



vallee

*Consulting Engineers,
Architects & Planners*

December 23, 2021

Norfolk County
Planning and Development
Robinson Administration Building
185 Robinson Street, Suite 200
Simcoe, ON N3Y 5L6

Attention: Mohammad Alam MPL, MUD, RPP, MCIP

**Reference: Planning Justification Report
Official Plan and Zoning By-law Amendment
G. Douglas Vallee Limited on behalf of Verlinda Homes
Southeast Corner of Lam Boulevard and Old Highway 24, Waterford
Roll# 33605062868**

Dear Mohammad,

Enclosed please find the necessary documents to complete an Official Plan and Zoning By-law amendment for the subject property, including:

- Signed Norfolk County Development Application, dated December 21, 2021;
- Cheque Payable to Norfolk County in the amount of \$8,800.00;
- Planning Justification Report, G. Douglas Vallee Limited, dated December 23, 2021;
 - Appendix A – Concept Site Plan;
 - Appendix B – Provincial Policy Statement 2020 – Policy Compliance;
 - Appendix C – Norfolk County Official Plan – Policy Compliance.
- Traffic Impact Study (prepared by Paradigm Transportation Solutions Limited, dated December 2021);
- D-6 Compatibility and Noise Assessment Study (prepared by CCS Engineering Inc. dated December 9, 2021);
- Functional Servicing Report (prepared by G. Douglas Vallee Limited dated December, 2021).

G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects & Planners



Authorized by the Association of Professional Engineers of Ontario
to offer professional engineering services.



Ontario Association
of Architects

If you require any further information, please do not hesitate to contact me at scottpuillandre@gdvallee.ca or 519-426-6270.

Regards,



Scott Puillandre, CD, MSc
Planner
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects & Planners

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Planning Department Development Application Form

Complete Application

A complete development application consists of the following:

1. A properly completed and signed application form (signature must be original in planners file);
2. Supporting information adequate to illustrate your proposal as indicated in **Section H** of this application form (plans are required in paper copy and digital PDF format);
3. Written authorization from the registered owner of the subject lands where the applicant is not the owner as per Section N; and,
4. Cash, debit or cheque payable to Norfolk County in the amount set out in the user fees By-Law.

The above information is required to ensure that your application is given full consideration. An incomplete or improperly prepared application will not be accepted and may result in delays during the processing of the application. This application must be typed or printed in ink and completed in full.

Pre-Submission Consultation “Pre-consultation”:

A pre-consultation meeting with staff is required for all applications; however, minor applications may be exempted depending on the nature of the proposal, with approval from the Director of Planning or delegate. The purpose of a pre-consultation meeting is to provide the applicant with an opportunity to present the proposed application, discuss potential issues, and for the County and Agency staff to identify the required information and materials to be submitted with the application in order for it to be considered complete. The applicant has the opportunity to make revisions to the application prior to submission, without the additional costs of recirculation fees. It may be necessary to seek the assistance of independent professional help (for example, a planning consultant or engineer) for complex applications. If a pre-consultation meeting has been held to discuss your development, please **include a copy of the Pre-consultation minutes with your application** as part of the submission package. It should be noted that **pre-consultation minutes are valid for one year after the meeting date.**

Development Application Process

Once an application has been deemed complete by a planner, it will be circulated to public agencies and County departments for review and comments. Notice of the application is also provided to adjacent land owners. The comments received assist the planner with the review and recommendation/approval of your application. The time involved in processing an application varies depending upon its complexity and its

acceptability to the other agencies and is subject to statutory *Planning Act* decision timeframes.

An additional fee will be required if a review by the Long Point Region Conservation Authority or by the Grand River Conservation Authority is deemed necessary by planning staff and/or by the Authority. A separate cheque payable to the Long Point Region Conservation Authority or the Grand River Conservation Authority is required in accordance with their fee schedule at the same time your application is submitted.

Additional studies required as part of the complete application shall be at the sole expense of the applicant. It should also be noted that in some instances peer reviews may be necessary to review particular studies and that the cost shall be at the expense of the applicant. The company to complete the peer review shall be selected by the County.

If the application is withdrawn prior to the circulation to commenting agencies, the entire original fee will be refunded. If withdrawn after the circulation to agencies, half the original fee will be refunded. If your drawings are required to be recirculated there will be an additional fee. Also, please note that if your engineering drawings require more than three reviews due to revisions by the owner or failure to revise your engineering drawings as requested, an additional fee will be charged. No refund is available after the public meeting and/or after approval of application.

Notification Sign Requirements

For the purpose of public notification and in order for staff to locate your lands for appropriate applications (zoning, subdivision, condominium or official plan) you will be given a sign to indicate the intent and purpose of your development application. It is your responsibility to:

1. Post one sign per frontage in a conspicuous location on the subject lands;
2. Ensure one sign is posted at the front of the subject lands at least three feet above ground level, not on a tree;
3. Notify the Planner when the sign is in place in order to avoid processing delays; and
4. Maintain the sign until the development application is finalized and thereafter removed.

Contact Us

For additional information or assistance in completing this application, please contact a planner at 519-426-5870 or 519-875-4485 extension 1842 or planning@norfolkcounty.ca. Please submit the completed application and fees to the attention of the Planning Department at 185 Robinson Street, Suite 200, Simcoe, ON N3Y 5L6.

For Office Use Only:

File Number	_____	Public Notice Sign	_____
Related File Number	_____	Application Fee	_____
Pre-consultation Meeting	_____	Conservation Authority Fee	_____
Application Submitted	_____	Well & Septic Info Provided	_____
Complete Application	_____	Planner	_____

Check the type of planning application(s) you are submitting.

- ☒ Official Plan Amendment
- ☒ Zoning By-Law Amendment
- ☐ Temporary Use By-law
- ☐ Draft Plan of Subdivision/Vacant Land Condominium
- ☐ Condominium Exemption
- ☐ Site Plan Application
- ☐ Extension of a Temporary Use By-law
- ☐ Part Lot Control
- ☐ Cash-in-Lieu of Parking
- ☐ Renewable Energy Project or Radio Communication Tower

Please summarize the desired end result of this application (for example: a special zoning provision on the subject lands to include additional use(s), changing the zone and/or official plan designation of the subject lands, creating a certain number of lots, or similar)

Property Assessment Roll Number: _____

A. Applicant Information

Name of Owner _____

It is the responsibility of the owner or applicant to notify the planner of any changes in ownership within 30 days of such a change.

Address _____

Town and Postal Code _____

Phone Number _____

Cell Number _____

Email _____

Name of Applicant _____

Address _____

Town and Postal Code _____

Phone Number _____

Cell Number _____

Email _____

Name of Agent _____

Address _____

Town and Postal Code _____

Phone Number _____

Cell Number _____

Email _____

Please specify to whom all communications should be sent. Unless otherwise directed, all correspondence and notices in respect of this application will be forwarded to both owner and agent noted above.

☐ Owner

☐ Agent

☐ Applicant

Names and addresses of any holder of any mortgagees, charges or other encumbrances on the subject lands:

B. Location, Legal Description and Property Information

1. Legal Description (include Geographic Township, Concession Number, Lot Number, Block Number and Urban Area or Hamlet):

Municipal Civic Address: _____

Present Official Plan Designation(s): _____

Present Zoning: _____

2. Is there a special provision or site specific zone on the subject lands?

☐ Yes ☐ No If yes, please specify corresponding number:

3. Present use of the subject lands:

4. Please describe **all existing** buildings or structures on the subject lands and whether they are to be retained, demolished or removed. If retaining the buildings or structures, please describe the type of buildings or structures, and illustrate the setback, in metric units, from front, rear and side lot lines, ground floor area, gross floor area, lot coverage, number of storeys, width, length, and height on your attached sketch which must be included with your application:

5. If an addition to an existing building is being proposed, please explain what it will be used for (for example: bedroom, kitchen, or bathroom). If new fixtures are proposed, please describe.

6. Please describe **all proposed** buildings or structures/additions on the subject lands. Describe the type of buildings or structures/additions, and illustrate the setback, in metric units, from front, rear and side lot lines, ground floor area, gross floor area, lot coverage, number of storeys, width, length, and height on your attached sketch which must be included with your application:

7. Are any existing buildings on the subject lands designated under the *Ontario Heritage Act* as being architecturally and/or historically significant? Yes ☐ No ☐

If yes, identify and provide details of the building:

8. If known, the length of time the existing uses have continued on the subject lands:

9. Existing use of abutting properties:

10. Are there any easements or restrictive covenants affecting the subject lands?

☐ Yes ☐ No If yes, describe the easement or restrictive covenant and its effect:

C. Purpose of Development Application

Note: Please complete all that apply.

1. Please explain what you propose to do on the subject lands/premises which makes this development application necessary:

2. Please explain why it is not possible to comply with the provision(s) of the Zoning By-law/and or Official Plan:

3. Does the requested amendment alter all or any part of the boundary of an area of settlement in the municipality or implement a new area of settlement in the municipality? ☐ Yes ☐ No If yes, describe its effect:

4. Does the requested amendment remove the subject land from an area of employment? ☐ Yes ☐ No If yes, describe its effect:

5. Does the requested amendment alter, replace, or delete a policy of the Official Plan?
☐ Yes ☐ No If yes, identify the policy, and also include a proposed text of the policy amendment (if additional space is required, please attach a separate sheet):

6. Description of land intended to be severed in metric units:

Frontage: _____

Depth: _____

Width: _____

Lot Area: _____

Present Use: _____

Proposed Use: _____

Proposed final lot size (if boundary adjustment): _____

If a boundary adjustment, identify the assessment roll number and property owner of the lands to which the parcel will be added: _____

Description of land intended to be retained in metric units:

Frontage: _____

Depth: _____

Width: _____

Lot Area: _____

Present Use: _____

Proposed Use: _____

Buildings on retained land: _____

7. Description of proposed right-of-way/easement:

Frontage: _____

Depth: _____

Width: _____

Area: _____

Proposed use: _____

8. Name of person(s), if known, to whom lands or interest in lands to be transferred, leased or charged (if known):

9. Site Information**Zoning****Proposed**

Please indicate unit of measurement, for example: m, m² or %

Lot frontage	_____	_____
Lot depth	_____	_____
Lot width	_____	_____
Lot area	_____	_____
Lot coverage	_____	_____
Front yard	_____	_____
Rear yard	_____	_____
Left Interior side yard	_____	_____
Right Interior side yard	_____	_____
Exterior side yard (corner lot)	_____	_____
Landscaped open space	_____	_____
Entrance access width	_____	_____
Exit access width	_____	_____
Size of fencing or screening	_____	_____
Type of fencing	_____	_____

10. Building Size

Number of storeys	_____	_____
Building height	_____	_____
Total ground floor area	_____	_____
Total gross floor area	_____	_____
Total useable floor area	_____	_____

11. Off Street Parking and Loading Facilities

Number of off street parking spaces	_____	_____
Number of visitor parking spaces	_____	_____
Number of accessible parking spaces	_____	_____
Number of off street loading facilities	_____	_____

12. Residential (if applicable)

Number of buildings existing: _____

Number of buildings proposed: _____

Is this a conversion or addition to an existing building? ☐ Yes ☐ No

If yes, describe: _____

Type	Number of Units	Floor Area per Unit in m2
Single Detached	_____	_____
Semi-Detached	_____	_____
Duplex	_____	_____
Triplex	_____	_____
Four-plex	_____	_____
Street Townhouse	_____	_____
Stacked Townhouse	_____	_____
Apartment - Bachelor	_____	_____
Apartment - One bedroom	_____	_____
Apartment - Two bedroom	_____	_____
Apartment - Three bedroom	_____	_____

Other facilities provided (for example: play facilities, underground parking, games room, or swimming pool):

13. Commercial/Industrial Uses (if applicable)

Number of buildings existing: _____

Number of buildings proposed: _____

Is this a conversion or addition to an existing building? ☐ Yes ☐ No

If yes, describe:

Indicate the gross floor area by the type of use (for example: office, retail, or storage):

Seating Capacity (for assembly halls or similar): _____

Total number of fixed seats: _____

Describe the type of business(es) proposed: _____

Total number of staff proposed initially: _____

Total number of staff proposed in five years: _____

Maximum number of staff on the largest shift: _____

Is open storage required: ☐ Yes ☐ No

Is a residential use proposed as part of, or accessory to commercial/industrial use?

☐ Yes ☐ No If yes please describe:

14. Institutional (if applicable)

Describe the type of use proposed: _____

Seating capacity (if applicable): _____

Number of beds (if applicable): _____

Total number of staff proposed initially: _____

Total number of staff proposed in five years: _____

Maximum number of staff on the largest shift: _____

Indicate the gross floor area by the type of use (for example: office, retail, or storage):

15. Describe Recreational or Other Use(s) (if applicable)

D. Previous Use of the Property

1. Has there been an industrial or commercial use on the subject lands or adjacent lands? ☐ Yes ☐ No ☐ Unknown

If yes, specify the uses (for example: gas station or petroleum storage):

2. Is there reason to believe the subject lands may have been contaminated by former uses on the site or adjacent sites? ☐ Yes ☐ No ☐ Unknown

3. Provide the information you used to determine the answers to the above questions:

4. If you answered yes to any of the above questions in Section D, a previous use inventory showing all known former uses of the subject lands, or if appropriate, the adjacent lands, is needed. Is the previous use inventory attached? ☐ Yes ☐ No

E. Provincial Policy

1. Is the requested amendment consistent with the provincial policy statements issued under subsection 3(1) of the *Planning Act, R.S.O. 1990, c. P. 13*? ☐ Yes ☐ No

If no, please explain:

2. It is owner's responsibility to be aware of and comply with all relevant federal or provincial legislation, municipal by-laws or other agency approvals, including the Endangered Species Act, 2007. Have the subject lands been screened to ensure that development or site alteration will not have any impact on the habitat for endangered or threatened species further to the provincial policy statement subsection 2.1.7? ☐ Yes ☐ No

If no, please explain:

3. Have the subject lands been screened to ensure that development or site alteration will not have any impact on source water protection? ☐ Yes ☐ No

If no, please explain:

Note: If in an area of source water Wellhead Protection Area (WHPA) A, B or C please attach relevant information and approved mitigation measures from the Risk Manager Official.

4. Are any of the following uses or features on the subject lands or within 500 metres of the subject lands, unless otherwise specified? Please check boxes, if applicable.

Livestock facility or stockyard (submit MDS Calculation with application)

☐ On the subject lands or ☐ within 500 meters – distance _____

Wooded area

☐ On the subject lands or ☐ within 500 meters – distance _____

Municipal Landfill

☐ On the subject lands or ☐ within 500 meters – distance _____

Sewage treatment plant or waste stabilization plant

☐ On the subject lands or ☐ within 500 meters – distance _____

Provincially significant wetland (class 1, 2 or 3) or other environmental feature

☐ On the subject lands or ☐ within 500 meters – distance _____

Floodplain

☐ On the subject lands or ☐ within 500 meters – distance _____

Rehabilitated mine site

☐ On the subject lands or ☐ within 500 meters – distance _____

Non-operating mine site within one kilometre

☐ On the subject lands or ☐ within 500 meters – distance _____

Active mine site within one kilometre

☐ On the subject lands or ☐ within 500 meters – distance _____

Industrial or commercial use (specify the use(s))

☐ On the subject lands or ☐ within 500 meters – distance _____

Active railway line

☐ On the subject lands or ☐ within 500 meters – distance _____

Seasonal wetness of lands

☐ On the subject lands or ☐ within 500 meters – distance _____

Erosion

☐ On the subject lands or ☐ within 500 meters – distance _____

Abandoned gas wells

☐ On the subject lands or ☐ within 500 meters – distance _____

F. Servicing and Access

1. Indicate what services are available or proposed:

Water Supply

- | | |
|--|---|
| <input type="checkbox"/> Municipal piped water | <input type="checkbox"/> Communal wells |
| <input type="checkbox"/> Individual wells | <input type="checkbox"/> Other (describe below) |
-

Sewage Treatment

- | | |
|---|---|
| <input type="checkbox"/> Municipal sewers | <input type="checkbox"/> Communal system |
| <input type="checkbox"/> Septic tank and tile bed in good working order | <input type="checkbox"/> Other (describe below) |
-

Storm Drainage

- | | |
|---|---------------------------------------|
| <input type="checkbox"/> Storm sewers | <input type="checkbox"/> Open ditches |
| <input type="checkbox"/> Other (describe below) | |
-

2. Existing or proposed access to subject lands:

- | | |
|---|---|
| <input type="checkbox"/> Municipal road | <input type="checkbox"/> Provincial highway |
| <input type="checkbox"/> Unopened road | <input type="checkbox"/> Other (describe below) |

Name of road/street: _____

G. Other Information

1. Does the application involve a local business? ☐ Yes ☐ No

If yes, how many people are employed on the subject lands?

2. Is there any other information that you think may be useful in the review of this application? If so, explain below or attach on a separate page.

H. Supporting Material to be submitted by Applicant

In order for your application to be considered complete, **folded** hard copies (number of paper copies as directed by the planner) and an **electronic version (PDF) of the properly named site plan drawings, additional plans, studies and reports** will be required, including but not limited to the following details:

1. Concept/Layout Plan
2. All measurements in metric
3. Key map
4. Scale, legend and north arrow
5. Legal description and municipal address
6. Development name
7. Drawing title, number, original date and revision dates
8. Owner's name, address and telephone number
9. Engineer's name, address and telephone number
10. Professional engineer's stamp
11. Existing and proposed easements and right of ways
12. Zoning compliance table – required versus proposed
13. Parking space totals – required and proposed
14. All entrances to parking areas marked with directional arrows
15. Loading spaces, facilities and routes (for commercial developments)
16. All dimensions of the subject lands
17. Dimensions and setbacks of all buildings and structures
18. Location and setbacks of septic system and well from all existing and proposed lot lines, and all existing and proposed structures
19. Gross, ground and useable floor area
20. Lot coverage
21. Floor area ratio
22. Building entrances, building type, height, grades and extent of overhangs
23. Names, dimensions and location of adjacent streets including daylighting triangles
24. Driveways, curbs, drop curbs, pavement markings, widths, radii and traffic directional signs
25. All exterior stairways and ramps with dimensions and setbacks
26. Retaining walls including materials proposed
27. Fire access and routes
28. Location, dimensions and number of parking spaces (including visitor and accessible) and drive aisles
29. Location of mechanical room, and other building services (e.g. A/C, HRV)
30. Refuse disposal and storage areas including any related screening (if indoors, need notation on site plan)
31. Winter snow storage location

32. Landscape areas with dimensions
33. Natural features, watercourses and trees
34. Fire hydrants and utilities location
35. Fencing, screening and buffering – size, type and location
36. All hard surface materials
37. Light standards and wall mounted lights (plus a note on the site plan that all outdoor lighting is to be dark sky compliant)
38. Business signs (make sure they are not in sight lines)
39. Sidewalks and walkways with dimensions
40. Pedestrian access routes into site and around site
41. Bicycle parking
42. Architectural elevations of all building sides
43. All other requirements as per the pre-consultation meeting

In addition, the following additional plans, studies and reports, including but not limited to, **may** also be required as part of the complete application submission:

- ☐ Zoning Deficiency Form
- ☐ On-Site Sewage Disposal System Evaluation Form (to verify location and condition)
- ☐ Architectural Plan
- ☐ Buildings Elevation Plan
- ☐ Cut and Fill Plan
- ☐ Erosion and Sediment Control Plan
- ☐ Grading and Drainage Control Plan (around perimeter and within site) (existing and proposed)
- ☐ Landscape Plan
- ☐ Photometric (Lighting) Plan
- ☐ Plan and Profile Drawings
- ☐ Site Servicing Plan
- ☐ Storm water Management Plan
- ☐ Street Sign and Traffic Plan
- ☐ Street Tree Planting Plan
- ☐ Tree Preservation Plan
- ☐ Archaeological Assessment
- ☐ Environmental Impact Study

- ☐ Functional Servicing Report
- ☐ Geotechnical Study / Hydrogeological Review
- ☐ Minimum Distance Separation Schedule
- ☐ Noise or Vibration Study
- ☐ Record of Site Condition
- ☐ Storm water Management Report
- ☐ Traffic Impact Study – please contact the Planner to verify the scope required

Site Plan applications will require the following supporting materials:

1. Two (2) complete sets of the site plan drawings folded to 8½ x 11 and an electronic version in PDF format
2. Letter requesting that the Holding be removed (if applicable)
3. A cost estimate prepared by the applicant's engineer
4. An estimate for Parkland dedication by a certified land appraiser
5. Property Identification Number (PIN) printout

Standard condominium exemptions will require the following supporting materials:

- ☐ Plan of standard condominium (2 paper copies and 1 electronic copy)
- ☐ Draft condominium declaration
- ☐ Property Identification Number (PIN) printout

Your development approval might also be dependent on Ministry of Environment and Climate Change, Ministry of Transportation or other relevant federal or provincial legislation, municipal by-laws or other agency approvals.

