-ECA).

At the discretion of City staff, the applicant should confirm the following details prior to final approval:

a. The plan proposes that the future development of area A30 (see Figure 3 - the land located within the City of Thorold that currently drains to the Towpath Drain) bypasses P30 to a separate outlet to the creek. As such, staff recommend consideration for a flow route that will be required with the future development of A30.

b. Although this may not affect the pond configuration, a total of the internal and external drainage areas to a SWM pond should be used in sizing its permanent pool volume.

c. It is recommended that the 100-year 24-hour storm be used to confirm pond storage.

d. Major flow (i.e., overland flow) routes be directed to the pond main cells, in order to minimize resuspension of deposited sediment in the forebays.

e. With respect to SWM Pond P31, a berm is required to direct flows along the forebay length. It appears that flow short-circuiting will occur with the current configuration (refer to the Report Figure 6).

f. Confirm the 'percent imperviousness' of A300 in Figure 4, and the 'Average Discharge' of Pond Calculations for P30 &P31.

Servicing

Regional staff reviewed the Functional Servicing Report prepared by Upper Canada Consultants (dated October 2024). Staff provided comments in a markup version of the document (please see attached); however, key comments are summarized below.

Staff note that site servicing will be under the jurisdiction of the City of Welland and will require the construction of new water, sanitary and storm services for the proposed development. The servicing plan indicates that the local watermain and sanitary sewer will cross the municipal boundary into Thorold (via Street C) and would create a water/sewer billing issue between the municipalities. The plan should be revised so that

servicing does not cross into Thorold. Staff note it is currently understood that the City of Thorold has a servicing strategy utilizing Merritt Road.

The servicing plan proposes a single sanitary connection for the subject lands to the existing Regional sanitary sewer on Quaker Road. Engineering drawings showing details of this connection are to be submitted to the Region for review and comment, and the connection must be in accordance with Regional standards. The Region will require an application letter from the City and a connection permit fee of $1,250 submitted to Susan Dunsmore, P.Eng, Acting Director, Infrastructure Planning & Development Engineering at 905-980-6000 ext. 3661.

Staff note that any new servicing proposed to cross a Regional main are required to be detailed in plan and profile, and any changes to grades (cover) are to be shown on the plans.

Staff will need to ensure that Regional infrastructure will not be negatively impacted by the proposed site servicing. Final detailed engineering design drawings with calculations will be required for Regional review and approval, prior to the City signing off on the CLI ECA.

Transportation

The Region's current 10-year capital budget forecast includes the widening of Rice Road (Regional Road 54) between Quaker Road and Merritt Road. These works would include signalization of the Rice Road & Quaker Road intersection. Please note that the timing of these works are subject to change depending on Regional budget and priorities, and projects are not guaranteed until the construction budget year is approved by Regional Council.

Waste Collection

Regional staff note that subdivision developments are eligible to receive internal curbside waste collection, assuming they meet the requirements of Niagara Region's Waste Collection Policy. In order for this service to be provided, the developer/owner shall comply with the Niagara Region's Corporate Policy and By-laws related to curbside collection of waste and complete the Application for Commencement of Collection and Indemnity Agreement. The required forms and policy can be found at the following link: www.niagararegion.ca/waste

Future submissions are to confirm the intention for waste collection and include a waste collection plan to justify that the proposed road design meets the requirements of the current policy. It appears Street 'C' and Street 'G' will require temporary "T" turnarounds to accommodate collection until the adjacent developments occur. The drawing should indicate all road widths and curb radii. Regional staff ask that truck turning movements (using the Regional waste collection vehicle template) be included.

If the requirements of the Waste Collection Policy cannot be met, then waste collection will be the responsibility of the owner through a private contractor and not the Niagara Region.

Circular Materials Ontario is responsible for the delivery of Blue / Grey Box recycling collection services. The most up to date information regarding recycling can be found using the following link: https://www.circularmaterials.ca/resident-communities/niagara-region/

Conclusion

Regional Public Works Growth Management and Planning Division staff are not in a position to provide final comments and support for these applications at this time as additional information is required to confirm that the proposal will not have a negative impact on the Region's Natural Heritage System, in alignment with Provincial and Regional policies, as noted above and in the attached Appendix. Updated comments and recommended draft plan conditions to address Regional and Provincial interests will be provided upon review and approval of the requested EIS Addendum.

Please send copies of the staff report and notice of the City's decision on these applications. If you have any questions related to the above comments, please contact me at connor.wilson@niagararegion.ca.

Kind regards,



Connor Wilson
Development Planner

cc: Pat Busnello, MCIP, RPP, Manager of Development Planning, Niagara Region
Susan Dunsmore, P.Eng. Acting Director, Infrastructure Planning and Development Engineering, Niagara Region
Cara Lampman, Manager Environmental Planning, Niagara Region
Adam Boudens, M.Sc., Senior Environmental Planner, Niagara Region
Jake McGowan, Development Approvals Technician, Niagara Region
Josh Wilson, P. Eng., Acting Manager of Development Engineering, Niagara Region

Appendix

Detailed Environmental Planning Comments
210, 276 Quaker Road, City of Welland

1. The EIS does not include an analysis of all potentially relevant designated NES features outlined in the 2022 NOP. Notably, Mineral Shallow Marsh, Mineral Meadow Marsh, Forb Mineral Meadow Marsh and Mineral Thicket Swamp communities are confirmed present adjacent to Towpath Drain, but an assessment of 'Other Wetland' policies is absent in the Report. Further, it appears that 'Other Wetlands' are proposed for removal, and that buffers are not currently recommended from wetlands that will remain within the block containing Towpath Drain. These issues should be addressed in an EIS Addendum.

2. A Significant Woodland is mapped along the northern extent of the subject property. Staff understand that removals of woodland on the subject lands took place in 2020/2021, however, components of the woodland remain intact on the adjacent property. The Conceptual Site Plan shows development directly adjacent to the woodland but doesn't address whether a buffer is appropriate or has been considered. Staff request that this area be assessed in an EIS Addendum.

3. Staff request that a more fulsome discussion related to the location of wildlife corridors/linkages be included in the EIS Addendum. The subject property is located within the Northwest Welland Secondary Plan (SP) Area and was evaluated through the Subwatershed Study (SWS) component of the SP (Natural Heritage and Natural Hazards Existing Conditions report, prepared by Aquafor Beech, dated April 2019). Within the SWS, a north-south Natural Heritage Corridor as well as an east-west corridor (associated with Towpath Drain) were conceptually shown traversing the site. Both SP policies as well as NOP Policy 3.1.17, provide direction on how linkages are to be assessed as part of development applications. As such, staff request that additional information related to the form and function of the corridors as well as an evaluation of potential impacts (direct and indirect) to the corridor, including corresponding mitigation measures, be elaborated on in the Addendum. Staff note that a north-south corridor is identified as a requirement in the SP, however, the precise location of where this occurs on the subject lands is flexible provided appropriate justification is provided.

4. As it relates to blocks associated with Towpath Drain, staff request that the EIS Addendum confirm that the recommended block widths are sufficient to accommodate wildlife linkage/corridor requirements. Please also include a high-level mitigation strategy so that staff can be assured that potential negative impacts on the ecological and hydraulic functions provided in these blocks can be adequately addressed through detailed design.