All final plans must include the owner's signature as well as the engineer's signature and seal.

I. Development Agreements

A development agreement may be required prior to approval for site plan, subdivision and condominium applications. Should this be necessary for your development, you will be contacted by the agreement administrator with further details of the requirements including but not limited to insurance coverage, professional liability for your engineer, additional fees and securities.

J. Transfers, Easements and Postponement of Interest

The owner acknowledges and agrees that if required it is their solicitor's responsibility on behalf of the owner for the registration of all transfer(s) of land to the County, and/or transfer(s) of easement in favour of the County and/or utilities. Also, the owner further acknowledges and agrees that it is their solicitor's responsibility on behalf of the owner for the registration of postponements of any charges in favour of the County.

K. Permission to Enter Subject Lands


Permission is hereby granted to Norfolk County officers, employees or agents, to enter the premises subject to this application for the purposes of making inspections associated with this application, during normal and reasonable working hours.

L. Freedom of Information

For the purposes of the *Municipal Freedom of Information and Protection of Privacy Act*, I authorize and consent to the use by or the disclosure to any person or public body any information that is collected under the authority of the *Planning Act*, R.S.O. 1990, c. P. 13 for the purposes of processing this application.



Owner/Applicant Signature



Date

M. Owner's Authorization

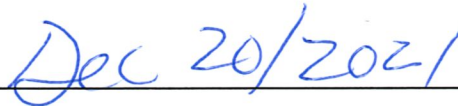
If the applicant/agent is not the registered owner of the lands that is the subject of this application, the owner(s) must complete the authorization set out below.

I/We Thomas O'Hara am/are the registered owner(s) of the lands that is the subject of this application.

I/We authorize G.Douglas Vallee Limited to make this application on my/our behalf and to provide any of my/our personal information necessary for the processing of this application. Moreover, this shall be your good and sufficient authorization for so doing.



Owner



Date

Owner

Date

N. Declaration

I, Thomas O'Hara of Waterford

solemnly declare that:

all of the above statements and the statements contained in all of the exhibits transmitted herewith are true and I make this solemn declaration conscientiously believing it to be true and knowing that it is of the same force and effect as if made under oath and by virtue of *The Canada Evidence Act*.

Declared before me at:


NIAGARA REGION


Owner/Applicant Signature

In THE CITY OF NIAGARA FALLS

This 21st day of DECEMBER

A.D., 20 21


A Commissioner, etc.

ELDON FRASER DARBYSON, a commissioner, etc.,
Province of Ontario, for G. Douglas Vallee Limited.
Expires March 28, 2022.

265

MS ANGIE O HARA
101 MAPLE STREET
PORT CARLING, ON, P0B1J0
(705) 205-3752

DATE 2021-12-20
Y Y Y Y M M D D

PAY TO THE
ORDER OF

Norfolk County

\$ 8800.00

Eighty eight hundred

100 DOLLARS

Security features
included.
Details on back.



CANADIAN IMPERIAL BANK OF COMMERCE
8553 MANNING AVE.
FORT McMURRAY, AB T9H 3N7

CIBC PremierService™

[Signature]

MEMO

Orchard Square

Official Plan Zoning Amendment

⑈ 265⑈ ⑆08089⑈010⑆ 80⑈01839⑈



vallee

*Consulting Engineers,
Architects & Planners*

December 23, 2021

County of Norfolk
Robinson Administration Building
185 Robinson Street, Suite 200
Simcoe, ON N3Y 5L6

Attention: Mohammad Alam MPL, MUD, RPP, MCIP

Dear Mohammad,

**Reference: Planning Justification Report
Official Plan and Zoning By-law Amendment
G. Douglas Vallee Limited on behalf of Verlinda Homes
Southeast Corner of Lam Boulevard and Old Highway 24, Waterford
Roll# 33605062868**

Introduction

G. Douglas Vallee Limited has been retained by Verlinda Homes to make application for an Official Plan and Zoning By-law Amendment to permit a 55-dwelling unit residential development on a vacant lot at the southeast corner of Lam Boulevard and Old Highway 24 in Waterford.

It is proposed to change the designation of a portion of the lands from Commercial to Urban Residential and to amend the zoning by-law to facilitate the development of a mix of housing unit types in the form of a condominium including a mix of one-storey and one-storey stacked dwellings, two-storey townhouses and three-storey stacked townhouses. Appendix A provides a detailed site plan for the proposed development, which will feature four different housing forms to provide residents of Norfolk County with increased housing options.

This Planning Justification report provides planning support and information to Norfolk County Staff and Council to consider when reviewing the Official Plan and Zoning By-law amendments for the subject application.

This application:

- Avoids impacts on surrounding lands;
- Mitigates current and future potential land use conflicts;
- Is consistent with the Provincial Policy Statement 2020;
- Maintains the general intent and purpose of the Norfolk County Official Plan;
- Maintains the general intent and purpose of the Norfolk County Zoning By-law; and
- Represents good planning.

G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects & Planners



Professional Engineers

Authorized by the Association of Professional Engineers of Ontario
to offer professional engineering services.



Ontario Association
of Architects

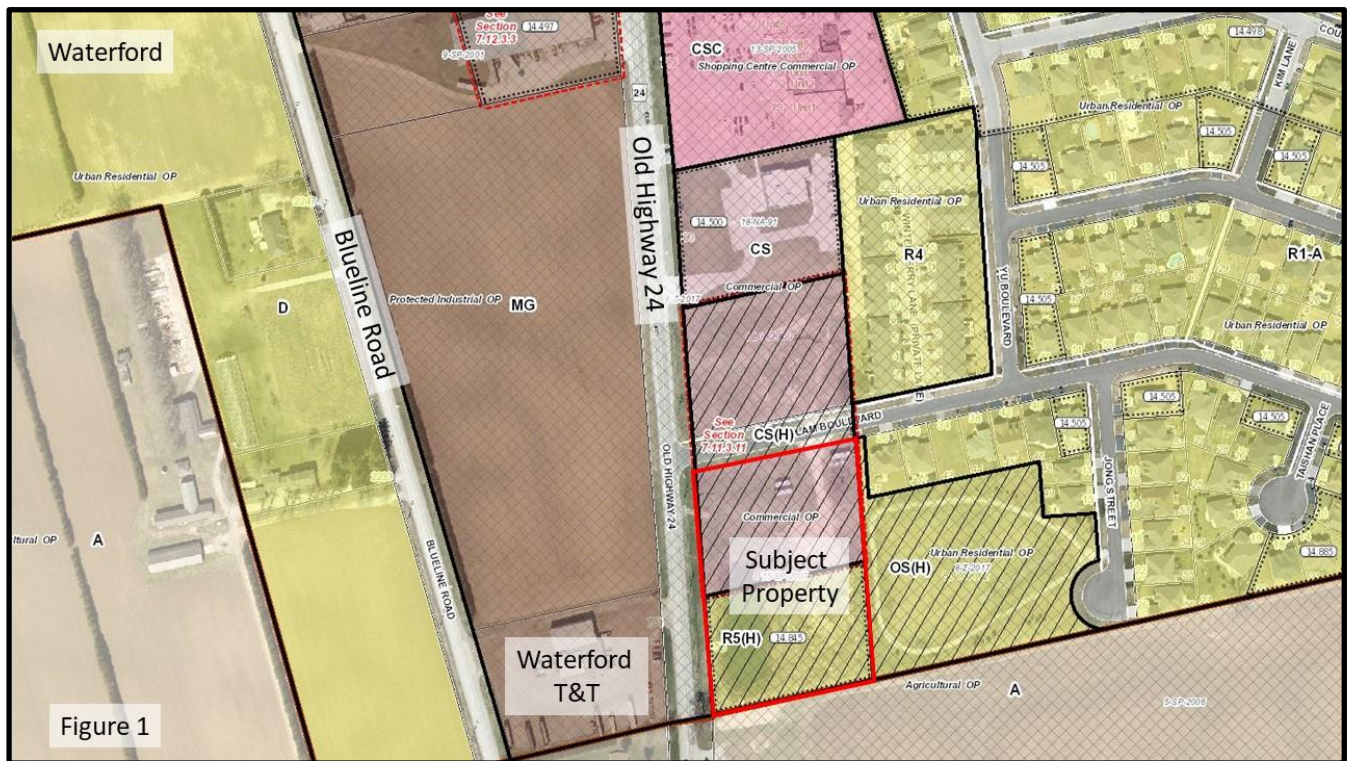
Supporting documents have been provided, including:

- Appendix A – Proposed Site Plan.
- Appendix B – Provincial Policy Compliance Chart;
- Appendix C – Official Plan Compliance Chart;

Site Description

The subject lands are a vacant parcel of approximately 1.3ha in area located in the community of Waterford at the southeast corner of the intersection of the Lam Boulevard and Old Highway 24. At this time the property does not have a listed civic address according to the Norfolk County GIS. The property has no prominent vegetation, with a large existing pond occupying the southwest corner of the property.

As shown on Figure 1 below, the northern portion of the property is currently designated Commercial under the Official plan and zoned Service Commercial (CS), while the southern portion is designated Urban Residential and zoned Urban Residential Type 5 (R5) with a special provision 14.845. A Holding (H) provision has been applied to both the CS and R5 zones on the property.



Background

Supporting studies have been prepared and submitted with these applications, including:

- Traffic Impact Study (prepared by Paradigm Transportation Solutions Limited, dated December 2021);

G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects & Planners

- D-6 Compatibility and Noise Assessment Study (prepared by CCS Engineering Inc. dated December 9, 2021);
- Functional Servicing Report (prepared by G. Douglas Vallee Limited dated December, 2021).

Site Design



Figure 2

G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects & Planners

As shown in Figure 2 above, the proposed development provides an attractive site design which implements a number of creative features to achieve efficient land use while ensuring compatibility with surrounding residential uses. Some of these include:

- Driveways and parking areas located between units and street lines to avoid back lotting;
- On-site Communal mailboxes;
- On-site private garbage collection;
- Lower density units located on perimeter of the site near existing residential uses. Higher density units provided internally to minimize potential land use conflicts;
- Creative unit design to provide a variety of housing options to Norfolk County Residents. This includes studio ground level stacked units to appeal to single or retired individuals;
- 19 additional on-site parking spaces not required under the zoning by-law;
- Central walkway / promenade to provide walk-up access for the studio units and appealing greenspace for all residents.

Planning Analysis

The proposed Official Plan and Zoning By-law amendments were prepared in light of several planning documents including the Planning Act, the Provincial Policy Statement, the County Official Plan and Zoning By-law.

Planning Act

Section 2 of the Planning Act outlines matters of provincial interest. Section 3 of the Planning Act requires that, in exercising any authority that affects a planning matter, planning authorities “*shall be consistent with the policy statements*” issued under the Act and “*shall conform with the provincial plans that are in effect on that date, or shall not conflict with them, as the case may be*”.

Section 22 of the Planning Act outlines the requirements for considering an Official Plan Amendment.

Section 34 of the Planning Act allows for the consideration of amendments to the zoning by-law.

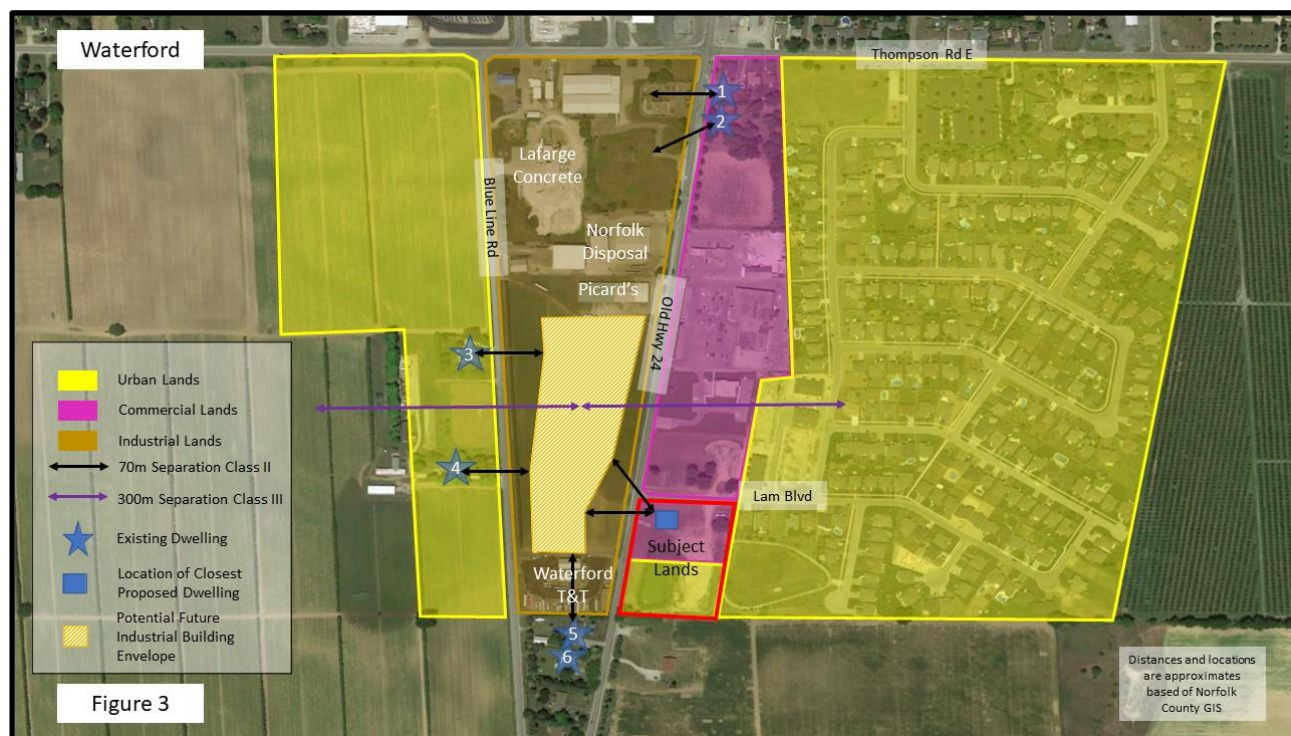
Provincial Policy Statement (PPS)

The subject lands are within a Settlement Area as defined by the Provincial Policy Statement, 2020 (PPS). The PPS provides policy direction for appropriate land use planning and development patterns to achieve healthy, liveable, and resilient communities through efficient development that will protect resources of provincial interest, public health and safety, the quality of the natural and built environment, and will facilitate economic growth. It is encouraged that planning authorities consider infilling, redevelopment and intensification in a compact form in areas that support active transportation and can take advantage of existing infrastructure.

Section 1.2.6 of the PPS provides guidance on Land Use Compatibility. The current designation of the MG lands located immediately across the road present a number of challenges for any future land development in the surrounding area. As indicated on Figure 1 and 3, a large swath of Protected Industrial land extends down the middle of town, flanked by Urban Residential lands to the west and a mix of Commercial and Urban Residential lands to the east.

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Figure 3 below provides a representative land use map with the locations of existing dwellings along with proposed dwellings on the subject lands. Presently there are existing sensitive land uses (residential dwellings) located in closer proximity to the Protected Industrial lands than the proposed development. With no buffer provided between the existing Urban Residential lands to the west of Blue Line Road and the Protected Industrial lands to the east, landowners of the Industrial lands will be required to consider Ministry D-6 mitigation strategies between these differing land uses in order to be consistent with the PPS. Given the existing land uses in the area, development of future industrial uses is currently constrained by provincial requirements. As shown on Figure 3, the potential future industrial building envelope exceeds an area of approximately 20,000m². The proposed application does not inhibit future viable development of the nearby industrial lands. Given the close proximity to existing residential dwellings, high intensity industrial uses (Class III) are not likely to occur on these lands.



CCS Engineering Inc has completed a D-6 Compatibility and Noise Assessment That study considered two types of industrial facilities that could impact the proposed development: Existing and Future.

Existing Facilities: The CCS Engineering study concluded that there are no existing facilities (industrial or commercial) that are expected to adversely impact the proposed development with noise, dust or odour emissions.

Future Facilities: The design of any future industrial facility must take into consideration the provincial guidelines and standards as referenced previously for the protection of sensitive land uses such as the residential dwellings. Even without the proposed residential development, the fact that there are existing residential dwellings in close proximity to this industrially designated land, will require that any planned

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industrial land use would need to mitigate noise, dust or odour emissions to protect those existing dwellings. Depending on the type of industrial use and activity being developed, mitigation measures enforced through an Environmental Compliance Approvals process with the Ministry must occur and is applied to the whole of the lands. The standards for future development of the industrial lands will not be inhibited by this proposed residential development, given that the existing dwellings have already set the parameters for future limited industrial uses.

As the necessary studies have been completed to satisfy Section 1.2.6.2 of the PPS, approval of this application will not further hamper the protection and long-term viability of the existing industrial lands.

A decision by Council to approve the Official Plan and Zoning By-law amendment will be consistent with PPS, 2020. Full details describing the applicable Provincial policies and how the application is consistent with the PPS are included in Appendix B.

Norfolk County Official Plan

The northern portion of the subject lands are currently designated Commercial, while the southern portion is designated Urban Residential. It is proposed to change the Commercial designation to Urban Residential. The details of compliance with the Official Plan are demonstrated in Appendix C.

Several sections of the Official Plan apply when considering zoning by-law amendments and are discussed in detail under Appendix C. On a high level, details of the Official Plan policies are captured by the overarching Goals and Objectives. Section 2.2 of the Official Plan set out six “Goals and Objectives” to which the following five are applicable to the proposed residential development:

- Protecting and Enhancing the Natural Environment;
- Maintaining and Enhancing the Rural and Small-Town Character;
- Maintaining a High Quality of Life;
- Upgrading and Expanding Infrastructure; and
- A Well Governed, Well Planned and Sustainable County.

The proposed official plan and zoning by-law amendment achieves the ‘Goals and Objectives’ of the Official Plan as demonstrated in Appendix C.

The proposed development will provide a compact form of additional housing choices and compatible character to the existing mix of residential and commercial development in the area. This will result in an efficient use of land of high quality providing a variety of housing forms and levels of affordability. The lands are subject to site plan control to ensure County development standards are achieved.

The subject lands are vacant and underutilized. The commercial portion represents less than 0.5 ha in area which provides reduced space for many of the uses permitted under the CS zone. Higher intensity permitted uses (including but not limited to lumber yard, garden supply center, equipment rental establishment, etc.) require large retail buildings and associated parking / display / storage areas. Lower intensity permitted uses (including but not limited to clinic or doctor office, daycare nursery, dry cleaning establishment, etc.) are normally grouped in a large shared plaza which also requires extensive parking areas. In addition to the area required for a commercial building and parking space, additional lands are also required for landscaping, snow storage, garbage collection, and stormwater management. These

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factors make a smaller parcel unattractive for many of the permitted uses under the CS zone. As such an amendment to change the existing Commercial designation to Urban Residential is beneficial to the community in order to provide additional housing options for the residents of Norfolk County and use vacant lands efficiently.

The lands are near a network of sidewalks to provide easy walkability to the local services located less than 250m away. Additionally, the development is immediately adjacent to a designated cycling route identified on Schedule I-3 "Active Transportation" of the Official Plan. The County Official Plan supports the development of vacant and underutilized lands that are compact and efficiently used and lends support to the location of the development being within close proximity to active transportation and potential active transportation networks as identified on Schedule "I".

Norfolk County's existing infrastructure will be reviewed by Norfolk County's consultant (RV Anderson Associates) in consideration of the connections proposed to service this development and in light of a Functional Servicing Report prepared by G. Douglas Vallee Limited. Existing services will be extended to the site from the existing mains along Lam Boulevard. The proposed infrastructure will be designed and constructed in accordance with Norfolk County's requirements, and will be subject to Norfolk County's approval through the site plan process.

The lands are near existing residential, commercial and institutional uses including the Waterford District High School, several places of worship, parks and a retail center. Through the site plan process, appropriate landscaping, buffering and the recommendations from the D-6 Compatibility and Noise Assessment completed by CCS Engineering Inc. will be considered to improve compatibility with the adjacent uses.

Summary of Official Plan review

The proposed Official Plan and zoning by-law amendment meets the policies of the Official Plan. As shown in Appendix C, the proposed development meets the requirements of a medium density development as per Section 7.7.2b) through the implementation of appropriate and compatible forms of housing.

The land use compatibility with adjacent industrial land uses has been addressed through expert studies. Any necessary mitigation measures will be implemented during the site plan approval process. The development concept represents an appropriate land use considering the size of the property, proximity to existing residential and commercial uses, availability of servicing, and the provision of buffering and landscaping. Accordingly, the proposed applications meet the intent and purpose of the Official Plan and represent good planning.

A decision of Council to approve the proposed Official Plan amendment from Commercial to Urban Residential is considered appropriate.

Norfolk County Comprehensive Zoning By-law

The northern portion of the subject lands are zoned Service Commercial (CS), while the southern portion is zoned Urban Residential Type 5 (R5) with a special provision 14.845. The current R5 zoning, special provision 14.845 permits 44 dwelling units on the 0.5ha residential portion with parking permitted in the

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front yard and a reduced visitor parking requirement. This represents a current permitted density of 88 uph. It is interesting to note that the limit of 44 dwelling units was put in place at the time due to the limitation of the capacity of the Waterford Sewage Treatment Plant. It is understood that sewage treatment capacity is no longer of concern.

It is proposed to change the zoning of the entire block to Urban Residential Type 4 (R4) with site specific provisions to recognize minor modifications. The proposed amendment would permit an increase in the total number of units from 44 to 55 dwelling units, but a decrease in the density from 88 uph to 42 uph. The proposed reduction in density would facilitate a compatible development with the surrounding land uses while achieving an efficient use of the entire parcel.

The proposed development will comply with the R4 Zone provisions with requests for minor modifications. Table 1 and Table 2 below, respectively provide a parking assessment and outline of the requested site-specific zoning provisions.

Table 1: Parking Assessment for Orchard Square Condominium

Section	Minimum Requirement	Required	Provided
4.9 a) single detached, semi-detached, duplex, tri-plex, four-plex, townhouse dwellings and vacation home [8-Z-2017]	2 parking spaces for each dwelling unit: 55 units	110 spaces	98 spaces
4.9 f) All apartment dwellings; and duplex dwellings, tri-plex dwellings, four-plex dwellings, townhouse dwellings or single detached or semi-detached dwellings as part of a condominium development or when they abut a private road [27-Z-2020].	1 visitor space for every 3 dwelling units: 55 units / 3	19 spaces	50 spaces
4.3.3 Minimum Number and Type of Accessible Parking Spaces As per section 4.9 f) - 19 required visitor parking spaces Number of Parking Spaces: 1 – 25 Type A Accessible Space (Van): 1 Type B Accessible Space: 0	1 to be included as part of the total required visitor parking	1 accessible space included in the 19 visitor spaces identified in the line above	1 included above
Total		129 spaces	148 spaces (19 spaces more than required by Norfolk By-Law)

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The proposed parking configuration is deficient in the number of parking spaces provided per dwelling unit as there are 12 single bedroom dwelling units which have been provided with 1 dedicated space each. These single bedroom dwelling units will be marketed towards younger individuals who are likely single or retirees and therefore less likely to require more than one parking space.

With the inclusion of additional visitor parking, the overall parking configuration for the site provides 19 total parking spaces over and above what is required under the Norfolk County Zoning By-law. These additional spaces will ensure ample parking is provided across the entire site.

Table 2: Site Specific Zoning Provisions for Orchard Square Condominium

Section	Existing	Provided
2.88	“LOT” shall mean a parcel of land which can be legally conveyed. Where two (2) adjoining lots are in common ownership and a main building straddles the lots, the two (2) lots are deemed to be one (1) lot for the purposes of establishing interior side yards.	<p>In lieu of Section 2.88 the definition of a LOT shall not apply to the individual condominium units. The LOT shall be defined as the parcel of land (1.3ha) consisting of entire condominium block.</p> <p>The Norfolk County Zoning By-law provisions regarding the definition of a LOT are unclear in its application to a condominium development.</p> <p>The inclusion of this provision will clearly define the LOT and corresponding yard provisions. It will enhance the ability to interpret and apply the zoning by-law at the Site Plan approvals stage.</p>
3.11.2	For the purposes of this Subsection, a private condominium road servicing a condominium development shall be deemed to be an open, constructed and year-round improved street.	<p>In lieu of Section 3.11.2, the private condominium road shall not be deemed an improved street.</p> <p>See Section 2.88 above.</p> <p>The inclusion of this provision will clearly define the required yard and corresponding setback provisions for the entire condominium block. This will enhance the ability to interpret and apply the appropriate zoning by-law provisions for individual condominium units which will assist staff and residents when considering potential future additions such as decks.</p>

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4.2.3 b)	Not more than one (1) required parking space may be located within the required front yard or required exterior side yard [7-Z-2018];	<p>Section 4.2.3 b) shall not apply. A maximum of 13 parking spaces shall be permitted in the required front yard and a maximum of 6 parking spaces shall be permitted in the required exterior side yard of the condominium block.</p> <p>The additional parking provided on site will help reduce the potential for on-street parking while improving traffic flows in the area. Permitting parking in these areas will allow the parking to be more dispersed over the entire site, resulting in an attractive site design as shown on the concept plan (no back lotting, increased parking, alternative housing forms, etc.).</p> <p>Furthermore, there are no safety impacts generated by the proposed location of the parking and there remains a significant amount of landscaped open space to improve the aesthetics of the development and the visibility triangle remains unaffected.</p>
4.2.5 b)	In the case of a corner lot, a minimum of 50 percent of each of the front yard and exterior side yard shall be maintained as landscaped area.	<p>In lieu of Section 4.2.5 b), a minimum of 40 percent of each of the front yard and exterior side yard shall be maintained as landscaped area.</p> <p>The reduced landscaped area is required in order to permit parking in these areas. Through the site plan process, appropriate landscaping can be provided between the street line and the parking spaces.</p>
4.9 a)	<p>single detached, semi-detached, duplex, tri-plex, four-plex, townhouse dwellings and vacation home [8-Z-2017]</p> <p>2 parking spaces for each dwelling unit</p>	<p>In lieu of Section 4.9 a), a minimum of 1 parking space shall be required for the one-storey residential dwelling stacked, with required visitor parking.</p> <p>As outlined above, the proposed parking configuration is deficient in the number of parking spaces provided per dwelling unit as there are 12 single bedroom dwelling</p>

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		<p>units which have been provided with 1 dedicated parking space each. These single bedroom dwelling units will be marketed towards younger individuals or retirees who are likely to require a single parking space.</p> <p>The reduction of this requirement will allow for parking spaces to be dedicated and located in a more logical manner. This reduction allows for additional visitor parking spaces to be allocated across the site which better anticipates future resident guests.</p>
5.4.2 h)	maximum building height: 11 metres [8-Z-2017]	<p>In lieu of Section 5.4.2 h), the maximum permitted building height for a Stacked Townhouse shall be 12m. This provision shall only apply to a dwelling not immediately abutting any lot line.</p> <p>As indicated on Appendix A, the three-storey stacked townhouses will be located on the interior of the development. This provision is for aesthetic and design reasons in order to allow for an appropriately pitched roofline. The increased height provision will only apply to the stacked townhouse. The one and two-story dwellings located on the periphery of the development will ensure compatibility is maintained with the surrounding residential land uses.</p> <p>The proposed 12m maximum building height for the Stacked Townhouses is required to ensure a more functional and inviting interior and exterior building design including an attractive pitched roof.</p> <p>The increased maximum building height is required for the following reasons:</p> <ul style="list-style-type: none"> • The unique stacked apartment suites on the main floor will likely be purchased by Retirees and / or young

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		<p>professionals or used as rentals. These unit will require nine-foot ceilings in order to provide sufficient habitable living space;</p> <ul style="list-style-type: none">• Providing nine-foot ceilings on the main floor is an industry norm for these styles of dwellings. Both the stacked apartments and townhouses will have nine-foot ceilings on the main floor with eight-foot ceiling provided on the upper floors;• Without basements, additional space in the ceiling is required internally for building mechanical services (plumbing, HVAC, electrical). <p>The need for these increased ceiling heights and architecturally designed residential style sloped roofs will increase the total building height slightly above the standard provision of 11m. In this case an additional 1m of height is suggested.</p> <p>The increased maximum building height will not affect the developments overall compatibility with surrounding land uses, while enabling appropriate ceiling heights within the dwellings. This will ensure functional design while also providing a welcoming and comfortable living space for the future residents of Waterford.</p>
All other provisions of R4 zone shall apply.		

Compatibility

As shown on Figure 1, the subject lands are located on the southerly edge of the urban boundary of Waterford and surrounded by a variety of different land uses.

Adjacent lands to the south are used for agriculture, to the east are residential uses including parklands and single detached dwellings. Located immediately across Lam Boulevard is a vacant commercially zoned lot. As shown on Appendix A, the proposed development will provide a mix of housing forms. The single and two-storey dwellings will be located along the periphery of the condominium to ensure compatibility with adjacent residential uses. The three-storey dwellings will be located on the interior of the development to provide increased density while mitigating compatibility issues with surrounding

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residential lands. The proposed site plan allows for a mixed density development while ensuring compatibility with the existing built form in the area.

Located on the west side of Old Highway 24 exists lands zoned General Industrial (MG) with an operating truck / trailer repair business – Waterford Truck and Trailer. The necessary studies have been completed to ensure appropriate mitigation measure will be in place to ensure compatibility between these land uses including a demonstration of how the proposed development will not impact the development of nearby industrial lands.

Traffic

A Traffic Impact Study was completed by Paradigm Transportation Solutions Limited dated December 2021. The study area intersections included; Old Highway 24 and Lam Boulevard, access intersection on Old Highway 24 and access intersection on Lam Boulevard. The study considered the impacts on current traffic and forecasted traffic conditions, and concluded that the study area intersection and the access intersections are forecast to operate within acceptable levels of service under the 2022, 2027 and 2032 horizon years. Based on the findings of the study, Paradigm Transportation Solutions Limited recommends the subject development be considered for approval.

Services

Sanitary

The proposed development will be serviced by a sanitary sewer that connects to the existing 200mm sanitary sewer along Lam Boulevard. A peak sanitary design flow of approximately 3.68 L/s is anticipated from the proposed development. An analysis of the existing sanitary sewer network on Lam Boulevard and Old Hwy 24 indicates that there is sufficient capacity to support the sanitary flows from the proposed development. However, modelling from Norfolk County's consultant is recommended to determine the impact of the proposed additional sanitary flows further downstream.

Water

The existing 200mm watermain on Lam Boulevard shall serve as the water supply for the proposed development. The domestic maximum day demand and peak hourly demand were found to be 153.90 m³/day (1.78 L/s) and 11.40 m³/hour (3.17 L/s), respectively. An analysis of the hydraulic modelling will be conducted by the County consultants to determine the water servicing capacity and constraints on the existing water system to ensure adequate system flows and pressure for the aforementioned domestic and fire demands.

Storm Water

Two infiltration trench facilities are utilized to collect and detain runoff for infiltration. Overland flow (major storm events) storm sewers (minor storm events) will convey stormwater to the proposed SWM storage facility, ultimately releasing to the existing municipal 600mm diameter storm sewer along Old Hwy 24 via a storm sewer. Under all storm events, peak flows associated with the post-development site are controlled to less than or equal to the allowable peak flow rate determined as part of the Yin Subdivision Phase 5 - Vallee Project 10-034. Quality control will be analyzed during the detailed design stage.

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Conclusion

The proposed Official Plan and Zoning By-law Amendments are consistent with the policies of the PPS and the Norfolk County Official Plan. The proposed development will achieve 42 uph providing a compact form of development while maintaining compatibility with the surrounding residential land uses. As an existing lot of record with access to full municipal services, this development will provide much needed housing options for the residents of Norfolk County.

The D-6 Compatibility and Noise Assessment completed by CCS Engineering Inc. has shown there will be no negative impacts on the industrial lands or the proposed development. Recommendations from this assessment will be implemented during the construction phase to further mitigate the potential of future land use conflicts. Through the site plan control process, appropriate buffering and other mitigation measures can be put in place to help ensure compatibility with the neighbouring lands.

The analysis of this application is supportive. The proposed application is consistent with Provincial and County planning policies. Accordingly, it is our opinion that the applications:

- model good planning;
- facilitate a development with the most appropriate land use; and
- ensures efficiency and compatibility with the surrounding land uses.

As such it is requested that Staff and Council consider a favourable recommendation and decision to amend the Official Plan and Zoning By-law to permit the 55-unit condominium development subject to site specific provisions.

Report prepared by:



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Planner
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Report reviewed and approved by:



Eldon Darbyson, BES, MCIP, RPP
Director of Planning
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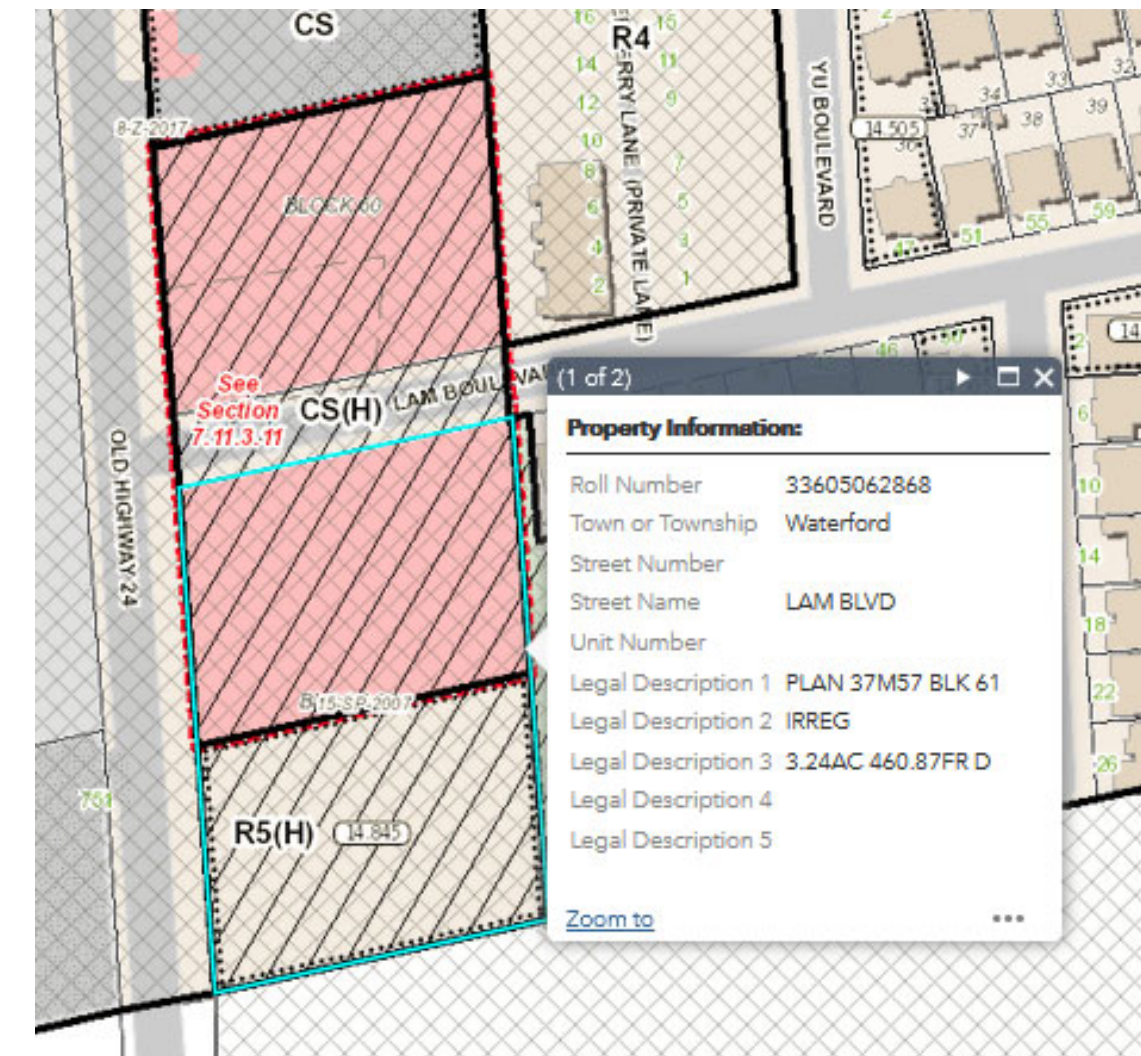
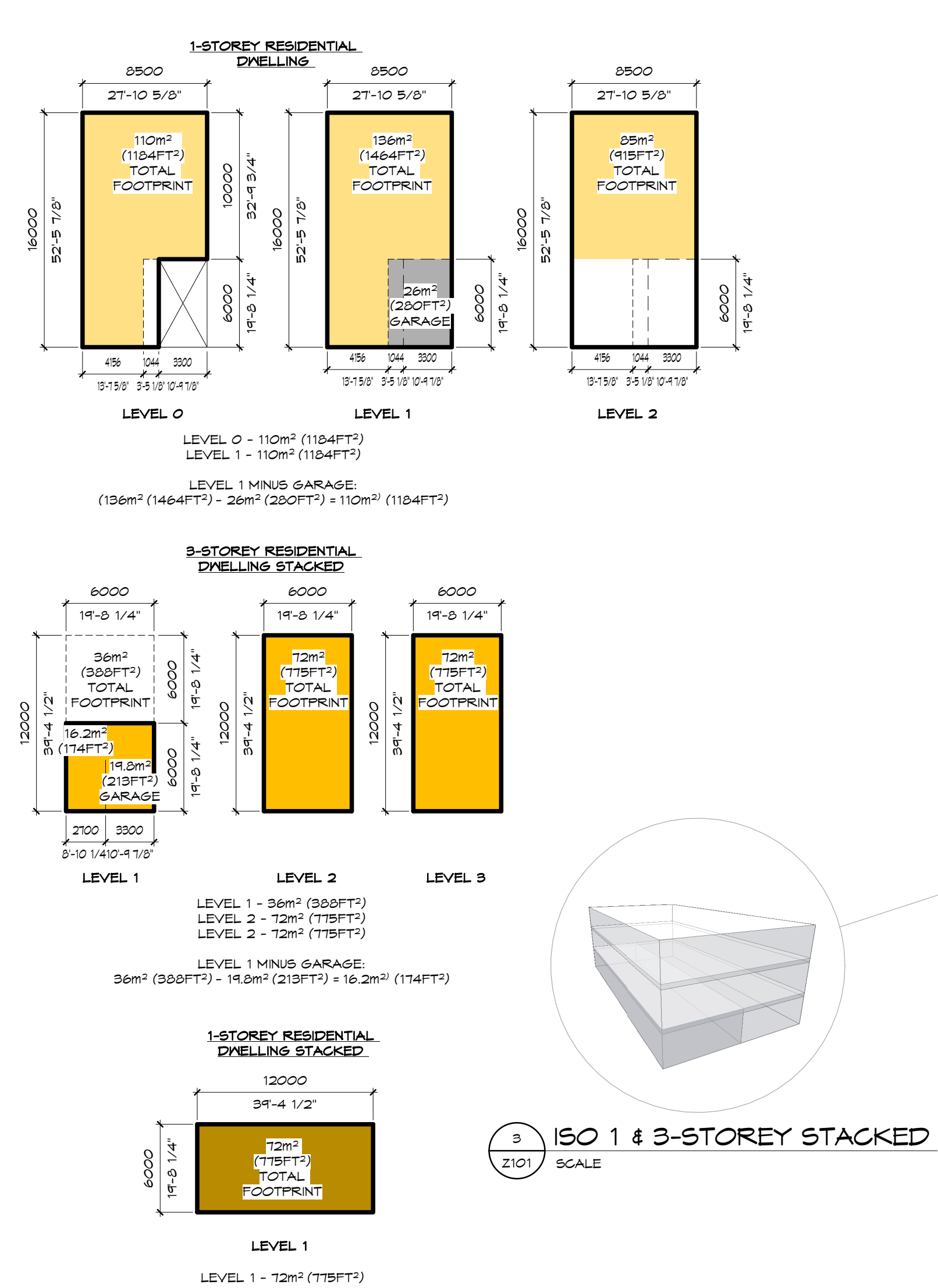
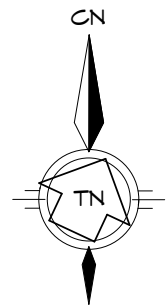
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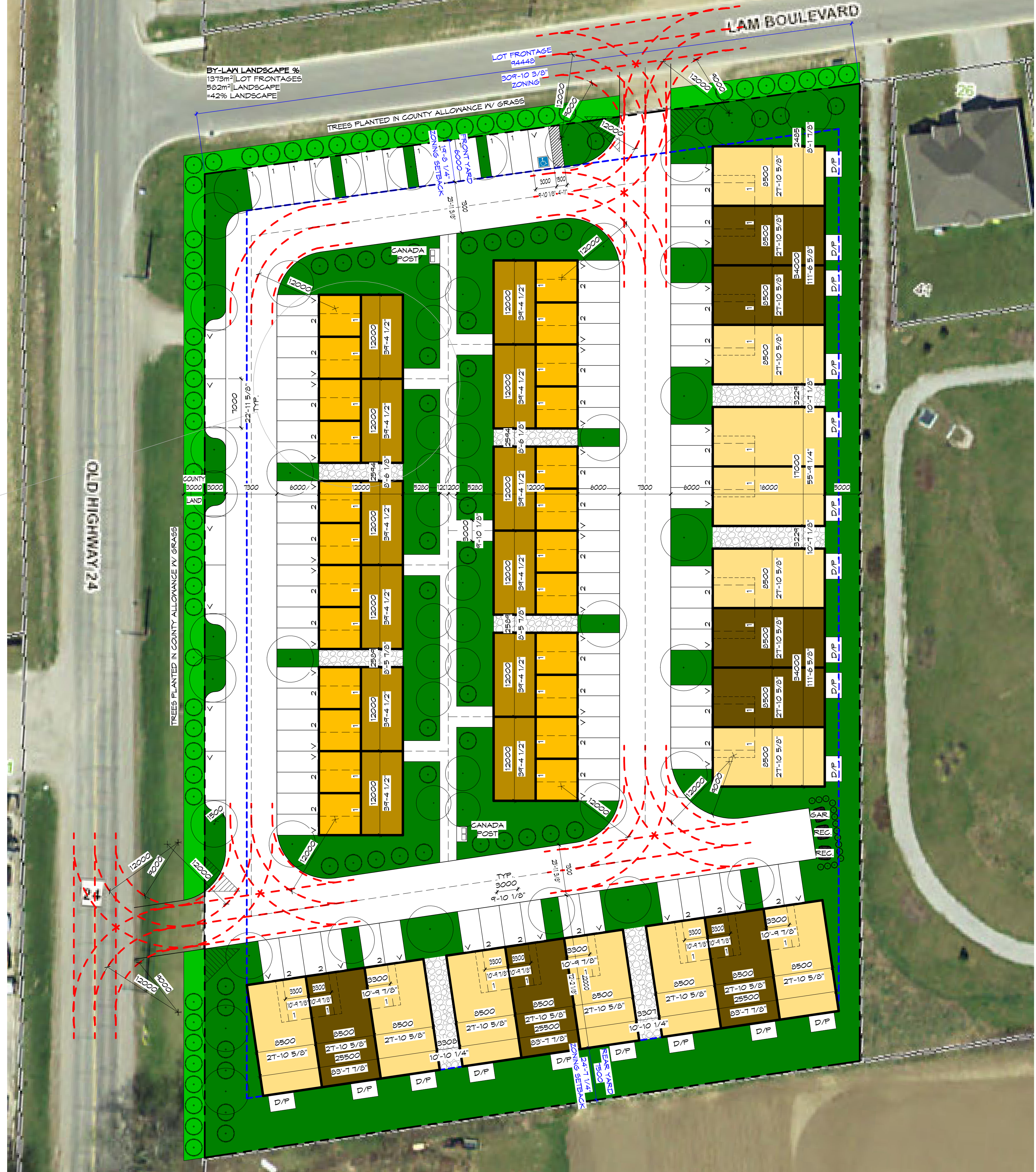


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SITE MAP - ZONING AMENDMENT
SCALE 1:100



1 SITE PLAN PROPOSED - ZONING AMENDMENT
SCALE 1:350

ZONING AMENDMENTS

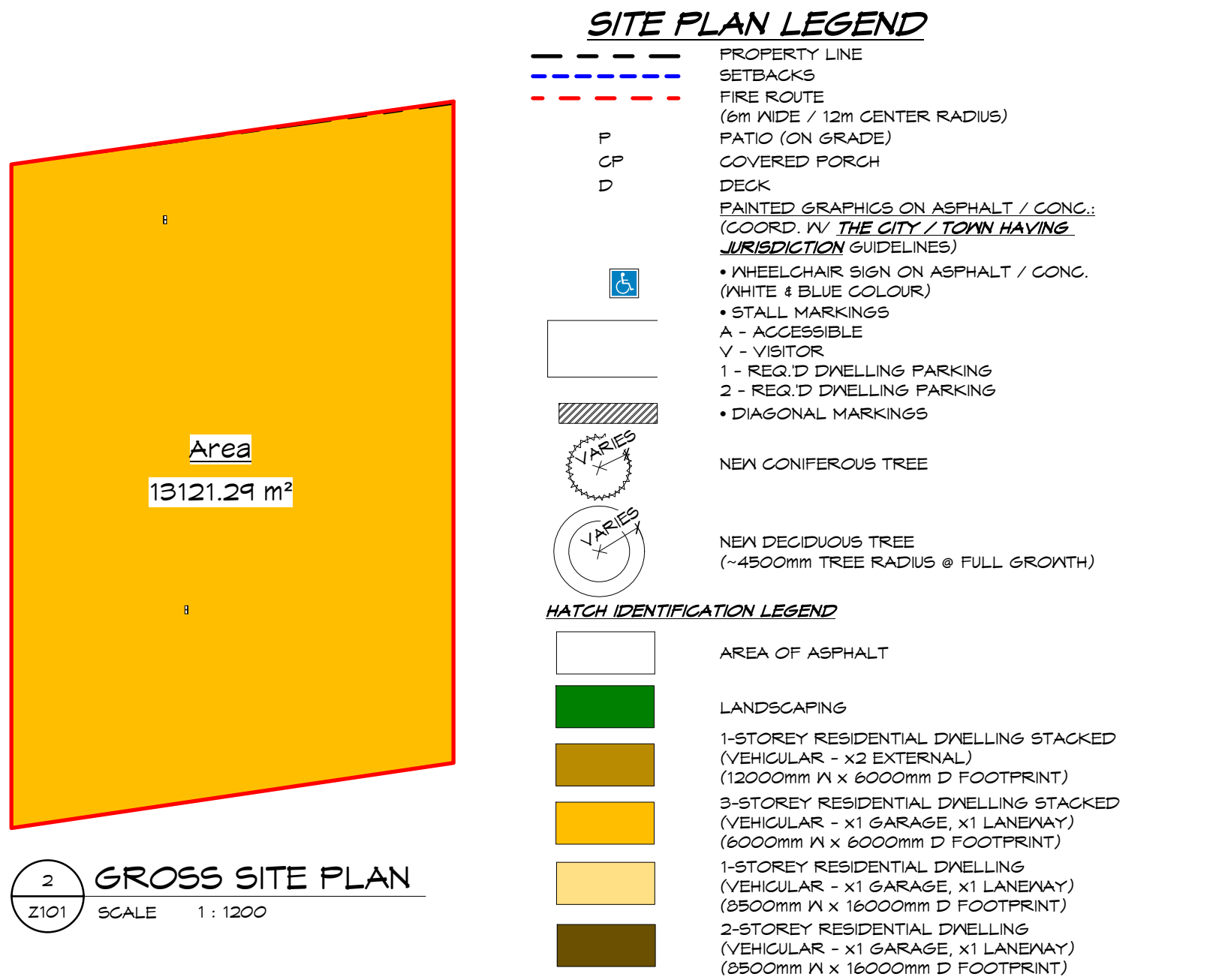
ZONING AMENDMENT

ZONING AMENDMENT

ZONING AMENDMENT

SITE STATISTIC & ZONING REQ.'S

PROPERTY LEGAL DESCRIPTION:			
PLAN 37M-57, BLK 61 PT. ROLL # 33605062868			
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY			
ZONING:			
IN ACCORDANCE TO ZONING BY-LAW 1-Z-2014 NORFOLK COUNTY - JULY-2020-CONSOLIDATION			
PROVISION	LAND USE:		
5.5	EX - URBAN RESIDENTIAL TYPE 5 ZONE (R5(H)) 14.845 in lieu of the corresponding provisions in the R5 Zone, the following shall apply: a. minimum front yard - 60 metre; b. maximum number of dwelling units - forty four (44); c. in lieu of the corresponding provisions of Section 4.0, the following shall apply: d. a minimum number of visitor parking spaces - eleven (11); e. parking spaces shall be permitted in the front yard.		
6.3	EX - SERVICE COMMERCIAL ZONE (SC(H)) 7.113.11 Waterford - In Subdivision Site Specific Policy Area (11-OP-2007, Amendment 2) On land designated Commercial - Site Specific Policy Area 7.113.11 on Schedule "B" to this Plan, commercial uses shall be limited to hotels, restaurants, auto service facilities, farm produce outlets and implement dealerships, building supply and lumberyard and other commercial types catering primarily to the travelling public and neighbourhood commercial uses.		
ZONING BY-LAW SPECIAL PROVISIONS:			
2.88	DEFINITION OF A LOT SHALL NOT APPLY IN LIEU, THE ENTIRE CONDOMINIUM BLOCK (APPROX. 1.3 HA) SHALL BE DEEMED AS THE LOT.		
3.11.2	SHALL NOT APPLY AND THE CONDOMINIUM ROAD SHALL NOT BE DEEMED TO BE AN IMPROVED STREET		
4.2.3.b)	SHALL BE AMENDED TO PERMIT MORE THAN 1 REQ'D SPACE IN REAR FRONT OR EXTERIOR SIDE YARD		
4.2.5.b2)	1 REQ'D PARKING SPOT FOR 1-STORY RESIDENTIAL DWELLING STACKED w/ REQ'D VISITOR SPACES		
4.9.a)	URBAN RESIDENTIAL TYPE 4 ZONE (R4)		
5.4	GROUP TOWNHOUSE		
5.4a)	STACKED TOWNHOUSE		
5.4.2h)	INCREASE BLDG. HEIGHT RESTRICTION (TO BE DETERMINED);		
PROVISION	SETBACKS (m - METERS):	REQUIRED (m)	PROVIDED (m)
5.4.2a)	MIN. LOT AREA:		
5.4.2a.i)	ATTACHED GARAGE	156m ²	13121.29m ²
5.4.2a)	MIN. LOT FRONTAGE:		
i) INTERIOR LOT		30	N/A
ii) CORNER LOT		30	94.4
iii) CORNER LOT ACCESSIBLE BY A REAR ALLEY			
5.4.2c)	MIN. FRONT YARD:		
i) ATTACHED GARAGE		6	6
5.4.2d)	MIN. EXTERIOR SIDE YARD:		
i) w/ A 6m FRONT YARD		6	6
5.4.2e)	MIN. INTERIOR SIDE YARD		
i) ATTACHED GARAGE		3	5
5.4.2f)	MIN. REAR YARD:		
i) ATTACHED GARAGE		1.5	1.5
5.4.2g)	MIN. SEPARATION BETWEEN TOWNHOUSE DWELLINGS		
i) ATTACHED GARAGE		2	2 MIN.
5.4.2h)	MAX. BLDG. HEIGHT		
i) ATTACHED GARAGE		11	7.5/D - 11
5.4.3	MIN. MUTUAL SIDE LOT LINE		
i) ATTACHED GARAGE		1.2	-
5.4.4	MAX. UNITS IN A TOWNHOUSE DWELLING		
i) ATTACHED GARAGE		8 UNITS	6 UNITS
PARKING:			
PROVISION	NUMBER OF PARKING SPACES	REQUIRED	PROVIDED
4.9a)	SINGLE DETACHED, SEMI-DETACHED, DUPLEX, TRI-PLEX, FOUR-PLEX, TOWNHOUSE DWELLINGS & VACATION HOME (8-Z-2011): 2 SPACES / DWELLING UNIT 2 SPACES x 55 DWELLING UNITS = 110	110 SPACE(S)	98 SPACE(S)
4.9a)	(1-STORY RESIDENTIAL DWELLING 2 SPACES x 19 DWELLING UNITS = 38) (2-STORY RESIDENTIAL DWELLING STACKED 2 SPACES x 24 DWELLING UNITS = 48) (1-STORY RESIDENTIAL DWELLING STACKED 2 SPACES x 12 DWELLING UNITS = 24)	(38 SPACE(S)) (48 SPACE(S)) (24 SPACE(S))	(38 SPACE(S)) (48 SPACE(S)) (12 SPACE(S))
4.9f)	VISITOR PARKING: 1 SPACE / 3 DWELLING UNITS 1 SPACE x (55 / 3) =	19 SPACE(S)	50 SPACE(S)
4.7	LOADING SPACES:	N/A	
4.7	DROP OFF SPACES:	N/A	
	TOTAL PARKING:	129 SPACE(S)	148 SPACE(S)
BARRIER FREE PARKING:			
4.3.3	BARRIER FREE PARKING REQ'D (PART OF REQ'D VISITOR PARKING) 1:25 (VISITOR) PARKING SPACES = TYPE A' (3.4m WIDE) PLUS 1.5m AISLE TYPE B' (2.4m WIDE) PLUS 1.5m AISLE	= 1 SPACE(S)	1 SPACE(S)



Project Title
ORCHARD SQUARE

OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA,

**PRELIMINARY
NOT TO BE
USED FOR
CONSTRUCTION**

PROJECT No.
20-128
Drawing Title
ZONING AMENDMENT
Drawing No.
Z101

Appendix B to Planning Justification Report
Corner of Lam Boulevard and Old Highway 24, Waterford
Our Project 20-128 Orchard Square

Provincial Policy Statement 2020 – Policy Compliance Table

This appendix demonstrates how the proposed application is consistent with those applicable policies of the Provincial Policy Statement 2020.