5. There are numerous sloughs and wet depressions visible on the subject lands based on a review of aerial imagery. Staff request that they be assessed in

accordance with both wetland and headwater drainage feature survey protocols. Soil assessment data should also be provided.

6. The location of eco-passages associated with roads in the Study Area should be further explored to provide guidance that can be relied on at detailed design. Consideration of both wet and dry culverts should be included in the EIS Addendum.

7. Staff note that the EIS does not assess ‘supporting area and features’ or ‘enhancement areas’, as required by Niagara Official Plan (NOP) policies. Please include specific sections related to both in an EIS Addendum.

8. Staff note that a pedestrian trail network was not discussed in the EIS. If the applicant intends to create pedestrian trails within the Subject Lands, staff request that locations be considered and assessed at this stage in the process. Staff require assurance that if trails are being considered within NES features or buffers, that proper regard has been given to the width and design of buffers, etc.

9. Staff note that the EIS indicates that the block containing the drain will provide an aquatic and terrestrial movement corridor. Staff request that in addition to chain-link fencing that consideration be given to reptile and amphibian enclosure fencing to mitigate impacts between aquatic/terrestrial species and adjacent residential land uses. Please include an assessment of this mitigation measure in the EIS Addendum.

Niagara Region
Public Works Infrastructure Planning and Development Division
1815 Sir Isaac Brock Way, Thorold, ON L2V 4T7
905-980-6000 Toll-free:1-800-263-7215

Via Email Only

May 6, 2025

Region Files: PLOPA202401523; PLZBA202401522; PLSD202401516

Caitlin Kovacs
Development Planner
City of Welland
60 East Main Street
Welland, ON, L3B 3X4

Dear Ms. Kovacs:

Re: Regional and Provincial Comments (Revised)
Proposed Official Plan Amendment, Zoning By-law Amendment and Draft Plan of Subdivision
City Files: OPA 53, 2024-06, 26T-14-24004
Applicant: Ashton Homes
Agent: Upper Canada Consultants
210, 276 Quaker Road
City of Welland

Regional Infrastructure Planning and Development staff has reviewed the proposed Official Plan Amendment (OPA), Zoning By-law Amendment (ZBA), and Draft Plan of Subdivision (DPS) applications for lands municipally known as 210 and 276 Quaker Road in the City of Welland.

The OPA application seeks to modify the existing mapping and land use designations of the Northwest Welland Secondary Plan (NWSP) to recognize the realignment of the approved Towpath Drain that resulted in the shift of boundaries of the Environmental Conservation Area, Low Density Greenfield Residential, Medium Density Residential, and the Open Space and Recreation Area designations.

The ZBA applization proposes to rezone the subject lands from Agricultural (A1) and Environmental Conservation Overlay (EC) to Residential Low Density (RL-2-XX), in part, Residential Medium Density (RM-XX), in part, Open Space (OS), in part, and Environmental Conservation Overlay (EC), in part.

The Draft Plan proposes 263 lots for low density residential (single-family residential) and13 blocks for medium density residential (street town residential) for a total of 339 residential dwelling units.

A pre-consultation meeting was held to discuss the proposal on May 16, 2024, with City and Regional staff in attendance. Regional staff provided comments on the application December 19, 2024. The below revised comments are provided as Regional conditions related to regional infrastructure and waste collection were not previously provided.

Planning Act Changes

Staff advise pursuant to the *Planning Act*, as of March 31, 2025, Niagara Region is an upper-tier municipality without planning responsibilities. The council of an upper-tier municipality, on conditions agreed upon with the council of a lower municipality, may provide advice and assistance to lower-tier municipalities in respect of planning matters generally. Niagara Region has not entered into any service level agreement to continue providing planning support and advice to the City of Welland.

Please be advised that through this change to the *Planning Act*, the *Niagara Official Plan, 2022* (NOP) is effectively an official plan of the City of Welland, which remains in effect until the City revokes or amends it to provide otherwise. As such, City staff should be satisfied that the application conforms to NOP policies.

Under the Memorandum of Understanding (MOU) for Engineering Review between the City and the Region, the below comments are considered Regional requirements with respect to the Region's interests.

Servicing

Regional staff has reviewed the Functional Servicing Report (FSR), prepared by Upper Canada Consultants (dated October 2024). Staff have provided comments in a markup version of the document (see Appendix II), however key comments are summarized below.

Staff note that site servicing will be under the jurisdiction of the City of Welland and will require the construction of new water, sanitary, and storm services for the proposed development. The servicing plan indicates that the local watermain and sanitary sewer will cross the municipal boundary into Thorold (via Street C). This would create a water/sewer billing issue between the municipalities. The plan should be revised so that servicing does not cross into the City of Thorold. It is currently understood that the City of Thorold has a servicing strategy utilizing Merritt Road.

The servicing plan proposes a single sanitary connection for the subject lands to the existing Regional sanitary sewer on Quaker Road. Engineering drawings showing details of this connection are to be submitted to the Region for review and comment. The connection must be in accordance with Regional standards. The Region will require an application letter from the City, and a connection permit fee of $1,250 made to Susan Dunsmore, P.Eng, Acting Director, Infrastructure Planning & Development Engineering at 905-980-6000 ext. 3661.

Any new servicing proposed to cross a Regional main is required to be detailed in plan and profile drawings, and any changes to grades (cover) are to be shown on the plans.

Staff will need to ensure that Regional infrastructure will not be negatively impacted by the proposed site servicing. Final detailed engineering design drawings with calculations will be required for Regional review and approval, prior to the City signing off on the Consolidated Linear Infrastructure (CLI) Environmental Compliance Approval (ECA).

Transportation

The Region's current 10-year capital budget forecast includes widening Rice Road (Regional Road 54) between Quaker Road and Merritt Road. These works would also include signalization of the Rice Road & Quaker Road intersection. Please note that the timing of these works are subject change depending on Regional budget and priorities, and projects are not guaranteed until the construction budget year is approved by Regional Council.

Stormwater Management

The submitted 'Stormwater Management (SWM) Plan', prepared by Upper Canada Consultants (dated October 2024) proposes stormwater from the subject development be directed to two SWM facilities, namely P30 and P3, prior to Towpath Drain. The facilities are sized to provide an Enhanced level of water quality control, peak flow control, and erosion control, and the report indicates that the peak flow at Niagara Street will not exceed the existing level.

Therefore, staff have no objection to the development SWM plan. The SWM and engineering plan details are subject to the review and approval from City staff to ensure their 'Northwest Welland SWM Implementation Plan (2022)' and local storm infrastructure requirements will be adequately addressed, and the future SWM facilities are subject to the City's CLI ECA.

At the discretion of City staff, the applicant should confirm the following details prior to final approval:

a. The plan proposes that future development of area A30 (refer to Figure 3), i.e., land in City of Thorold currently drains to Towpath Drain, bypass P30 to a separate outlet to the creek. As such, a flow route that will be required by future development of A30 should be considered with the subject development plan.
b. This may not affect the pond configuration, however, a total of the internal and external drainage areas to a SWM pond should be used in sizing its permanent pool volume.
c. It is recommended that the 100-year, 24-hour storm be used to confirm pond storage.
d. Major flow (i.e., overland flow) routes are to be directed to pond main cells, in order to minimize resuspension of deposited sediment in forebays.

e. With respect to SWM Pond P31, a berm is required to direct flows along the forebay length. The current configuration, refer to the Report Figure 6, appears that flow short-circuiting will occur.
f. Confirm the 'percent imperviousness' of A300 of Figure 4, and the 'Average Discharge' of Pond Calculations of P30 &P31.