Section	Policy	Comments	
1.1	<p>Managing and Directing Land Use to Achieve Efficient and Resilient Development and Land Use Patterns Policy 1.1.1 outlines that healthy, liveable, and safe communities are sustained by:</p> <p>a) promoting efficient development and land use patterns which sustain the financial well-being of the Province and municipalities over the long term;</p> <p>b) accommodating an appropriate affordable and market-based range and mix of residential types (including single-detached, additional residential units, multi-unit housing, affordable housing and housing for older persons), employment (including industrial and commercial), institutional (including places of worship, cemeteries and long-term care homes), recreation, park and open space, and other uses to meet long-term needs;</p> <p>c) avoiding development and land use patterns which may cause environmental or public health and safety concerns;</p> <p>d) avoiding development and land use patterns that would prevent the efficient expansion of settlement areas in those areas which are adjacent or close to settlement areas;</p> <p>e) promoting the integration of land use planning, growth management, transit-supportive development, intensification and</p>	<p>a) The subject lands are appropriate for residential development. The split zoning and designation of the property makes the parcel less attractive for commercial development.</p> <p>b) This development adds a compact form of residential development to cater to various incomes and mix of housing types in the area.</p> <p>c) A land use compatibility study was prepared to demonstrate no anticipated negative impacts will be generated</p> <p>d) N/A</p> <p>e) The proposed development is located within 250m of the Ride</p>	✓

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	<p>infrastructure planning to achieve cost-effective development patterns, optimization of transit investments, and standards to minimize land consumption and servicing costs;</p> <p>f) improving accessibility for persons with disabilities and older persons by addressing land use barriers which restrict their full participation in society;</p> <p>g) ensuring that necessary infrastructure and public service facilities are or will be available to meet current and projected needs;</p> <p>h) promoting development and land use patterns that conserve biodiversity; and;</p> <p>i) preparing for the regional and local impacts of a changing climate.</p>	<p>Norfolk stop located at the Waterford Plaza.</p> <p>f) Sidewalk network is available and is located near public transit.</p> <p>g) Infrastructure and various services exist in the area. Capacity does exist within these services to support the development.</p> <p>h) N/A</p> <p>i) N/A</p>	✓
1.1.3.1	States that settlement areas shall be the focus of growth and development.	The subject lands are within the urban boundary of Waterford.	✓
1.1.3.2	<p>States that land use patterns within settlement areas shall be based on densities and a mix of land uses which:</p> <p>a) efficiently use land and resources;</p> <p>b) are appropriate for, and efficiently use, the infrastructure and public service facilities which are planned or available, and avoid the need for their unjustified and/or uneconomical expansion;</p> <p>c) minimize negative impacts to air quality and climate change, and promote energy efficiency;</p> <p>d) prepare for the impacts of a changing climate;</p>	<p>a) Compact form of development on an existing lot of record</p> <p>b) Municipal services are available to this development with no requirement for extension</p> <p>c) N/A</p> <p>d) N/A</p>	✓

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	<p>e) support active transportation;</p> <p>f) are transit-supportive, where transit is planned, exists or may be developed; and</p> <p>g) are freight-supportive.</p>	<p>e) The location of the development provides walkability to a number of nearby services.</p> <p>f) Located within 250m of the Ride-Norfolk stop at the Waterford Plaza.</p> <p>g) N/A</p>	✓
	Land use patterns within settlement areas shall also be based on a range of uses and opportunities for intensification and redevelopment in accordance with the criteria in policy 1.1.3.3, where this can be accommodated.	This development adds to the range of uses on vacant underutilized lands.	✓
1.1.3.3	Planning authorities shall identify appropriate locations and promote opportunities for transit-supportive development, accommodating a significant supply and range of housing options through intensification and redevelopment where this can be accommodated taking into account existing building stock or areas, including brownfield sites, and the availability of suitable existing or planned infrastructure and public service facilities required to accommodate projected needs.	This policy encourages the proposed development which represents intensification through the provision of a range of housing options that can be serviced with existing infrastructure. Public transit is available within 250m of the development.	✓
1.1.3.4	Appropriate development standards should be promoted which facilitate intensification, redevelopment and compact form, while avoiding or mitigating risks to public health and safety.	The development intensifies the area in a compact form and is not located in a flood plain.	✓
1.1.3.5	Planning authorities shall establish and implement minimum targets for intensification and redevelopment within built-up areas, based on local conditions. However, where provincial targets are established through provincial plans, the provincial target shall represent the minimum target for affected areas.	The County Official Plan indicates that the County shall target that a minimum 25 percent of its annual residential growth be accommodated through infill, intensification and redevelopment within the existing	✓

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		built-up areas in the Urban Areas with full municipal services.	
1.2.6	<p>Land Use Compatibility</p> <p>Major facilities and 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, minimize risk to public health and safety, and to ensure the long-term operational and economic viability of major facilities in accordance with provincial guidelines, standards and procedures.</p> <p>A sensitive land use means buildings, amenity areas, or outdoor spaces where routine or normal activities occurring at reasonably expected times would experience one or more adverse effects from contaminant discharges generated by a nearby major facility. Sensitive land uses may be a part of the natural or built environment. Examples may include, but are not limited to: residences, day care centres, and educational and health facilities.</p> <p>A major facility means facilities which may require separation from sensitive land uses, including but not limited to airports, manufacturing uses, transportation infrastructure and corridors, rail facilities, marine facilities, sewage treatment facilities, waste management systems, oil and gas pipelines, industries, energy generation facilities and transmission systems, and resource extraction activities.</p>	<p>As shown through the D-6 Compatibility and Noise Assessment completed by CCS Engineering Inc., there are no existing facilities (industrial or commercial) that are expected to adversely impact the proposed development with noise, dust or odour emissions.</p> <p>Any future proposed industrial facility will already have to take into consideration these provincial guidelines and standards due to potential residential land uses across Blueline Road.</p>	✓
1.4	<p>Housing</p> <p>Planning authorities to provide for an appropriate range and mix of housing types and densities.</p>	This development adds to the range and mix of housing types and densities in the area.	✓
1.4.3	Planning authorities to provide for an appropriate range and mix of housing options and densities to meet projected market-based and affordable housing needs of current and future residents of the regional market area by:		

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	<p>b) permitting and facilitating:</p> <ol style="list-style-type: none"> 1. all housing options required to meet the social, health, economic and well-being requirements of current and future residents, including special needs requirements and needs arising from demographic changes and employment opportunities; and 2. all types of residential intensification, including additional residential units, and redevelopment in accordance with policy 1.1.3.3; <p>c) directing the development of new housing towards locations where appropriate levels of infrastructure and public service facilities are or will be available to support current and projected needs;</p> <p>d) promoting densities for new housing which efficiently use land, resources, infrastructure and public service facilities, and support the use of active transportation and transit in areas where it exists or is to be developed;</p> <p>e) requiring transit-supportive development and prioritizing intensification, including potential air rights development, in proximity to transit, including corridors and stations; and</p> <p>f) establishing development standards for residential intensification, redevelopment and new residential development which minimize the cost of housing and facilitate compact form, while maintaining appropriate levels of public health and safety.</p>	<p>b) The development adds to the range of housing options and is located in an area near employment opportunities.</p> <p>c) This development represents residential intensification where public facilities are already available.</p> <p>d) The proposed development will achieve 42 uph to ensure efficient use of the land. The urban area of Waterford contains existing infrastructure public services facilities.</p> <p>e) N/A</p> <p>f) The development is an appropriate density for the size of the lands near sidewalks, public transit and existing and future trails.</p>	✓
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Summary

The proposed development will facilitate the construction of a 55-dwelling unit development on an existing vacant parcel of land within the County's Settlement Area. The proposed official plan and zoning amendments will help add to the range of housing in the area. The form of development contributes the County's existing residential building supply, improves the mix of land uses in the area, adds to the diversity unit configurations available, and will appeal to individuals with different needs and financial abilities. The lands have access to existing municipal infrastructure and will not cause any environmental or public health and safety concerns as the necessary studies have been completed to implement mitigation from adjacent industrial land uses. Municipal servicing is available on Old Highway 24 which can be extended to the subject property at the developers cost and will be confirmed through the site plan application.

1.5 Public Spaces, Recreation, Parks, Trails and Open Space

Section 1.5 addresses healthy communities and the provision of public spaces, recreation, parks, trails and open space. The lands are too small to provide viable parkland. Therefore, 5% of the value of the lands will be paid to the County in lieu of parkland dedication in accordance with County policies. It will facilitate active transportation and community connectivity due to the proximity of local businesses and services and fosters social interaction through existing recreation in the area. More specifically, the development is near public parks and within one kilometre of restaurants, pharmaceutical stores and within a five (5) minute walk to the Trans Canada Trail identified on Schedule I of the Official Plan.

1.6 Infrastructure and Public Service Facilities

Policy 1.6 discusses the efficient use of infrastructure, utilities and green infrastructure.

The subject lands will take advantage of existing infrastructure and coordinate the installation of utilities. Green infrastructure in the form of street trees as required by the County. The lands will contain permeable surfaces in the form of sodded boulevards open space areas unoccupied by buildings, structures and driveways.

1.8 Energy Conservation, Air Quality and Climate Change

Policy 1.8.1 states that planning authorities shall support energy conservation and efficiency, improved air quality, reduced greenhouse gas emissions, and preparing for the impacts of a changing climate through land use and development patterns which:

- b) promote the use of active transportation and transit in and between residential, employment (including commercial and industrial) and institutional uses and other areas;
- e) encourage transit-supportive development and intensification to improve the mix of employment and housing uses to shorten commute journeys and decrease transportation congestion;

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The proposed development is in a location that encourages active transportation to nearby residential and employment and institutional uses. The lands are in close proximity to various commercial and institutional uses which provide employment opportunities to the future residents of the development.

3.0 Protecting Public Health and Safety

Policy 3.0 discusses natural and human-made hazardous lands, where development is prohibited or permitted subject to conditions addressing flooding and erosion.

As show through the D-6 Compatibility and Noise Assessment (Appendix C) completed by CCS Engineering Inc., there are no existing facilities (industrial or commercial) that are expected to adversely impact the proposed development with noise, dust or odour emissions. Any future proposed industrial facility will already have to take into consideration these provincial guidelines and standards due to existing residential land uses across Blueline Road. The proposed development does not inhibit the establishment of future viable industrial uses.

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Norfolk County Official Plan – Policy Compliance Table

This appendix demonstrates how the proposed application is consistent with those applicable policies of the Norfolk County Official Plan.

Section	Policy	Comments	
2.2	<p>Goals and Objectives</p> <p>This section of the Official Plan sets out six “Goals and Objectives” to which the following five are applicable to the proposed residential development:</p> <ul style="list-style-type: none"> • Strong and Diversified Economy; • Maintaining and Enhancing the Rural and Small-Town Character; • Maintaining a High Quality of Life; • Upgrading and Expanding Infrastructure; and • A Well Governed, Well Planned and Sustainable County. 	<p>The proposed Official Plan and Zoning Bylaw Amendments maintain the general purpose and intent of the Official Plan’s Goals and Objectives by providing compact and efficient residential development within the serviced urban area of Waterford. The location of the development will provide its residents with easy access to commercial and social services located in the nearby shopping centre and downtown areas.</p> <p>The proposed development will provide residents with access to much needed housing options to live and work in Norfolk County. Through the site plan process, adherence to the County’s high quality design criteria will ensure this development maintains and enriches the rural and small-town character.</p> <p>The mix of housing options provided in this development will achieve a density of 42 uph to ensure efficient use of land while maintaining compatibility with surrounding residential land uses. The location of this development will provide its residents with easy access to Old Highway 24 in order to access employment opportunity across Norfolk County.</p>	✓
5.3	<p>Housing</p> <p>The provision of housing is an essential part of planning in Norfolk County. The County shall ensure that a full range of housing types are</p>	<p>The proposed application is consistent with the policies of this section of the official plan. This residential development will provide a unique and much need form of housing. The proposed application provides a number of</p>	✓

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	<p>provided to meet the anticipated demand and demographic change.</p> <p>5.3 e) Under this section the County shall encourage innovative and appropriate housing development that exhibits design and adaptability characteristics, and may represent non-traditional additions to the County's housing stock.</p> <p>5.3 g) Further the County shall encourage that housing be considered when opportunities for redevelopment become available. This includes the redevelopment of existing single-use and underutilized areas with full municipal services, such as shopping plazas, business and employment sites and older commercial and residential areas, especially where the land is in close proximity to human services. Special attention shall be given to the design of buildings, the landscaping treatment and features of the site to ensure that the proposed redevelopment is physically compatible with the adjacent uses.</p>	<p>different housing forms, including: traditional and stacked townhouses. The stacked townhouses will also include a smaller single storey townhouse, which will provide a much-needed lower cost housing option in Norfolk.</p> <p>e) This section of the Official Plan requires the County to consider innovative and appropriate housing options. As shown on the concept site plan, the design of this development will provide a form of housing not readily available in Norfolk County.</p> <p>g) Currently this vacant parcel of land remains underutilized, partially zoned and designated residential and commercial. The mixed zoning and designation make the parcel less attractive to many of the permitted uses. The proposed application will make effective use of the land and provide efficient access to human services in the neighbouring shopping plaza and easy access to the downtown area. As shown through the D-6 compatibility study there are no negative impacts on the proposed development or surrounding land uses. Through the site plan process, buffering and landscaping will be provided on site to further mitigate any potential impacts. The innovate site design has incorporated a set back from Old Highway 24 which will further mitigate any non-compatibility and provide increased visual appeal for people travelling through Waterford.</p>	✓
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	<p>5.3.1 f) The County shall consider applications for infill development, intensification and redevelopment of sites and buildings through intensification based on the following criteria:</p> <ul style="list-style-type: none"> i. the development proposal is within an Urban Area, and is appropriately located in the context of the residential intensification study; ii. the existing water and sanitary sewer services can accommodate the additional development; iii. the road network can accommodate the traffic generated; iv. the proposed development is compatible with the existing development and physical character of the adjacent properties and surrounding neighbourhood; and v. the proposed development is consistent with the policies of the appropriate Land Use Designation associated with the land. 	<p>The proposed application is for a residential development on an existing lot of record within the serviced urban area of Waterford. The development will be provided with access to municipal water and sewer services. As part of the application the necessary studies have been completed to show capacity exists within these systems along with a traffic impact study. A Ministry of Environment D-6 compatibility study has shown the proposed development will not be negatively impacted.</p> <p>The site plan concept demonstrates that two storey development will occur closer to the existing residential area to the east and three storey development is located central to the site. This site design allows the development to transition from a scale perspective to the existing residential area.</p>	✓
5.4	<p>Community Design The following shall be the policy of the County:</p> <ul style="list-style-type: none"> a) Through implementation of this Plan, the County shall seek to maintain and improve the physical design characteristics of the Urban Areas in the context of new and existing development and stress a generally high 	<ul style="list-style-type: none"> a) This development will be subject to the site plan control process which will ensure high quality design. 	✓

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	<p>quality of settlement design throughout the County.</p> <p>b) Through the review of development applications, including plans of subdivision, site plans and other development proposals, the County:</p> <ul style="list-style-type: none"> i. shall ensure that new development is designed in keeping with the traditional character of the Urban Areas, in a manner that both preserves the traditional image of the Urban Areas and enhances the sense of place within the County while maintaining the community image of existing settlement areas; ii. shall promote efficient and cost-effective development design patterns that minimize land consumption; iii. shall promote the improvement of the physical character, appearance and safety of streetscapes, civic spaces, and parks; iv. shall encourage tree retention and tree replacement; v. shall ensure that design is sympathetic to the heritage character of an area, including the area's cultural heritage resources; vi. shall strongly encourage design that considers and, wherever possible, continues existing and traditional street 	<ul style="list-style-type: none"> i. The proposed development will achieve 42 uph to ensure efficient use of the land while providing a density that maintains an overall small-town characteristic. ii. The proposed development will provide 42 uph to ensure efficient use of the lands on an existing lot of record. iii. As shown on the site plan, this development will provide increased setbacks and ample buffering along Old Highway 24 to help improve the streetscape in the area. iv. A tree planting plan can be provided during the site plan approval process. v. Consideration can be given during the site plan approval process to help implement this policy. vi. Increased setback from Old Highway 24 will help maintain the existing street patterns. 	<p>✓</p> <p>✓</p>
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	<p>patterns and neighbourhood structure; and</p> <p>vii. may require, at the County's sole discretion, that proponents submit design guidelines with development applications, establishing how the policies of this Section have been considered and addressed. Such guidelines may also be required to address related issues of residential streetscaping, landscaping, setbacks, sidewalks, signage, garage placement, and architectural treatment</p> <p>c) Adequate measures shall be taken to ensure that the permitted uses have no adverse effects on adjacent land uses. Adequate buffering shall be provided between any uses where land use conflicts might be expected, and such buffering may include provisions for grass strips and appropriate planting of trees and shrubs, berms or fence screening, and other means as appropriate. Modifications to building orientation may also be appropriate buffering measures, but not in replacement of appropriate plantings.</p> <p>d) Development design that establishes reverse lotting on Provincial Highways and County Roads will not be permitted. Development design that requires features such as noise attenuation or privacy fencing will be discouraged. Wherever possible, new development will be oriented toward streets or parks.</p>	<p>vii. This requirement will be met during the site plan application process.</p> <p>c) These requirements will be met during the site plan approval process. Recommendations from the D-6 Land Use Compatibility Study, including increased setback, landscape buffering, noise fences and construction requirements will be incorporated into the development of the site.</p> <p>d) As shown on the site plan, no reverse lotting is proposed for any dwelling units on this development.</p>	<p>✓</p> <p>✓</p>
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6.4	<p>Urban Areas</p> <p>This section of the Official Plan identifies the six Urban Areas of Norfolk County – Delhi, Courtland, Port Dove, Port Rowan, Simcoe, and Waterford – as the focal points for growth and development activity.</p>	<p>The proposed application is within the urban boundary of Waterford and will help Norfolk County meet its growth targets.</p>	✓
6.5.4	<p>The County will support and promote the continued development of Waterford as an important urban community and agricultural support centre in the County. The following shall be the policy of the County:</p> <ul style="list-style-type: none"> a) Waterford is the closest Urban Area to Highway No. 403. The County shall encourage employment growth and development in the Urban Area. b) Many of the historic residences in the Waterford Urban Area are of cultural heritage value or interest. The County will encourage the maintenance, rehabilitation, and adaptive reuse of the historic residences. c) Trail linkage opportunities exist in the Waterford Urban Area due to the presence of abandoned rail corridors and other linear open space features. The County will encourage the development of trails integrating Waterford with other areas of the County. 	<p>This development is located within the urban area of Waterford and does not offend these policies.</p>	✓

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<p>7.7</p>	<p>Urban Residential Designation</p> <p>The Urban Residential Designation applies to the Urban Areas of the County. The Urban Areas are expected to continue to accommodate attractive neighbourhoods which will provide for a variety of residential forms.</p> <p>A variety of housing types are needed to meet the needs of a diverse population.</p> <p>Under Permitted uses 7.7.1 b) Medium density residential uses shall be permitted including triplex dwellings, fourplex dwellings, row or block townhouse dwellings, converted dwellings containing more than two dwelling units, walk-up apartments and similar medium profile residential buildings.</p>	<p>The proposed development will provide a variety of housing forms including traditional townhouses, three storey stacked townhouses and single storey stacked townhouses.</p> <p>The policies of section 7.7.2b) require development to <u>generally</u> have a net density of between 15 and 30 uph. While the proposed development provides 42 uph, it is achieved through a creative site design implementing a housing form aligned with this section.</p> <p>As a proposed medium density condominium, subject to Section 9.6.5 Site Plan Control, the development will adhere to Norfolk County's design criteria to ensure all requirements of this section are satisfied. This will include the necessary studies and modeling to ensure service capacity exists and appropriate buffering and landscaping is implemented.</p>	<p>✓</p>
<p>7.7.2</p>	<p>Land Use Policies</p> <p>7.7.2 b) Triplex, fourplex, townhouses, and other medium density housing forms, shall generally have a net density of between 15 and 30 uph, save and except for in the Courtland Urban Area where private servicing limitations shall determine the density of development. New medium density residential development and other uses that are similar in terms of profile, shall meet the following criteria:</p> <ul style="list-style-type: none"> i. the density, height and character of the development shall have regard to adjacent uses; ii. the height and massing of the buildings at the edge of the medium density residential development shall have regard to the height and massing of the buildings in any adjacent 	<p>Despite achieving 42 uph, given the proposed developments close proximity to parks, public transit and local services (grocery store, pharmacy) this development meets all policy requirements established under Section 7.7.2b) and 7.7.2c).</p>	

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	<p>low density residential area and may be subject to additional setbacks, or landscaping to provide an appropriate buffer;</p> <p>iii. the development will be encouraged to have direct access to an arterial or collector road, where possible and appropriate;</p> <p>iv. the watermain and sanitary sewers shall be capable of accommodating the development, or the proponent shall commit to extending services at no cost to the County, save and except for in the Courtland Urban Area, where private septic systems shall be permitted;</p> <p>v. the development is adequately serviced by parks and school facilities;</p> <p>vi. in developments incorporating walk-up apartments, block townhouse dwellings and medium-profile residential buildings, on-site recreational facilities or amenities such as playground equipment may be required;</p> <p>vii. the development shall be designed and landscaped, and buffering shall be provided to ensure that the visual impact of the development on adjacent uses is minimized;</p>		
7.11	<p>Commercial Designation</p> <p>Commercial areas are accessible locations along the County's major transportation routes offering suitable accommodation for a specific range of commercial uses which have the following basic characteristics:</p> <p>c) space-extensive uses having physical requirements in terms of the size or configuration of the site or building such that they cannot be accommodated within the Downtown Areas;</p>	<p>As a parcel of mixed designations, representing less than 0.5ha of Commercial area, the parcel size conflicts with its current designation and its intention to encourage commercial development. Redesignation of this small parcel does not offend the policies of the official plan.</p>	✓

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7.11.1	<p>The Commercial Designation encourages the establishment of commercial uses and permits limited residential development provided that the uses do not negatively impact the planned function of the Commercial areas. Residential uses are permitted as follows:</p> <ul style="list-style-type: none"> i. in a building of commercial character, residential uses shall only be permitted above the ground floor; and ii. in a building of residential character, either single detached or multiple dwelling, residential and/or commercial uses shall be permitted, provided the residential character of the building is maintained. 	<p>The proposed land use is for a multi-residential dwelling unit development which will be designed with residential character and therefore is permitted.</p> <p>The commercial portion represents less than 0.5 ha in area which provides reduced space for many of the uses permitted under the CS zone. Higher intensity permitted uses (including but not limited to lumber yard, garden supply center, equipment rental establishment, etc.) require large retail buildings and associated parking / display / storage areas. Lower intensity permitted uses (including but not limited to clinic or doctor office, daycare nursery, dry cleaning establishment, etc.) are normally grouped in a large shared plaza which also requires extensive parking areas.</p> <p>In addition to the area required for a commercial building and parking space, additional lands are also required for landscaping, snow storage, garbage collection, and stormwater management. These factors make a smaller parcel unattractive for many of the permitted uses under the CS zone.</p>	✓
7.11.2	<p>Land Use Policies</p> <p>The following policies apply to land designated Commercial.</p> <ul style="list-style-type: none"> a) Commercial development shall be compatible with surrounding uses and shall be adequately buffered from adjacent sensitive land uses. b) Adequate off-street parking and loading spaces shall be provided in accordance with the Zoning By-law 	<p>Given the requirements under this section, the small size of the commercial designation makes this parcel less attractive to many commercial uses.</p> <p>These requirements further restrict and reduce the area of land available for commercial uses.</p>	✓

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	<p>c) Commercial uses shall only locate on Provincial Highways, subject to the approval of the Province and the County, or arterial or collector roads, subject to the approval of the County.</p> <p>d) A high standard of site design shall be required through site plan control.</p> <p>e) Proposals to designate additional land as Commercial within the County shall be subject to the policies of Section 9.6.1 (Official Plan Amendments) and the criteria outlined in Section 7.10.2 (f) (Shopping Centre Commercial Designation – Land Use Policies), notwithstanding the size of the proposed use(s), or the presence or absence of a proposed Large Retail Use.</p>	<p>Conversion of this parcel to residential will help achieve appealing and much needed development on this underutilized property.</p>	
8.8	<p>Noise, Vibration, Odour and Light Emissions Noise, vibration, odour and other contaminants resulting from industrial activity can impact adjacent land uses, and the residents, businesses and visitors of Norfolk County. Managing noise, vibration and odour levels in the County is important to ensuring the health and well-being of the County, and in managing appropriate relationships between sensitive land uses, land uses that emit noise, vibration and/or odour, and certain elements of the transportation network</p>	<p>A D-6 Compatibility Assessment was completed by CCS Engineering Inc. to determine if noise, odour, vibration or dust emissions from surrounding sources might adversely impact the proposed townhouse development sensitive land uses.</p> <p>As shown through the D-6 Compatibility and Noise Assessment completed by CCS Engineering Inc., there are no existing facilities (industrial or commercial) that are expected to adversely impact the proposed development with noise, dust or odour emissions.</p> <p>Any future proposed industrial facility will already have to take into consideration these provincial guidelines and standards due to existing residential land uses located on the west side of Blueline Road.</p>	✓

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		Recommendations from the D-6 Compatibility and Noise Assessment including buffering and construction requirement will be incorporated into the development at the site plan stage to further mitigate any potential for future land use conflicts.	✓
8.9.1	<p>Services in Urban Areas</p> <p>8.9.1 c) All development in the Urban Areas shall be fully serviced by municipal piped water supply and waste water treatment systems, save and except for circumstances outlined in Section 8.9.1 f) (Services in Urban Areas). Notwithstanding this, appropriate development shall be permitted in the Courtland Urban Area on the basis of a municipal water system and private waste water disposal systems.</p> <p>e) Infilling of vacant areas within the Urban Areas which are already provided with full municipal services is encouraged, and shall be a criterion when evaluating proposed plans of subdivision and consents, with respect to the extension of services, utilities or the associated construction.</p>	As demonstrated by the Functional Servicing Report prepared by G. Douglas Vallee Limited dated December, 2021, adequate capacity exists within the water and sanitary mains along Lam Boulevard to service the development. As an existing lot within the urban area, this form of development is encouraged by the policies of this section.	✓
9.6	<p>Development Control</p> <p>9.6.1 c) The County shall consider the following criteria when reviewing applications to amend this Plan:</p> <ul style="list-style-type: none"> i) the manner in which the proposed amendment conforms to prevailing Provincial policy and regulations; ii) the manner in which the proposed amendment conforms to the Strategic Plan prepared in support on this Plan; 	The proposed application is for an Official Plan and Zoning Bylaw amendment in order to facilitate a medium density multi-unit condominium with innovative forms of housing. The development will be located on an existing lot of record within the Urban Settlement area of Waterford and will have access to adequate municipal water and sanitary services. The necessary studies and modeling have been completed to ensure there are no adverse impacts on surrounding land	✓

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Corner of Lam Boulevard and Old Highway 24, Waterford
Our Project 20-128 Orchard Square**

	<ul style="list-style-type: none"> iii) the manner in which the proposed amendment conforms to the Goals and Objectives, and policies of this Plan; iv) the impacts of the proposed amendment on the provision of and demand for municipal services, infrastructure and facilities; v) the adequacy of the proposed servicing solution with respect to the servicing policies of this Plan; vi) the impact of the proposed amendment on surrounding land uses, the transportation system, municipal services and community amenities and services; vii) the impact of the proposed amendment on the community structure and nature of the Urban Areas and/or Hamlet Areas; viii) the impact of the proposed amendment on cultural heritage resources and/or Natural Heritage Features; ix) the impact on agricultural uses and land; x) the impact of the proposed amendment on the financial sustainability of the County; and xi) any other information determined by the County, in consultation with the appropriate, agencies, to be relevant and applicable. 	<p>uses the necessary capacity exists within the municipal services to accommodate this development.</p> <p>This type of development will provide the citizens of Norfolk with increased housing options and is supported and encouraged by provincial and county land use planning policies.</p>	
9.10.5	<p>Parkland Dedication</p> <p>The County shall secure the maximum benefit of the Planning Act with respect to land dedication for park development and shall strive to meet the policies of Section 7.5.1 (Parks) of this Plan relating to park development.</p>	<p>Given the policies of Section 9.10.5, it is requested that the County accept cash-in-lieu of land dedication. Due to the size of the site, a parkland dedication large enough to provide a reasonable park facility would render the site impractical for development.</p>	✓

Appendix C to Planning Justification Report
Corner of Lam Boulevard and Old Highway 24, Waterford
Our Project 20-128 Orchard Square

	<p>g) The County may accept cash-in-lieu of the land dedication to be paid into a special account and used as specified in the Planning Act. Council will consider cash-in-lieu of parkland dedication under the following circumstances:</p> <ul style="list-style-type: none"> a. where the required land dedication fails to provide an area of suitable shape, size or location for development as public parkland; b. where the required dedication of land would render the remainder of the site unsuitable or impractical for development; and/or c. where it is preferable to have consolidated parkland of a substantial size servicing a wide area d. The County may establish a flat rate for cash-in-lieu payments for parkland dedications from new residential, commercial and industrial lots created by consent. 	<p>Additionally, the area is already serviced by adequate parklands located on the adjacent property. Cash-in-lieu of parkland dedication from this development could be used to provide facility upgrades to existing parks in Waterford.</p>	✓
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Orchard Square Townhouses Transportation Impact Study

Paradigm Transportation Solutions Limited

December 2021
210475





Project Summary



Project Number
210475

Date: December 2021
Version 1.0.0

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Orchard Square Townhouses Transportation Impact Study



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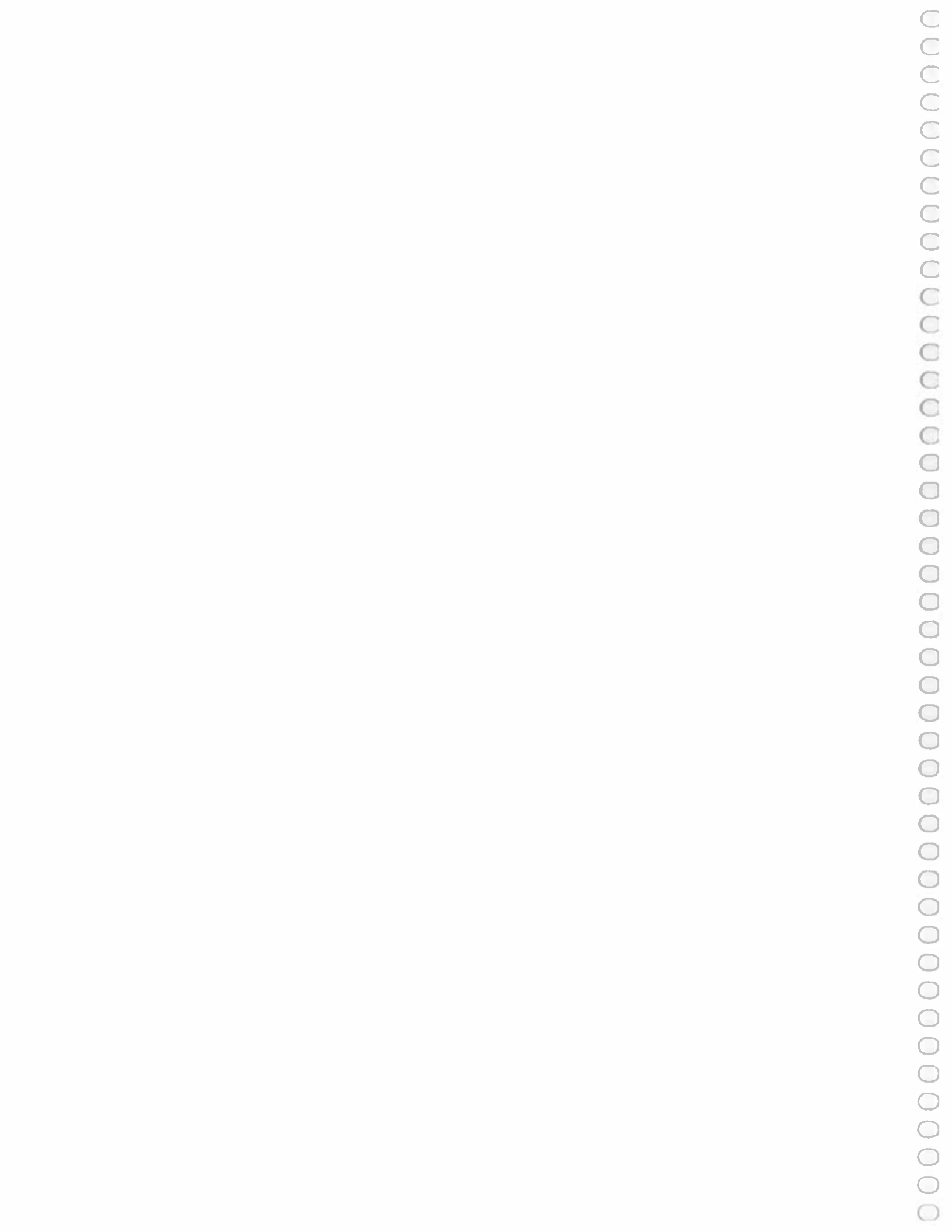
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Executive Summary

Content

Paradigm Transportation Solutions Limited (Paradigm) has been retained to conduct this Transportation Impact Study (TIS) for a proposed residential development located at the southeast corner of Old Highway 24 and Lam Boulevard in the Town of Waterford, Norfolk County.

This Transportation Impact Study (TIS) includes an analysis of existing traffic conditions, a description of the proposed development, traffic forecasts for development opening year (2022/23), five years after development opening (2027), and ten years after development opening (2032), and recommendations as required for improvements to address the traffic impacts of the proposed development.

Development Concept

The development is proposed to consist of 55 townhouses. Vehicular access is proposed via two full-moves access points: one on Old Highway 24 and one on Lam Boulevard.

TIS Scope

The scope of the Transportation Impact Study for the proposed development includes:

- ▶ **Study Area intersections:**
 - Old Highway 24 and Lam Boulevard;
 - Access intersection on Old Highway 24; and
 - Access intersection on Lam Boulevard.
- ▶ **Analysis Periods:** Weekday AM and PM peak hours.
- ▶ **Background Developments:** Condominium development located at the northeast corner of Old Highway 24 and Lam Boulevard.
- ▶ **Traffic Conditions:** Existing (2021), development opening (2022), five years after development opening (2027), and ten years after development opening (2032).

Conclusions

Based on the investigations carried out, it is concluded that:



- ▶ **Existing Traffic Conditions:** The intersection at Old Highway 24 and Lam Boulevard is currently operating within acceptable levels of service.
- ▶ **Development Trip Generation:** The development is forecast to generate 27 and 35 trips during the AM and PM peak hours, respectively.
- ▶ **Background Traffic Conditions:** The intersection at Old Highway 24 and Lam Boulevard is forecast to operate at acceptable levels of service under the 2022, 2027, and 2032 horizon years.
- ▶ **Total Traffic Conditions:** The study area intersection and the access intersections are forecast to operate within acceptable levels of service under the 2022, 2027, and 2032 horizon years.
- ▶ **Roadway Traffic Volumes:** The peak hour, peak direction traffic volume on Old Highway 24 is currently less than 350 vph, well within the capacity of 900 vph. Under the 2032 total traffic scenario, the peak hour, peak direction traffic volume will increase to approximately 400 vph. The projected increase will have minimal impacts on Old Highway 24 traffic flows.

Recommendations

Based on the findings of this study, it is recommended that the subject development be considered for approval as proposed.



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1 Introduction

1.1 Overview

Paradigm Transportation Solutions Limited (Paradigm) has been retained to conduct this Transportation Impact Study (TIS) for a proposed residential development located at the southeast corner of Old Highway 24 and Lam Boulevard in the Town of Waterford, Norfolk County. Figure 1.1 details the subject development location.

The development is proposed to consist of 55 townhouses. Vehicle access is proposed via two full-moves access points: one on Old Highway 24 and one on Lam Boulevard.

Build-out is expected to occur by 2022/23, subject to market conditions.

1.2 Purpose and Scope

The purpose of this report is to identify and assess the potential traffic impact resulting from the proposed development. The scope of the study, developed in consultation with Norfolk County staff via e-mail in September 2021, includes:

- ▶ Assessment of the current traffic and site conditions within the study area;
- ▶ Estimates of background traffic growth for build-out (2022), five years after build-out (2027), and ten years after build-out (2032);
- ▶ Estimates of additional traffic generated by the subject site;
- ▶ Analyses of the impact of the future traffic on the surrounding road network, including the following study area intersections and roadways:
 - Old Highway 24 and Lam Boulevard;
 - Access intersection on Old Highway 24;
 - Access intersection on Lam Boulevard; and
 - Roadway traffic volumes – Old Highway 24 and Lam Boulevard.
- ▶ Recommendations, if necessary, to mitigate the site generated traffic in a satisfactory manner.

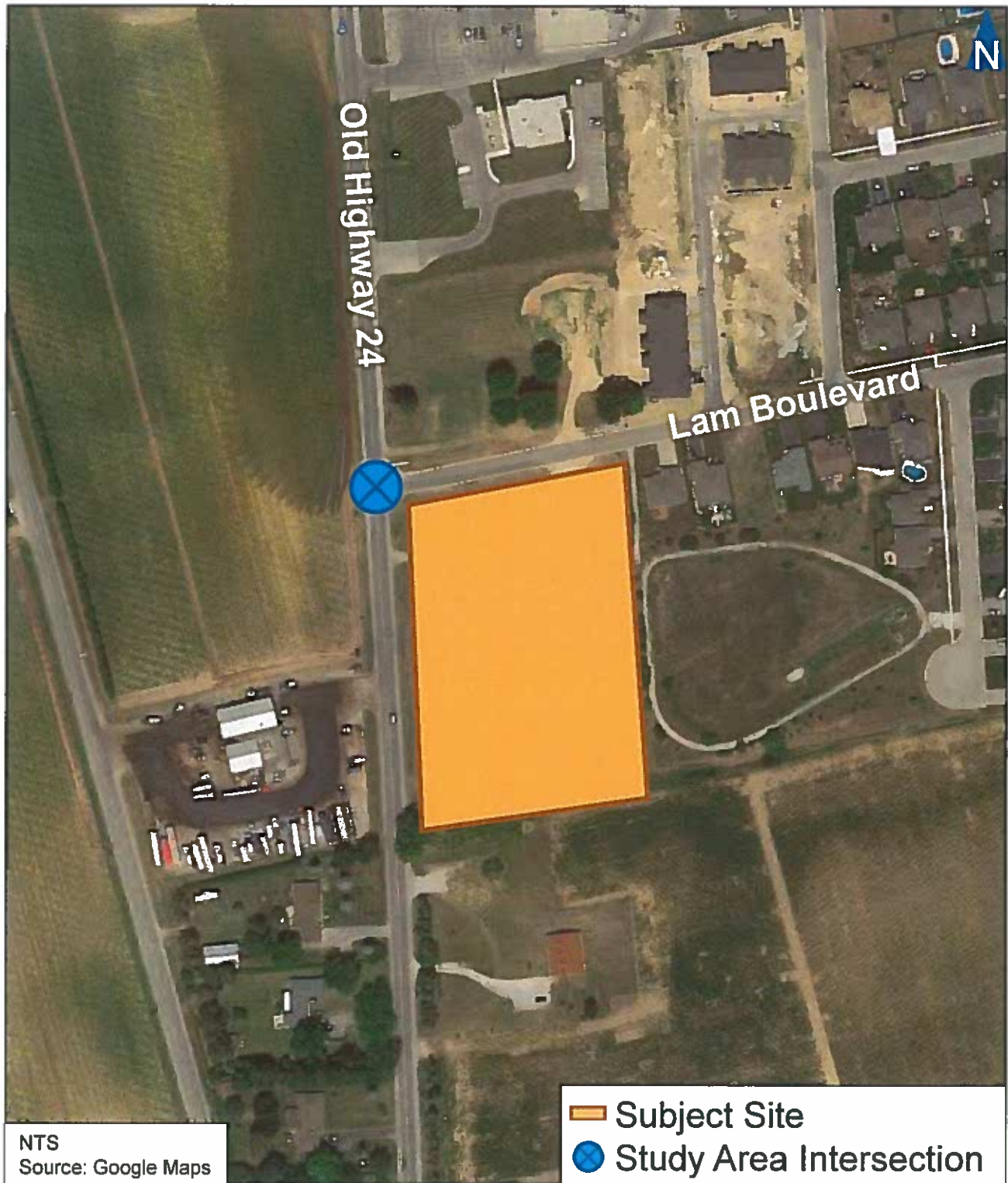
Appendix A contains the pre-study consultation material and responses from the Norfolk County.