Waste Collection

Subdivision developments are eligible to receive internal curbside waste collection assuming they meet the requirements of Niagara Region's Waste Collection Policy. For this service to be provided, the developer/owner shall comply with the Niagara Region's Corporate Policy and By-laws related to curbside collection of waste and complete the Application for Commencement of Collection and Indemnity Agreement. The required forms and policy can be found at the following link: www.niagararegion.ca/waste.

Future submissions are to confirm the intention for waste collection and include a waste collection plan to justify that the proposed road design meets the requirements of the current policy. It appears Street 'C' and Street 'G' will require temporary "T" turnarounds to accommodate collection until adjacent developments occur. The drawing should indicate all road widths and curb radii, and we ask that truck turning movements (using the Regional waste collection vehicle template) be included.

If the requirements of the Waste Collection Policy cannot be met, then waste collection will be the responsibility of the owner through a private contractor and not the Niagara Region.

Circular Materials Ontario is responsible for the delivery of Blue / Grey Box recycling collection services. The most up to date information regarding recycling can be found using the following link: https://www.circularmaterials.ca/resident-communities/niagara-region/

Conclusion

Regional Infrastructure Planning and Development staff offer no objection to the applications, subject to the above comments and fulfillment of the conditions in Appendix I.

Please be advised that through changes to the *Planning Act*, the NOP is effectively an official plan of the City of Welland, which remains in effect until the City revokes or amends it to provide otherwise. As such, City staff should be satisfied that the application conforms to NOP policies.

Regards,



Josh Wilson, P.Eng
Acting Manger, Development Engineering

cc: Maggie Ding, P.Eng., Stormwater Management Engineer
Katie Young, MCIP, RPP, Senior Development Planner

Appendix I: Regional Conditions of Draft Plan Approval
Appendix II: Regional comments on submitted Functional Servicing Report

Appendix I

Regional Conditions of Draft Plan Approval

210 and 276 Quaker Road, Welland

Servicing

1. That the owner provides a written acknowledgement to Niagara Region stating that draft approval of this subdivision does not include a commitment of servicing allocation by Niagara Region as servicing allocation will not be assigned until the plan is registered and that any pre-servicing will be at the sole risk and responsibility of the owner.

2. That the owner provides a written undertaking to Niagara stating that all Offers and Agreements of Purchase and Sale or Lease, which may be negotiated prior to registration of this subdivision shall contain a clause indicating that servicing allocation for the subdivision will not be assigned until the plan is registered, and a similar clause be inserted in the subdivision agreement between the owner and the City.

3. That prior to final approval for registration of this plan of subdivision, the owner shall submit the design drawings [with calculations] for the sanitary and storm drainage systems required to service this development to confirm capacity in the Regional system prior to the City signing off the CLI ECA

4. That the City obtain, on behalf of the owner, approval from the Regional Municipality of Niagara to connect to the Region's trunk sanitary sewer.

Stormwater Management

5. That prior to approval of the final plan or any on-site grading, the owner submit a stormwater management report for the subdivision, and the following plans designed and sealed by a qualified professional engineer in accordance with the Ministry of the Environment, Conservation and Parks documents entitled Stormwater Management Planning and Design Manual, March 2003 and Stormwater Quality Guidelines for New Development, May 1991, or their successors to the Niagara Region for review and approval:
    a) Detailed lot grading, servicing and drainage plans, noting both existing and proposed grades and the means whereby overland flows will be accommodated across the site.
    b) Detailed erosion and sedimentation control plans.
    c) Prior to final approval for registration of this plan of subdivision, the owner shall submit confirmation that the stormwater management facilities required to service this development are thru City CLI-ECA process.

6. That the Subdivision Agreement between the owner and the City contain provisions whereby the owner agrees to implement the approved plans required in accordance with the above-noted condition.

Waste Collection

7. That the owner ensure that all streets and development blocks can provide an access in accordance with the Regional Municipality of Niagara Corporate Policy and By-laws relating to the curbside collection of waste and recycling throughout all phases of development. Where a through street is not maintained, the owner shall provide a revised draft plan to reflect a proposed temporary "T" turnaround or cul-de-sac designed to Regional standards.

8. That the owner/developer ensure that all streets and development blocks can provide an access in accordance with the Niagara Region's Corporate Policy and By-laws relating to the curbside collection of waste and recycling.

9. That the owner/developer shall comply with the Niagara Region's Corporate Policy for Waste Collection and complete the Application for Commencement of Collection and Indemnity Agreement.

Clearance of Conditions

Prior to granting final approval, the City of Welland must be in receipt of written confirmation that the requirements of each condition have been met satisfactorily and that all fees have been paid to the satisfaction of Niagara Region.

Subdivision Agreement

Prior to final approval for registration, a copy of the executed Subdivision Agreement for the proposed development should be submitted to Niagara Region for verification that the appropriate clauses have been included. Niagara Region recommends that a copy of the draft agreement be provided in order to allow for the incorporation of any necessary revisions prior to execution.

Note: Clearance requests shall be submitted to the Region in accordance with the Memorandum of Understanding, which stipulates that requests for formal clearance of conditions are to be received and circulated to the Region by the local municipality. The local municipality is also responsible for circulating a copy of the draft agreement, and the Region is unable to provide a final clearance letter until the draft agreement is received. The Region is committed to reviewing submissions related to individual conditions prior to receiving the formal request for clearance. In this regard, studies and reports can be sent directly to the Region with a copy provided to the local municipality.

6/8/25

Planning Department

City of Welland

Attention: Caitlin Kovacs

Re: 210, 276 Quaker Road, Welland - Official Plan Amendment, Zoning By-law Amendment, and Draft Plan of Subdivision

To whom this may concern:

We have reviewed the circulation regarding the above noted application. The following paragraphs are to be included as a condition of approval:

Bell Canada Condition(s) of Approval

1) The Owner acknowledges and agrees to convey any easement(s) as deemed necessary by Bell Canada to service this new development. The Owner further agrees and acknowledges to convey such easements at no cost to Bell Canada.

2) The Owner agrees that should any conflict arise with existing Bell Canada facilities where a current and valid easement exists within the subject area, the Owner shall be responsible for the relocation of any such facilities or easements at their own cost. Upon receipt of this comment letter, the Owner is to provide Bell Canada with servicing plans/ CUP at their earliest convenience to planninganddevelopment@bell.ca to confirm the provision of communication/telecommunication infrastructure needed to service the development.

The Owner acknowledges and agrees that it is the responsibility of the Owner to provide entrance/service duct(s) at their own cost from Bell Canada's existing network infrastructure to service this development. In the event that no such network infrastructure exists, in accordance with the Bell Canada Act, the Owner shall be required to pay for the extension of such network infrastructure.

If the Owner elects not to pay for the above noted connection, Bell Canada may decide not to provide service to this development.

Concluding Remarks:

To ensure that we are able to continue to actively participate in the planning process and provide detailed provisioning comments, we note that we would be pleased to receive circulations on all applications received by the Municipality and/or recirculations.
If you believe that these comments have been sent to you in error or have questions regarding Bell's protocols for responding to municipal circulations and enquiries, please contact circulations@bell.ca directly.

Should you have any questions, please contact the undersigned.

Yours Truly,

Mohammad Bangee
mohammad.bangee@bell.ca

CANADA POST
955 HIGHBURY AVE N
LONDON ON N5Y 1A3
CANADAPOST.CA

POSTES CANADA
955 HIGHBURY AVE N
LONDON ON N5Y 1A3
POSTESCANADA.CA

December 5, 2024

CAITLIN KOVACS
CITY OF WELLAND
60 EAST MAIN STREET
WELLAND, ON L3B 3X4

Re: 210, 276 Quaker Road, Welland

Dear Caitlin,

This development will receive mail service to centralized mail facilities provided through our Community Mailbox program.

I will specify the conditions which I request to be added for Canada Post Corporation's purposes.

The owner shall complete to the satisfaction of the Director of Engineering of the City of Welland and Canada Post:

a) Include on all offers of purchase and sale, a statement that advises the prospective purchaser:

   i) that the home/business mail delivery will be from a designated Centralized Mail Box.

   ii) that the developers/owners be responsible for officially notifying the purchasers of the exact Centralized Mail Box locations prior to the closing of any home sales.

b) The owner further agrees to:

   i) work with Canada Post to determine and provide temporary suitable Centralized Mail Box locations which may be utilized by Canada Post until the curbs, boulevards and sidewalks are in place in the remainder of the subdivision.

   ii) install a concrete pad in accordance with the requirements of and in locations to be approved by Canada Post to facilitate the placement of Community Mail Boxes

Enbridge Gas Inc.
500 Consumers Road
North York, Ontario M2J 1P8
Canada

November 19, 2024

Caitlin Kovacs
Development Planner
Infrastructure and Development Services
City of Welland
60 East Main Street
Welland, ON L3B 3X4

Dear Caitlin,

Re: Draft Plan of Subdivision, Official Plan Amendment, Zoning By-Law Amendment
Ashton Homes
210, 256 & 276 Quaker Road
City of Welland
File No.: 26T-14-24004, OPA 53, 2024-06

Enbridge Gas does not object to the proposed application(s) however, we reserve the right to amend or remove development conditions. This response does not signify an approval for the site/development.

Please always call before you dig, see web link for additional details:
https://www.enbridgegas.com/safety/digging-safety-for-contractors

The Owner agrees to provide Enbridge Gas Inc. (Enbridge Gas) the necessary easements at no cost and/or agreements required by Enbridge Gas for the provision of local gas services for this project, in a form satisfactory to Enbridge Gas.

Sincerely,

Willie Cornelio CET
Sr Analyst Municipal Planning
Engineering

ENBRIDGE
TEL: 416-495-6411
500 Consumers Rd, North York, ON M2J1P8
enbridge.com
Safety. Integrity. Respect. Inclusion.

From: AMIN Pranav
To: Caitlin Kovacs
Subject: Welland - 210, 276 Quaker Road - 26T-14-24004
Date: November 27, 2024 4:38:14 PM

Welland Security Warning: This is an external email. Please do not click links or open attachments unless you are sure they are safe!

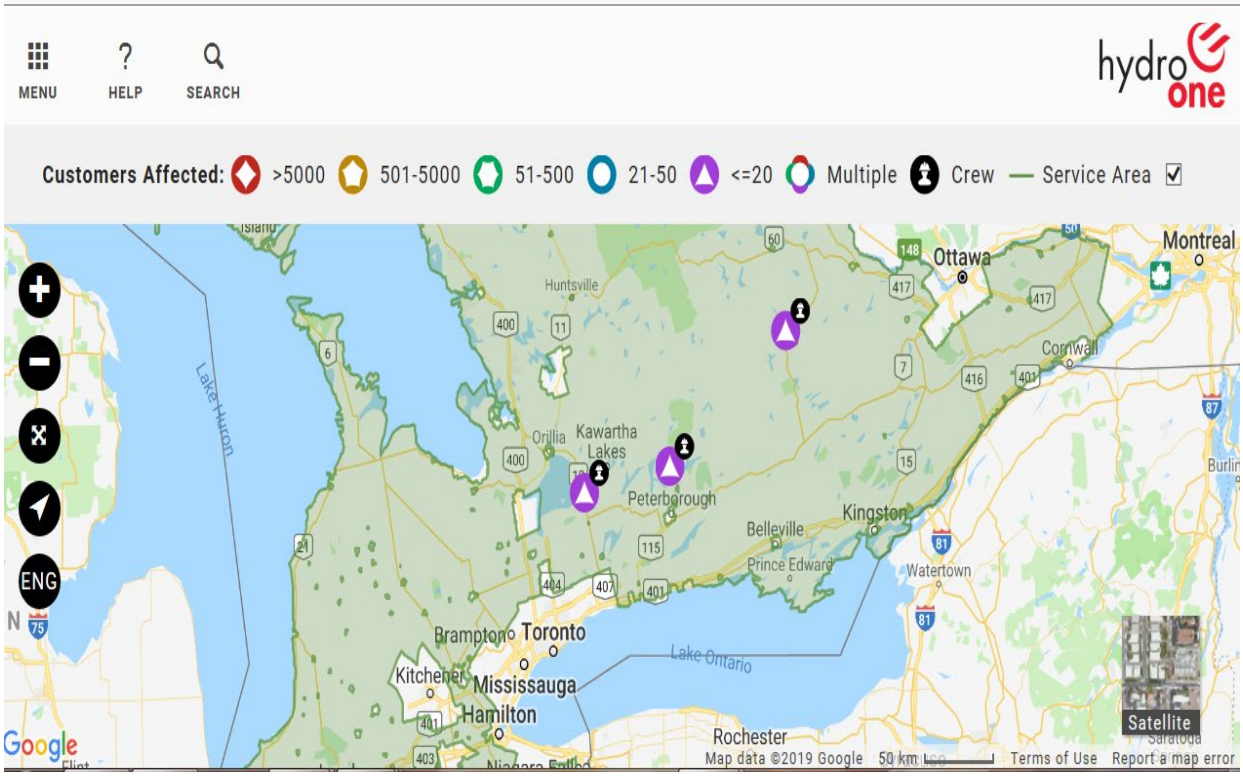
Hello,

We are in receipt of your Application for Subdivision, 26T-14-24004 dated 2024-11-13. We have reviewed the documents concerning the noted Plan and have no comments or concerns at this time. Our preliminary review considers issues affecting Hydro One's 'High Voltage Facilities and Corridor Lands' only.

For proposals affecting 'Low Voltage Distribution Facilities' the Owner/Applicant should consult their local area Distribution Supplier. Where Hydro One is the local supplier the Owner/Applicant must contact the Hydro subdivision group at subdivision@Hydroone.com or 1-866-272-3330.

To confirm if Hydro One is your local distributor please follow the following link: Stormcentre (hydroone.com)

Please select "Search" and locate the address in question by entering the address or by zooming in and out of the map.



If you have any further questions or inquiries, please contact Customer Service at 1-888-664-9376 or e-mail CustomerCommunications@HydroOne.com to be connected to your Local Operations Centre

If you have any questions please feel free to contact myself.