This study has been prepared in accordance with the requirements detailed by the Norfolk County TIS Guidelines¹.

¹ Norfolk County Integrated Sustainable Master Plan (ISMP), Appendix J: TIS Guidelines, September 2016.





Location of Subject Site

Old Highway 24 & Lam Boulevard Townhouses TIS
210475

Figure 1.1

2 Existing Conditions

2.1 Existing Roadways

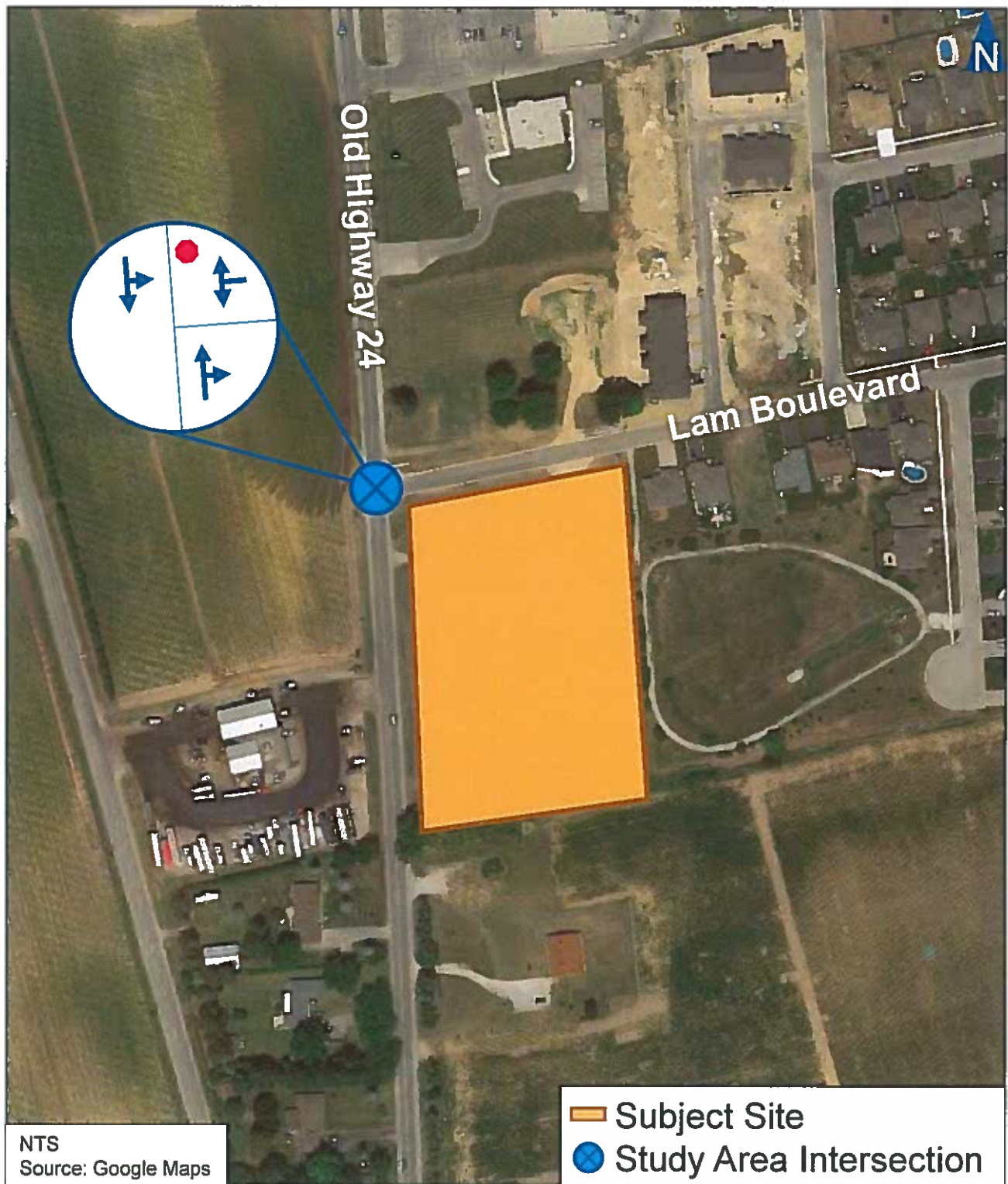
The main roadways near the subject site considered in assessing the traffic impacts of the development include:

- ▶ **Old Highway 24 (Highway 24)** is a north-south arterial road² with a two-lane cross section and a posted speed limit of 60 km/h. Approximately two-metre gravel shoulders are provided along both sides of the road. The nearest intersections to Lam Boulevard along Old Highway 24 are Thompson Road, approximately 560 metres north, and Blueline Road, approximately 510 metres south. Neither intersection is likely to be impacted by traffic from the proposed development.
- ▶ **Lam Boulevard** is an east-west local road with a two-lane cross section. The speed limit is not posted; therefore, it is assumed the statutory speed limit of 50 km/h governs. A sidewalk is provided along the north side of the road. Lam Boulevard terminates approximately 575 metres east of Old Highway 24.

Figure 2.1 displays the traffic control and lane configuration at the Old Highway 24 and Lam Boulevard intersection.

² Norfolk County Official Plan Schedule E-2: Transportation, Revised October 2018.





Existing Lane Configuration and Traffic Control

Old Highway 24 & Lam Boulevard Townhouses TIS
210475

Figure 2.1

2.2 Transit Service

Norfolk County operates Ride Norfolk Transit, which provides fixed route transit service in Waterford via the Brantford route on weekdays. The stops in Waterford are located at Waterford Medical on Sovereign Street, Waterford Library, and Waterford Plaza.

The route operates three times per day Monday through Friday and departs the Simcoe Library at 9:15 AM, 1:15 PM, and 3:20 PM. Out of town routes operate five times every Monday to Delhi.

The service costs \$2.50 to travel within Waterford and \$6.00 to travel to other towns in Norfolk County.

The nearest transit stops to the subject site are located approximately 175 metres north of Lam Boulevard in the Waterford Plaza.

Figure 2.2 illustrates the location of the Brantford transit route in the Town of Waterford.

2.3 Traffic Volumes

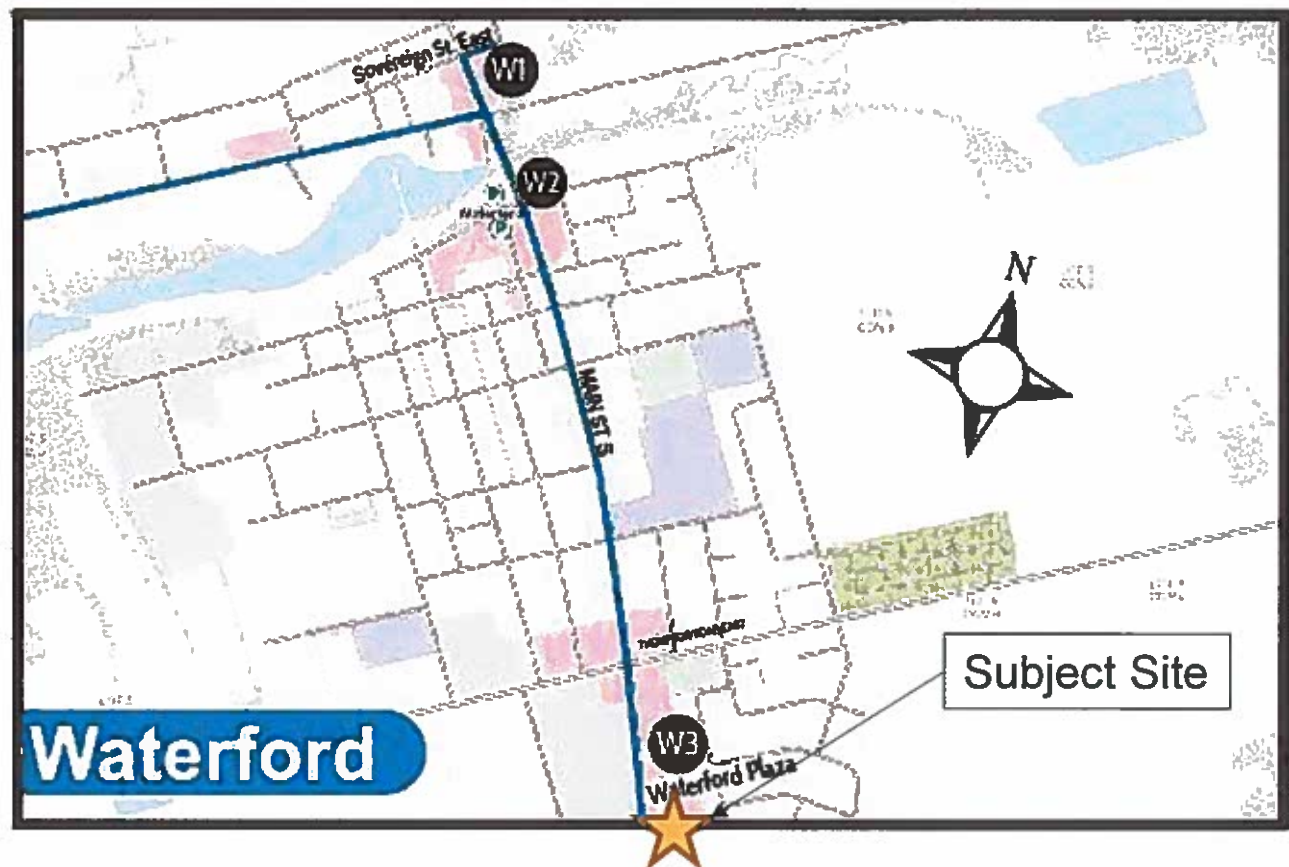
Figure 2.3 illustrates the existing AM (8:15 AM – 9:15 AM) and PM (4:00 PM – 5:00 PM) weekday peak hour turning movement traffic volumes collected by Paradigm on 14 September 2021.

It is noted that the peak hour, peak direction traffic volume on Old Highway 24 is less than 350 vehicles per hour (vph) and well within the lane capacity of 900 vph.

The peak hour, peak directional volume on Lam Boulevard is noted to be 53 vph.

Appendix B contains the detailed traffic counts for the study area intersections.





NTS
Source: Ride Norfolk Transit



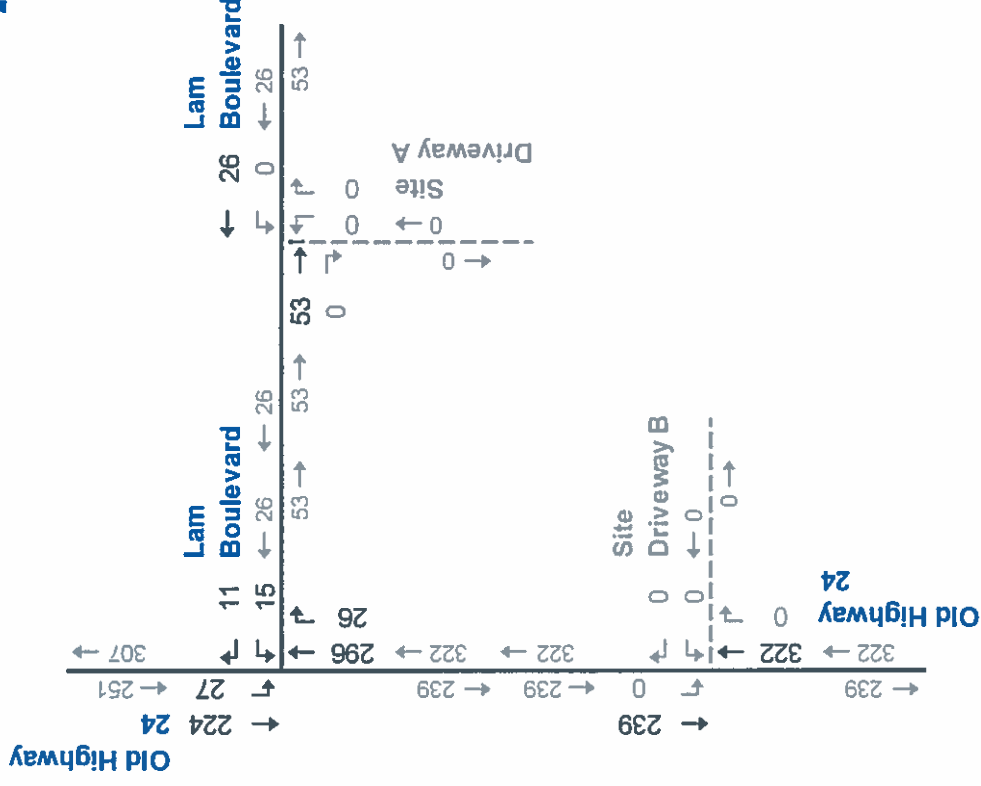
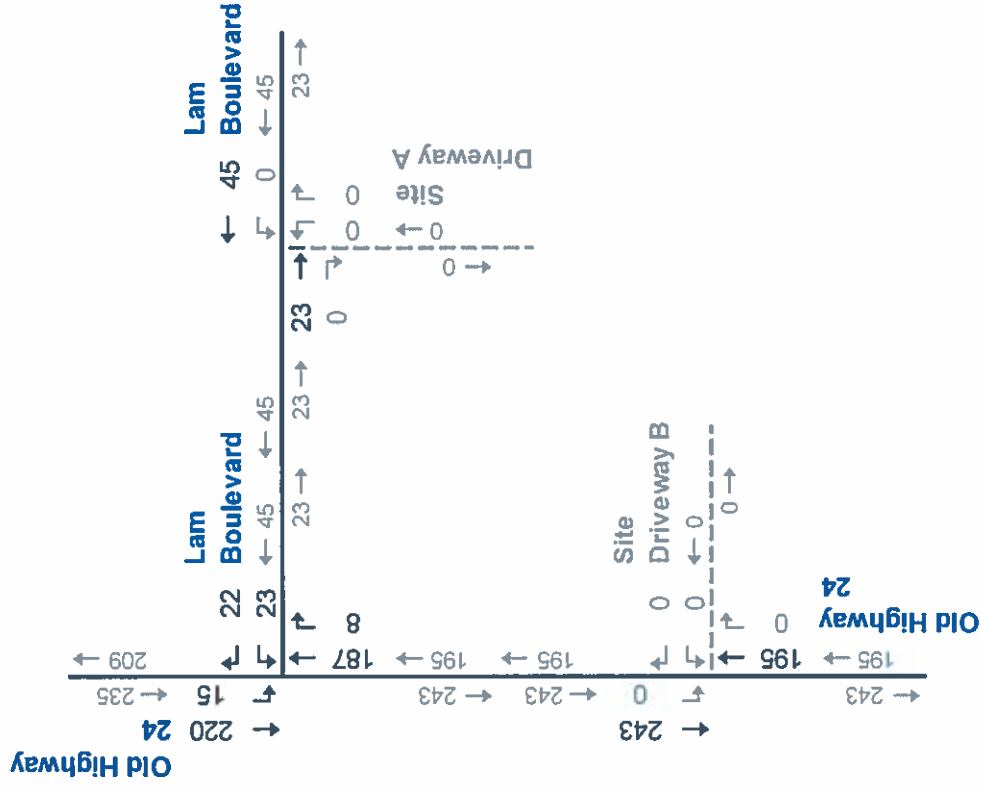
Existing Transit Network

Old Highway 24 & Lam Boulevard Townhouses TIS
210475

Figure 2.2

AM Peak Hour

PM Peak Hour



Exiting Traffic Volumes

2.4 Traffic Operations

The level of service conditions at the study area intersection has been assessed using Synchro 10. As per the County's TIS guidelines, movements at signalized intersections with a volume to capacity (v/c) ratio greater than 0.85 is considered critical. As the TIS guidelines do not specify a threshold for unsignalized intersections, it is assumed that movements with Level of Service (LOS) 'F' are deemed critical.

Intersection level of service (LOS) is a recognized method of quantifying the average delay experienced by drivers at intersections. It is based on the delay experienced by individual vehicles executing the various movements. The delay is related to the number of vehicles intending to make a particular movement, compared to the estimated capacity for that movement. The capacity is based on a number of criteria related to the opposing traffic flows and intersection geometry.

The highest possible rating is LOS A, under which the average total delay is equal or less than 10.0 seconds per vehicle. When the average delay exceeds 80 seconds for signalized intersections, 50 seconds for unsignalized intersections or when the volume to capacity ratio is greater than 1.00, the movement is classed as LOS F and remedial measures are usually implemented, if they are feasible. LOS E is usually used as a guideline for the determination of road improvement needs on through lanes, while LOS F may be acceptable for left-turn movements at peak times, depending on delays.

Table 2.2 summarizes the results of the intersection operational analysis under existing conditions, including the AM and PM peak hour level of service (LOS), volume to capacity ratios (V/C), and 95th percentile queues experienced.

The results indicate that the study area intersection is operating at acceptable levels of service and within capacity.

Appendix C contains the detailed Synchro 10 reports.



TABLE 2.1: EXISTING TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																		
				Eastbound				Westbound				Northbound				Southbound				Overall		
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach			
AM Peak Hour	Old Highway 24 & Lam Boulevard	TWSC	LOS Delay V/C Q					B 11 0.08 2		>	>	B 11		A 0 0.00 0	>	>	A 0	<	A 8 0.01 0		A 0	
PM Peak Hour	Old Highway 24 & Lam Boulevard	TWSC	LOS Delay V/C Q					B 12 0.06 2		>	>	B 12		A 0 0.00 0	>	>	A 0	<	A 8 0.02 1		A 1	

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

TWSC - Two-Way Stop Control

</> - Shared with through movement



3 Development Concept

3.1 Development Description

The subject site is located at the southeast corner of Old Highway 24 and Lam Boulevard in the Town of Waterford, Norfolk County. The development is proposed to consist of 55 townhouses.

A total of 148 parking spaces will be provided on-site. Vehicular access is proposed via two full-moves access points: one on Old Highway 24 and one on Lam Boulevard.

Build-out is expected to occur by 2022/23, subject to market conditions.

Figure 3.1 shows the proposed site plan.





3.2 Development Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation Manual³ provides rates and equations used to estimate the peak hour traffic volumes generated by the subject development based on ITE Land Use Codes (LUC) 220, Multifamily Housing (Low-Rise).

Table 3.1 summarizes the forecast number of net new trips generated by the proposed development.

TABLE 3.1: TRIP GENERATION

Land Use	Units	AM Peak Hour				PM Peak Hour			
		Rate	In	Out	Total	Rate	In	Out	Total
Multifamily Housing (Low-Rise) - LUC 220	55	Eq ¹	6	21	27	Eq ²	22	13	35
Total Trip Generation			6	21	27		22	13	35

$$^1\text{Ln}(T) = 0.95 \text{ Ln}(X) - 0.51$$

$$^2\text{Ln}(T) = 0.89 \text{ Ln}(X) - 0.02$$

3.3 Development Trip Distribution and Assignment

The trip distribution was determined based on existing travel patterns within the study area. Table 3.2 displays the breakdown of trip distributions used in this study.

TABLE 3.2: ESTIMATED TRIP DISTRIBUTION

To/From	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
North via Old Highway 24	55%	46%	44%	56%
South via Old Highway 24	45%	54%	56%	44%
Total	100%	100%	100%	100%

Figure 3.2 illustrates the site-generated traffic volumes for the AM and PM peak hours.