Thank you,

Dennis De Rango
Specialized Services Team Lead,
Real Estate Department

Niagara Peninsula CONSERVATION nature for all

3350 Merrittville Hwy. Unit 9
Thorold Ontario L2V 4Y6
905.788.3135 | info@npca.ca | npca.ca

June 5, 2025

Via Email Only

Caitlin Kovacs
Development Planner
City of Welland
60 East Main Street
Welland ON, L3B 3X4

NPCA File No.: PLSUB202401403

Dear Ms. Kovacs,

Re: Niagara Peninsula Conservation Authority (NPCA) Comments
Application for Official Plan Amendment, Zoning Bylaw Amendment, and Draft Plan of Subdivision
City of Welland: 210, 256, 276 Quaker Road
Municipal File Nos.: OPA No. 53, ZBA 2024-06, 26T-14-24004

The NPCA has received a request to review the complete application in relation to a proposed residential subdivision, inclusive 344 dwelling units. These are inclusive of 268 single detached dwelling units, and 76 street townhouses. The application will also incorporate a park block, stormwater management facilities, and a watercourse block. In response to this request, we offer the following comments.

The NPCA regulates watercourses, flood plains (up to the 100-year flood level), Great Lakes shorelines, hazardous land, valleylands, and wetlands under *Ontario Regulation 41/24* of the *Conservation Authorities Act*. The NPCA's *Policies for Planning and Development in the Watersheds of the Niagara Peninsula Conservation Authority* (NPCA policies) provides direction for managing NPCA regulated features. The subject lands are impacted by a watercourse and 100-year floodplain associated with the Towpath Drain.

Official Plan and Zoning Bylaw Amendment

An Official Plan Amendment is required to adjust and implement the land use designations as presented in the Northwest Welland Secondary Plan. Due to a recently issued works permit for the realignment of the Towpath Drain, mapping and schedule changes are required. The proponents are not proposing any amendments to the Policies. The EC Overlay is slated to align with the Towpath Drain block across the property. The NPCA has reviewed the Draft Official Plan Amendment and does not offer objections to the OPA.

A Zoning Bylaw Amendment is required to facilitate the Zoning as set forward in the Northwest Welland Secondary Plan. The lands are to be zoned a 'Residential Low Density' (RL-NWSP), 'Residential Medium Density' (RM-NWSP), Environmental Conservation Overlay (EC-NWSP), and an Open Space (OS) Zone. The NPCA has reviewed the Draft Zoning Bylaw Amendment and does not offer objections to the ZBA.

Niagara Peninsula CONSERVATION nature for all

3350 Merrittville Hwy. Unit 9
Thorold Ontario L2V 4Y6
905.788.3135 | info@npca.ca | npca.ca

Draft Plan of Subdivision and Conditions of Draft Approval

The NPCA has reviewed the Draft Plan of Subdivision (dated April 22, 2025) as prepared by Chambers & Associates., and associated Functional Servicing Report (dated May 2025) as prepared by Upper Canada Planning and Engineering Ltd. The NPCA notes that at a high level the design can be achieved. Detailed design elements can address the remaining concerns, and a draft plan condition has been created to address this item. Our Agency does not offer objections to the stormwater management strategy that calls for post-development peak flows to be attenuated to pre-development levels prior to discharge to the Towpath Drain, and that the strategy calls for extended detention volume to be detained for 24 hours prior to discharge to the Towpath Drain. We recognize wet ponds will be used to achieve this, offer no objections, and can confirm that our Agency believes these ponds are sized appropriately. The applicant should be aware that if the outlets for the ponds are within the 100-year floodplain, the function of the ponds may be compromised under 100-year conditions. The NPCA advises that through the realignment of the Towpath Drain, the 100-year floodplain will be incorporated within the watercourse block, and so will be contained away from the residential uses of the property.

The NPCA requests the following conditions be incorporated into the Conditions of Draft Approval for the Subdivision application.

1. That the Developer submits to the Niagara Peninsula Conservation Authority for review and approval, grading, storm servicing, stormwater management, staging and sequencing, and construction sediment control drawings. The Owner agrees that all Sediment and Erosion Control Measures shall be maintained in good condition for the duration of construction until all disturbed surfaces have been stabilized.

2. That prior to the commencement of any works or site alterations, the Owner shall obtain Work Permits from the NPCA for any works associated with the construction of the proposed stormwater outlet to the Towpath Drain. In support of the application, the following information will be required:
    a. Detailed design plans respecting the outlet, with associated riprap.
        i. Outfalls and riprap should not be perpendicular to flows and an updated design to align with the watercourse flow should be included for the works permit.
    b. Any other information as may be determined necessary by the NPCA.

3. That the Developer provides a 1.5 metre high (minimum) chain link fence along the lot lines of Blocks 1 to 21, 143, 223 to 233 (along the Towpath Drain) to the satisfaction of the Niagara Peninsula Conservation Authority.

4. That the Towpath Drain Block be zoned Environmental Conservation; Hazard; or similar zone categories that appropriately protect the features within these Blocks, to the satisfaction of the Niagara Peninsula Conservation Authority

5. That Conditions 1 to 4 above be incorporated into the Subdivision Agreement between the Developer and the City of Welland, to the satisfaction of the Niagara Peninsula Conservation Authority. The City of Welland shall circulate the draft Subdivision Agreement to the Niagara Peninsula Conservation Authority for its review and approval.

Niagara Peninsula CONSERVATION nature for all

3350 Merrittville Hwy. Unit 9
Thorold Ontario L2V 4Y6
905.788.3135 | info@npca.ca | npca.ca

Conclusion

In summary, the NPCA is supportive of the Official Plan Amendment, Zoning Bylaw Amendment, and Draft Plan of Subdivision the subject lands, provided the Draft Plan Conditions are incorporated.

I trust the above will be of assistance to you. Should you have any further questions or require further information in this matter, please do not hesitate to call. For administrative purposes, please forward any decisions and resolutions of your Council. In the event of an appeal to the Ontario Land Tribunal (OLT) please send notice of any Case Management Conference.

Please send a copy of any Staff Reports and/or Council recommendations once they are available. If you have any questions, please let me know.

Thank you,



Taran Lennard
Watershed Planner II
(905) 788-3135 ext. 277
tlennard@npca.ca

From: Taran Lennard
To: Caitlin Kovacs
Subject: RE: NPCA Review Response: 210, 256, 276 Quaker Road, Welland - Official Plan Amendment, Zoning By-law Amendment, and Draft Plan of Subdivision
Date: December 13, 2024 1:09:11 PM
Attachments: image001.png

Welland Security Warning: This is an external email. Please do not click links or open attachments unless you are sure they are safe!

Hi Caitlin,

The NPCA will require clarity on the SWM Pond and Outlet prior to finalizing our comments. If the Pond fills and overflows, this may have impacts to the 100-year floodplain.

- The NPCA notes outlets for both P30 and P31 are within the 100-year flood depth for the Towpath Drain. The NPCA notes that the form and function of these SWM Ponds may be compromised under 100-year conditions. It is the opinion of NPCA that the Pond will likely not design as intended under 100-year conditions and believe it may need to be enlarged which may impact the block sizing. Please revise and/or provide clarity to NPCA.
- Further, the NPCA would not support outfalls and associated rip-rap perpendicular to flow. The NPCA would require the proposed outfalls and rip-rap to be revised to align with the flow of the watercourse.

Thank you.

Taran Lennard
Watershed Planner II

Niagara Peninsula Conservation Authority (NPCA)
3350 Merrittville Highway | Unit 9 | Thorold, ON L2V 4Y6

905.788.3135 ext. 277
www.npca.ca
tlennard@npca.ca

For more information on Permits & Planning, please go to the Permits & Planning webpage at https://npca.ca/administration/permits.

For mapping on features regulated by the NPCA please go to our GIS webpage at https://gis-npca-camaps.opendata.arcgis.com/ and utilize our Watershed Explorer App or GIS viewer.

To send NPCA staff information regarding a potential violation of Ontario Regulation 41/24 please go to the NPCA Enforcement and Compliance webpage at https://npca.ca/administration/enforcement-compliance

From: Caitlin Kovacs <caitlin.kovacs@welland.ca>
Sent: November 12, 2024 3:42 PM
Subject: 210, 276 Quaker Road, Welland - Official Plan Amendment, Zoning By-law Amendment, and Draft Plan of Subdivision

Good Afternoon,

The following complete applications have been made for 210, 276 Quaker Road, Welland.

- Official Plan Amendment, City file no. OPA No. 53
- Zoning By-law Amendment, City file no. 2024-06
- Draft Plan of Subdivision, City file no. 26T-14-24004

The submission material is available via the link below.
Commenting Items - 210, 276 Quaker, Welland.zip

Please have any comments returned to me no later then December 20, 2024.

Thank you,

City logo

Caitlin Kovacs
Development Planner
Planning Division
60 East Main Street, Welland, Ontario L3B 3X4
Phone: 905-735-1700 x2131
welland.ca
engagewelland.ca

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This email has been scanned for spam and viruses by Proofpoint Essentials. Click here to

From: Shannon Larocque
To: Caitlin Kovacs
Subject: RE: 210, 276 Quaker Road, Welland - Official Plan Amendment, Zoning By-law Amendment, and Draft Plan of Subdivision
Date: November 19, 2024 9:43:54 AM

Welland Security Warning: This is an external email. Please do not click links or open attachments unless you are sure they are safe!

Hi Caitlin,
Thank you for circulating these applications. The Town of Pelham has no comments at this time.
Best Regards,
Shannon

Shannon Larocque, MCIP. RPP.
Manager of Planning
Town of Pelham
D: 905-980-6661 | E: slarocque@pelham.ca
T: 905-892-2607 x319
20 Pelham Town Square | PO Box 400 | Fonthill, ON | L0S 1E0

TOWN OF PELHAM CONFIDENTIALITY NOTICE
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From: Caitlin Kovacs <caitlin.kovacs@welland.ca>
Sent: Tuesday, November 12, 2024 3:42 PM
Subject: 210, 276 Quaker Road, Welland - Official Plan Amendment, Zoning By-law Amendment, and Draft Plan of Subdivision

Good Afternoon,

The following complete applications have been made for 210, 276 Quaker Road, Welland.

- Official Plan Amendment, City file no. OPA No. 53
- Zoning By-law Amendment, City file no. 2024-06
- Draft Plan of Subdivision, City file no. 26T-14-24004

The submission material is available via the link below.
Commenting Items - 210, 276 Quaker, Welland.zip

Please have any comments returned to me no later then December 20, 2024.

Thank you,

From: Zachary Sherwood
To: Caitlin Kovacs
Subject: RE: 210, 276 Quaker Road, Welland - Official Plan Amendment, Zoning By-law Amendment, and Draft Plan of Subdivision
Date: November 15, 2024 2:18:55 PM
Attachments: image001.png

Welland Security Warning: This is an external email. Please do not click links or open attachments unless you are sure they are safe!

Hi Caitlin,

No comments from Welland Hydro at this present time.

Zach Sherwood
Assets & Engineering Supervisor

Welland Hydro Electric System Corp.
950 East Main St, Welland, ON L3B 0L9
Ph: 905-732-1381 Ext 238 | Fax: 905-732-0123
Email: zsherwood@wellandhydro.com

Welland Hydro ELECTRIC SYSTEM CORP.
POWERING WELLAND'S FUTURE

Save paper: do you really need to print this e-mail?

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The submission material is available via the link below.
Commenting Items - 210, 276 Quaker, Welland.zip

Please have any comments returned to me no later then December 20, 2024.

Thank you,

City logo

Caitlin Kovacs
Development Planner
Planning Division
60 East Main Street, Welland, Ontario L3B 3X4
Phone: 905-735-1700 x2131
welland.ca
engagewelland.ca

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COUNCIL MEETING

PLANNING AND DEVELOPMENT SERVICES
PLANNING DIVISION

REPORT P&B-2025-30
July 8, 2025

SUBJECT:	**Request for Redline Revision to Draft Plan of Common Element Condominium – Warbler Place – 205 Lancaster Drive**
AUTHOR:	**Caitlin Kovacs, B.URPl** **Development Planner**
APPROVING SUPERVISOR:	**Taylor Meadows, B.URPI, CPT, RPP, MCIP** **Manager of Development Planning**
APPROVING MANAGER:	**Michael Greenlee, RPP, MCIP** **Manager of Planning Services**
APPROVING DIRECTOR:	**Grant Munday, B.A.A, RPP, MCIP** **Director, Planning And Development Services**

RECOMMENDATION:

THAT Council approves the Redline Draft Plan of Common Element Condominium for the Warbler Place Common Element Condominium (File no. 26CD-14-23003)

RELATIONSHIP TO STRATEGIC PLAN

This recommendation is aligned to Council's strategic priority of ensuring "**Liveability**" by creating a sense of belonging while enhancing mobility by improving access to recreation and community events, ensuring adequate housing options, encouraging job growth, and improving ways to efficiently move people throughout the city.

EXECUTIVE SUMMARY:

On May 25, 2025, the City received a request for Redline Revision to the Draft Plan of Common Element Condominium for 205 Lancaster Drive. No objections have been received from the Region of Niagara or the Niagara Peninsula Conservation Authority. The request is considered minor in nature and is supported by City staff.

BACKGROUND:

On February 27, 2024, the Warbler Place Common Element Condominium (File No. 26CD-14-23003) received Council approval, and has a lapsing date of February 27, 2027.

The Draft Plan of Common Element Condominium for Warbler Place consists of 14 Blocks, four private streets, four laneways, one greenway, and three woonerfs. The intention of the redline revision is to expand the common element to facilitate the inclusion of additional lands of the Owner.

DISCUSSION:

There has been one previous request for redline revision to the Draft Plan of Common Element Condominium. The previous redline request was made to permit a reduction in the buffer setback from 7.5 metres to 4.5 metres. This redline request has been reviewed and approved. The subject redline request is being made to continue the buffer setback down along the additional lands of the Owner. The 4.5 metre setback is to be maintained. These lands are part of the common element. The following document was submitted in support of the request:

- Revised Addendum to Slope Stability Assessment, dated, March 18, 2024 (Prepared by Niagara Testing and Inspection Ltd.)

In accordance with the Memorandum of Understanding amongst the local municipalities, Region of Niagara, all requests for redline revision to Draft Plans of Common Element Condominium to be circulated to the Region and NPCA for comments. This is to ensure that any conditions of Draft Plan Approval comply with current policies.

Both Agencies have been circulated and at the time of writing this report, no objections have been received.

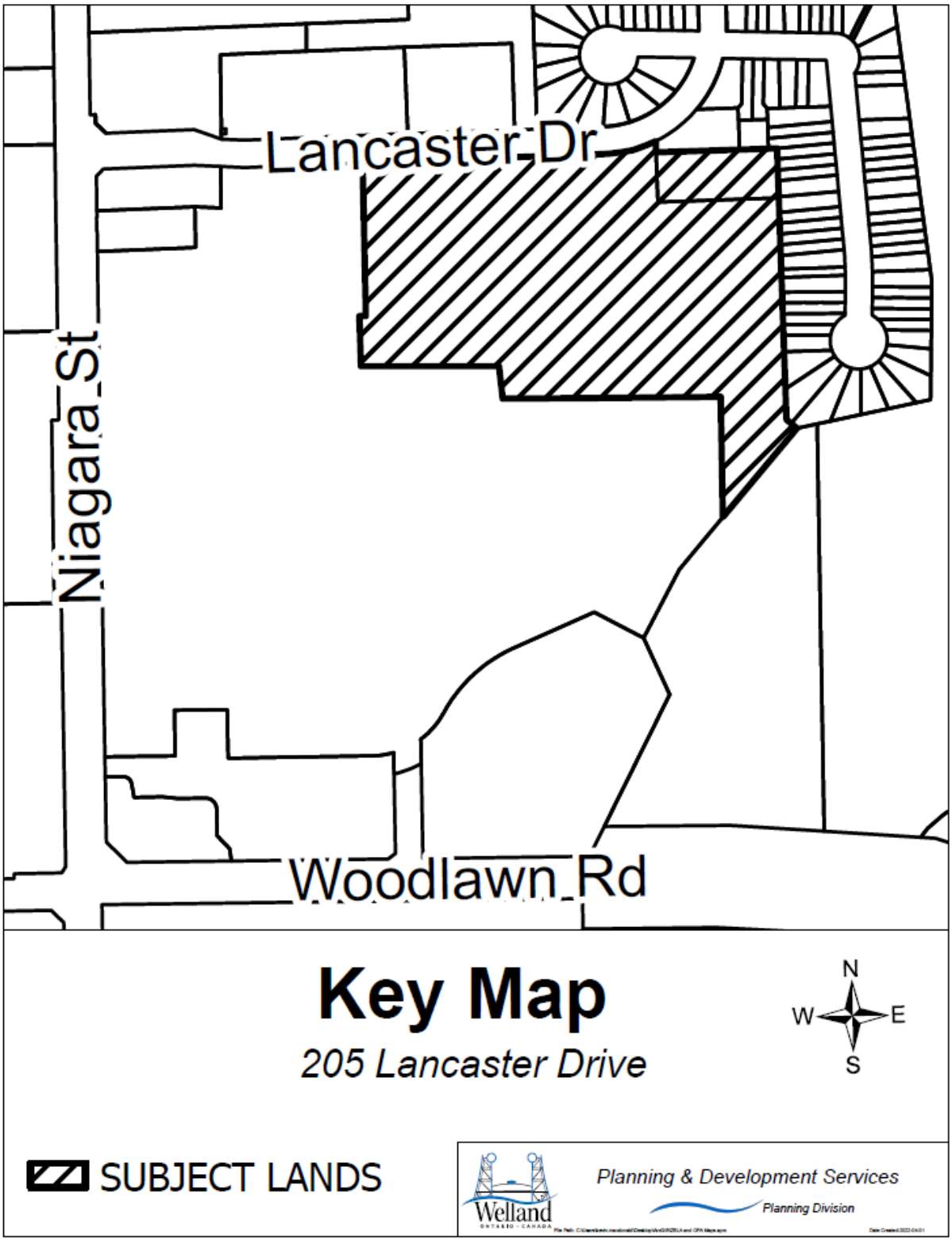
FINANCIAL:

There are no financial impacts resulting from the recommendation in this report.

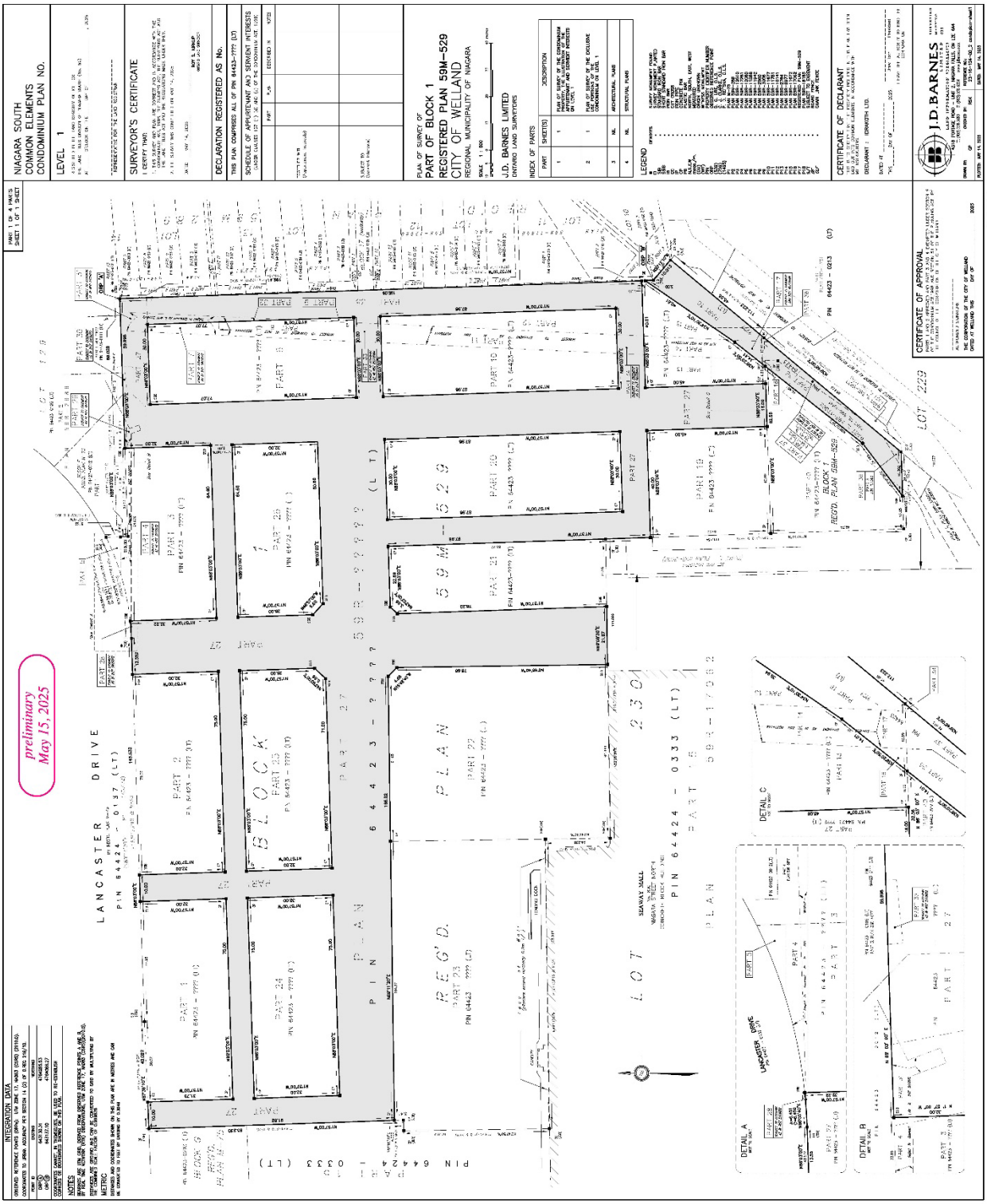
ATTACHMENT:

Appendix I - Key Map
Appendix II - Redline Draft Plan of Common Element Condominium
Appendix III - Top of Stable Slope Drawing

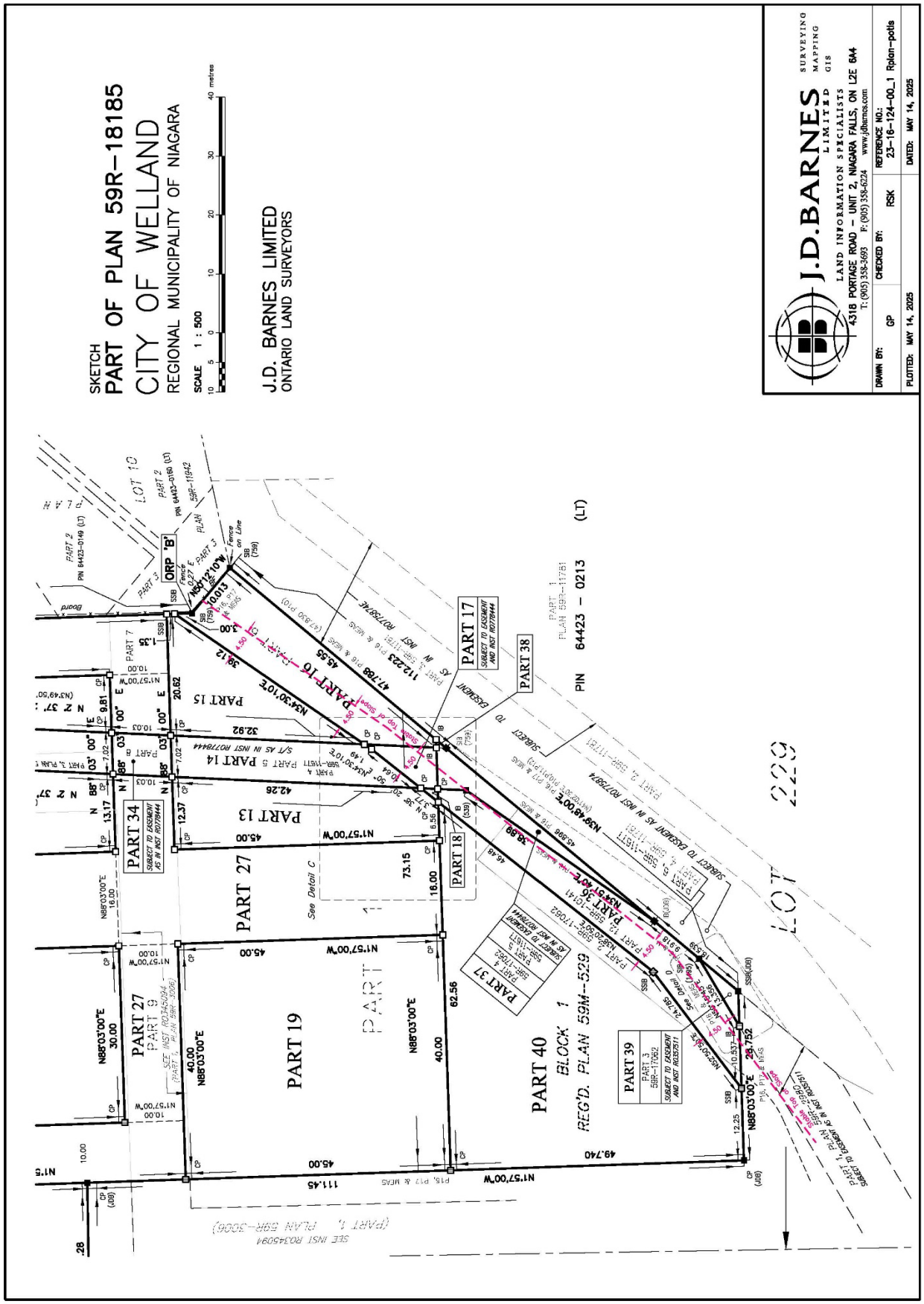
Appendix I


Lancaster Dr
Niagara St
Woodlawn Rd
Key Map
205 Lancaster Drive
N
W
E
S
SUBJECT LANDS
Welland
Planning & Development Services
Planning Division

Appendix II


NIAGARA SOUTH
COMMON ELEMENTS
CONDOMINIUM PLAN NO.
LEVEL 1
SURVEYOR'S CERTIFICATE
DECLARATION REGISTERED AS No.
PLAN OF SURVEY OF
PART OF BLOCK 1
REGISTERED PLAN 59M-529
CITY OF WELLAND
REGIONAL MUNICIPALITY OF NIAGARA
J.D. BARNES LIMITED
ONTARIO LAND SURVEYORS
INDEX OF PARTS
LEGEND
CERTIFICATE OF APPROVAL
CERTIFICATE OF DECLARANT
J.D.BARNES
preliminary
May 15, 2025
LANCASTER DRIVE
BLOCK 1
REGD. PLAN 59M-529
SEAWAY MALL
DETAIL A
DETAIL B
DETAIL C

Appendix III


SKETCH
PART OF PLAN 59R-18185
CITY OF WELLAND
REGIONAL MUNICIPALITY OF NIAGARA
SCALE 1 : 500
J.D. BARNES LIMITED
ONTARIO LAND SURVEYORS
J.D.BARNES
LIMITED
SURVEYING
MAPPING
GIS
LAND INFORMATION SPECIALISTS
4318 PORTAGE ROAD - UNIT 2, NIAGARA FALLS, ON L2E 6A4
T: (905) 358-3693 F: (905) 358-6224 www.jdbarnes.com
DRAWN BY: GP
CHECKED BY: RSK
REFERENCE NO.: 23-18-124-00_1 Rplan-potls
PLOTTED: MAY 14, 2025
DATED: MAY 14, 2025
PIN 64423 - 0213 (LT)
PART 1 59R-11781
PART 2 59R-11781
PART 3 59R-11781
PART 4 59R-11781
PART 5 59R-11781
PART 6 59R-11781
PART 7 59R-11781
PART 8 59R-11781
PART 9 59R-11781
PART 10 59R-11781
PART 11 59R-11781
PART 12 59R-11781
PART 13 59R-11781
PART 14 59R-11781
PART 15 59R-11781
PART 16 59R-11781
PART 17 59R-11781
PART 18 59R-11781
PART 19 59R-11781
PART 27 59R-11781
PART 34 59R-11781
PART 37 59R-11781
PART 38 59R-11781
PART 39 59R-11781
PART 40 59R-11781
BLOCK 1 REG'D. PLAN 59M-529
LOT 10
LOT 11
PLAN 59R-11942
PART 2 PIN 64423-0160 (LT)
PART 2 PIN 64423-0149 (LT)
ORP 'B'
Fence on Line
Fence 0.27 E
N60°12'10"W
10.013
SSB (759)
SSB (759)
SSB (759)

NOTICE OF MOTION

SUBMITTED BY: **Councillor Chiocchio**

SUBMISSION DATE: **June 17, 2025**

Notice of Motion:

City of Welland staff report back to Council with costs of installing large roadway markings indicating school crossing zone as well as with mid road signage indicating speed. Staff to concentrate on high traffic school zones and for the report to come back prior to the September 2025 school year, and take an example of the Town of Pelham as they have school markings zones. Ref. No. 25-22