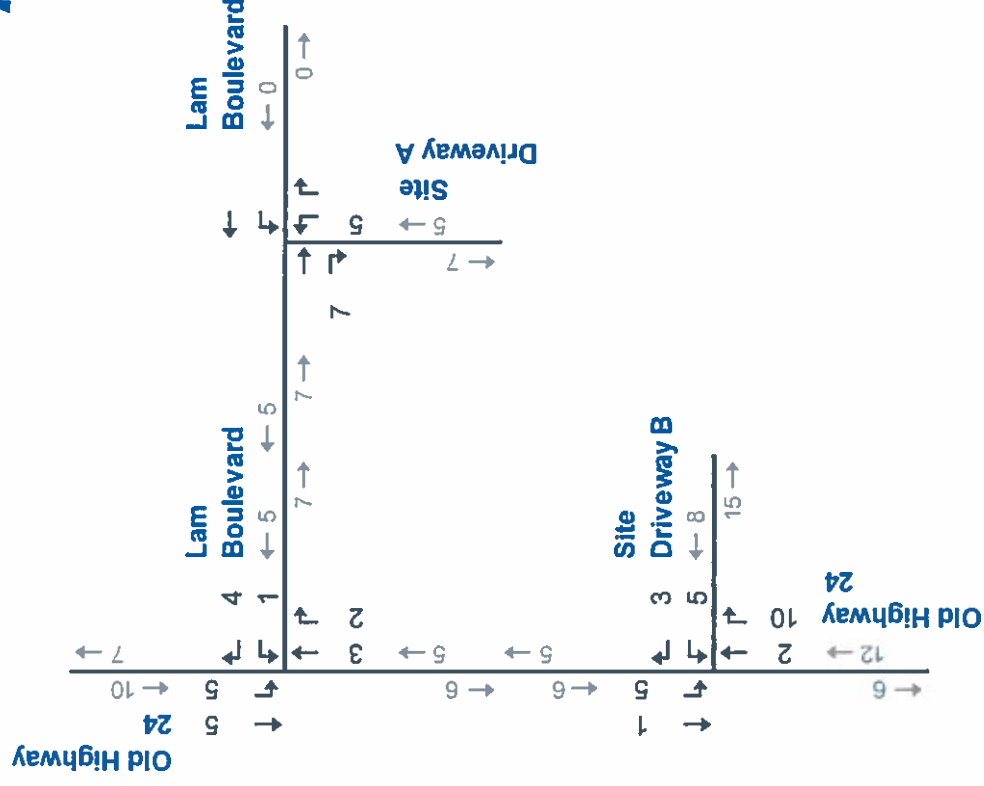
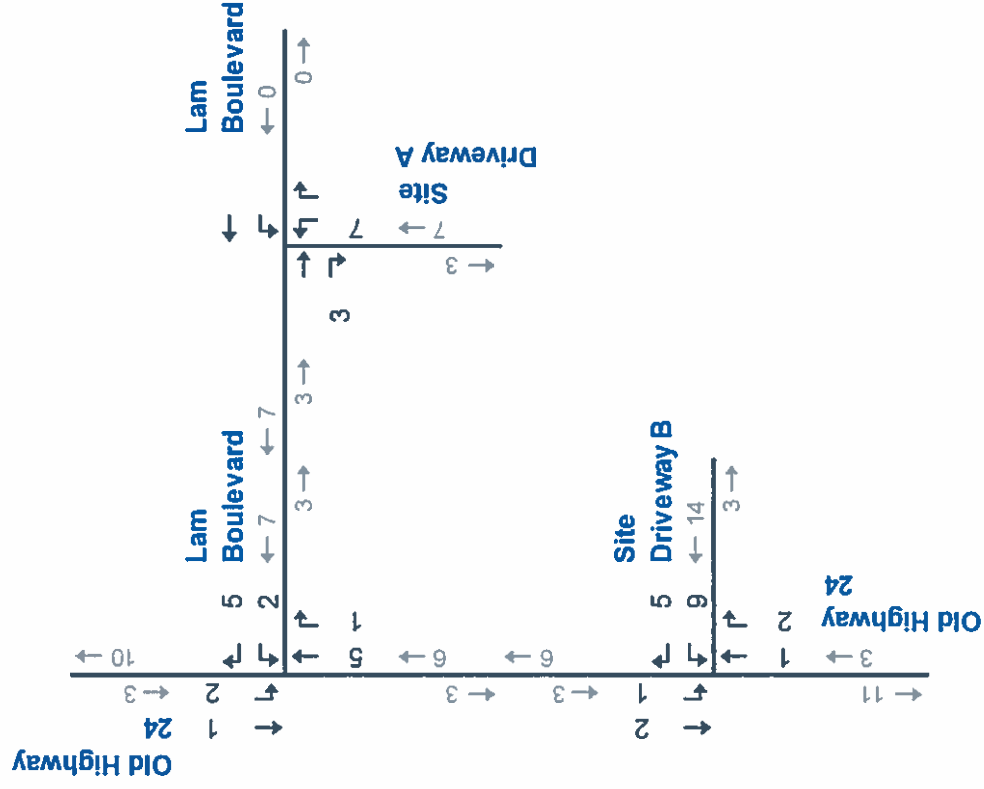
As shown in Figure 3.2, the new development will add a maximum of 12 vph to Old Highway 24, and a maximum of 7 vph to Lam Boulevard in either direction, during either peak hour.

³ Institute of Transportation Engineers Trip Generation Manual 10th Edition, 2017.



AM Peak Hour

PM Peak Hour



Site-Generated Traffic Volumes

4 Evaluation of Future Traffic Conditions

The assessment of future traffic conditions contained in this section includes estimates of future background and total traffic volumes, and the analyses for the year of development opening (2022), five years after opening (2027), and ten years after opening (2032).

4.1 Background Traffic Forecasts

In order to derive the generalized background traffic volumes, a growth rate of 1.5% was applied to the existing roadway traffic volumes. This growth rate was confirmed with Norfolk County staff during the pre-study consultation.

The growth rate was applied to the through movements along Old Highway 24.

4.1.1 Other Developments

During pre-study consultation, the County indicated that the development at the northeast corner of Old Highway 24 and Lam Boulevard should be included in the background traffic volumes.

Figure 4.1 illustrates the location of the background development.

The proposed condominium development consists of 52 units with a single access to Old Highway 24. The development is assumed to be completed between the 2022 and the 2027 horizons analyzed in this TIS.

A TIS was not completed for this location. As such, the ITE Trip Generation Manual was used to estimate the traffic generated by the subdivision during the weekday AM and PM peak hours. The rates of LUC 221, Multifamily Housing (Mid-Rise) were used to calculate the trips.

Table 4.1 summarizes the forecast number of net new trips generated by the proposed development.

TABLE 4.1: OTHER AREA DEVELOPMENT TRIP GENERATION

Land Use	Units	AM Peak Hour				PM Peak Hour			
		Rate	In	Out	Total	Rate	In	Out	Total
Multifamily Housing (Mid-Rise) - LUC 221	52	Eq ¹	5	13	18	Eq ²	15	9	24
Total Trip Generation			5	13	18		15	9	24

$$^1\text{Ln}(T) = 0.98 \text{ Ln}(X) - 0.98$$

$$^2\text{Ln}(T) = 0.96 \text{ Ln}(X) - 0.63$$



The same trip distribution that was used for the subject site traffic was applied to the background development traffic.

Figure 4.2 illustrates the background development traffic volumes for the AM and PM peak hours.





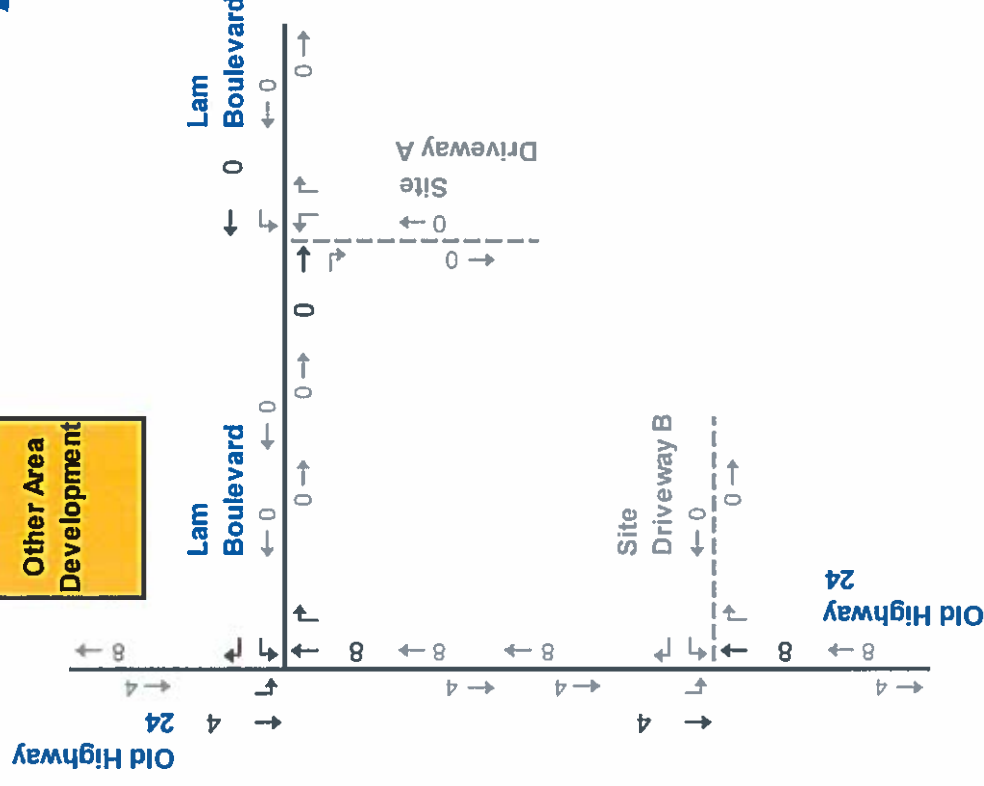
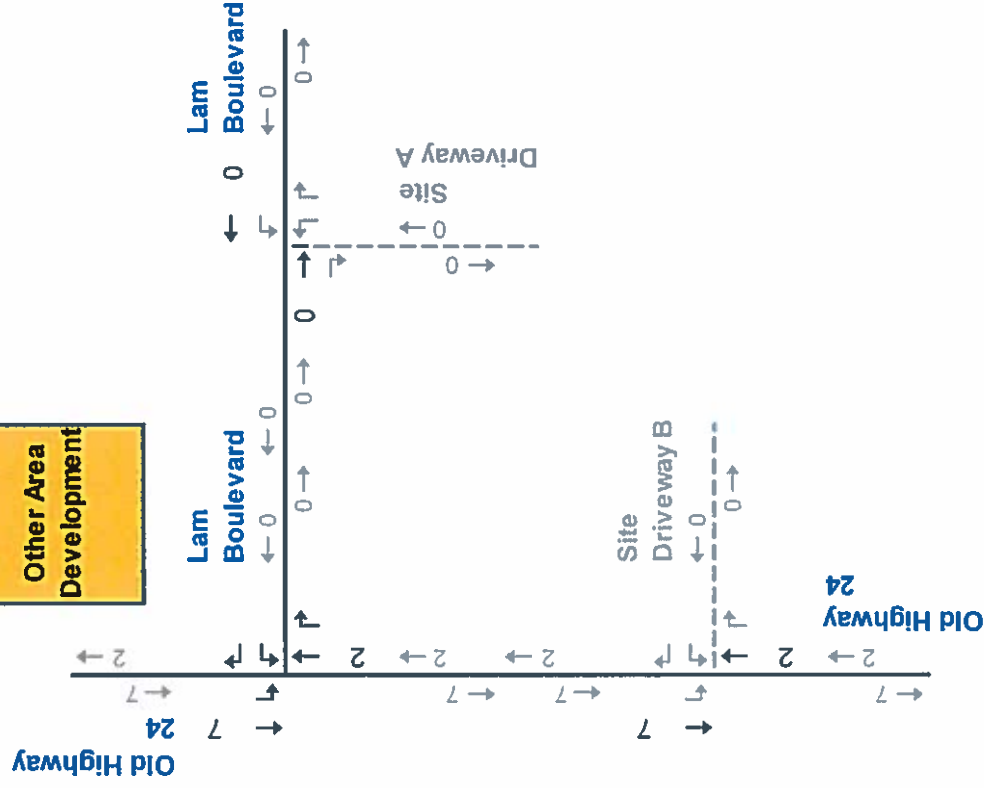
Background Development Location

Old Highway 24 & Lam Boulevard Townhouses TIS
210475

Figure 4.1

AM Peak Hour

PM Peak Hour



Background Development Traffic Volumes

Old Highway 24 & Lam Boulevard Townhouses TIS
210475

Figure 4.2

4.2 2022 Background Traffic Operations

Figure 4.3 illustrates the 2022 background traffic volumes, including road traffic growth.

The 2022 background traffic volumes have been analyzed using the same methodology as under existing traffic conditions.

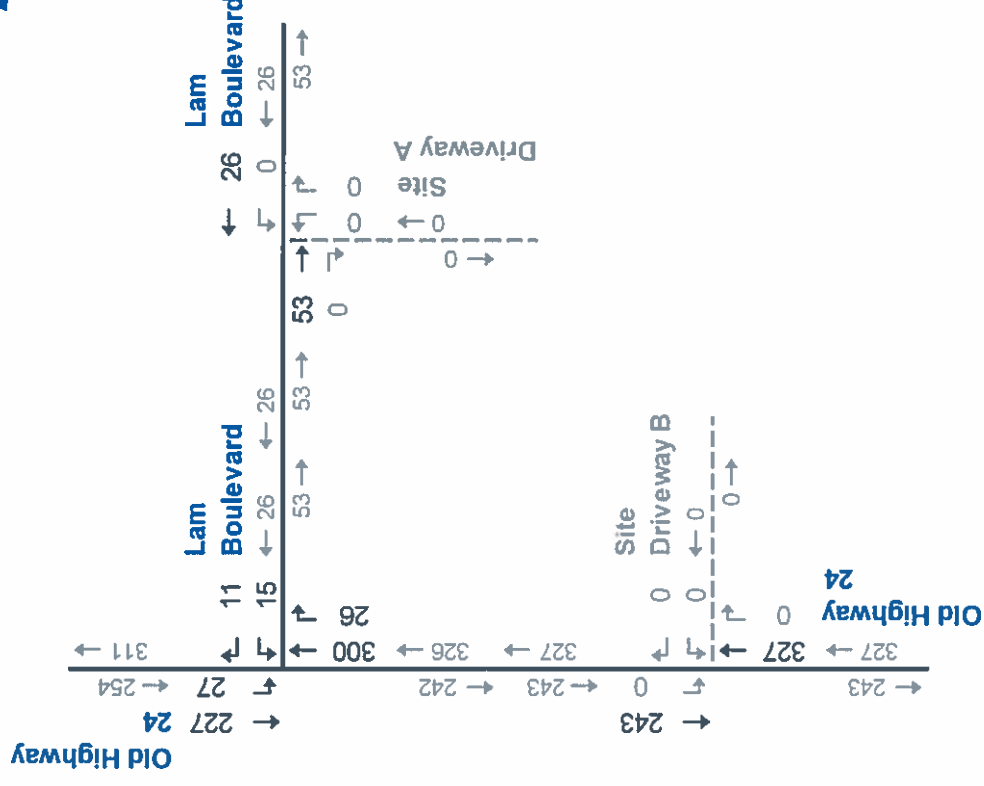
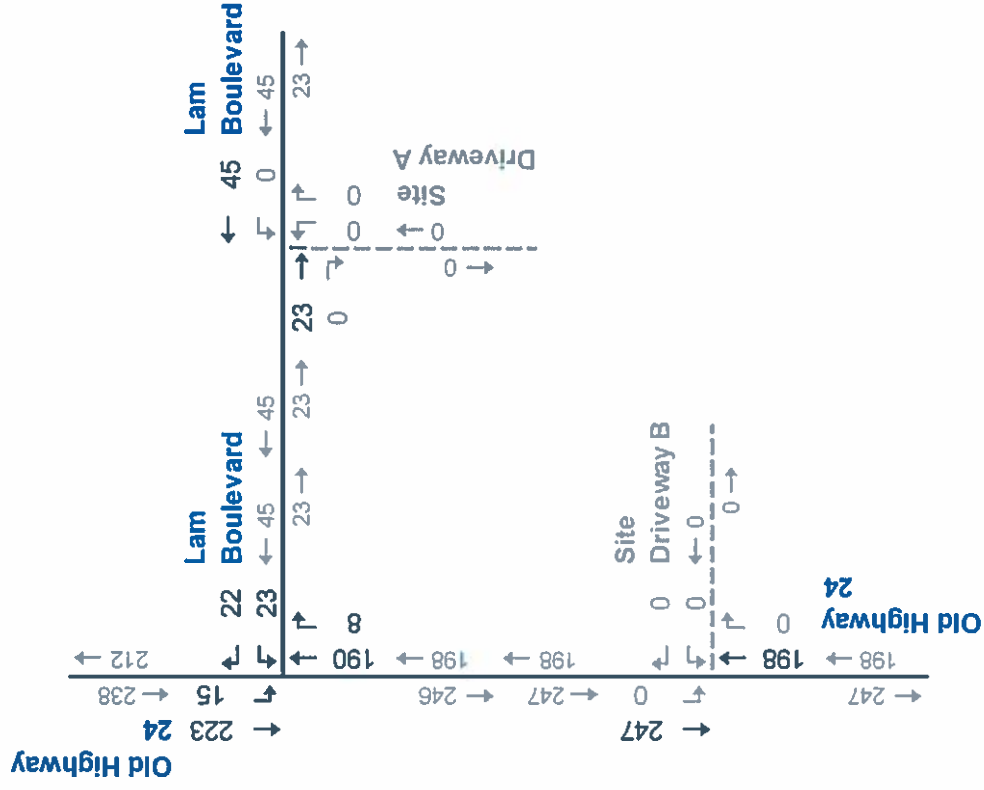
Table 4.2 summarizes the results of the 2022 background traffic operations. The results indicate that the study area intersection is forecast to operate at acceptable levels of service and within capacity during the AM and PM peak hours.

Appendix D contains the supporting detailed Synchro 10 reports.



AM Peak Hour

PM Peak Hour



2022 Background Traffic Volumes

Old Highway 24 & Lam Boulevard Townhouses TIS
210475

Figure 4.3

TABLE 4.2: 2022 BACKGROUND TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																	
				Eastbound				Westbound				Northbound				Southbound				Overall	
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach		
AM Peak Hour	Old Highway 24 & Lam Boulevard	TWSC	LOS Delay V/C Q					B 11 0.08 2		>	>	B 11		A 0 0.00 0	>	A 0	<	A 8 0.01 0		A 0	
PM Peak Hour	Old Highway 24 & Lam Boulevard	TWSC	LOS Delay V/C Q					B 12 0.06 2		>	>	B 12		A 0 0.00 0	>	A 0	<	A 8 0.02 1		A 1	

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

TWSC - Two-Way Stop Control

</> - Shared with through movement



4.3 2022 Total Traffic Operations

Figure 4.4 illustrates the 2022 total traffic volumes, including trips generated by the proposed development.

The 2022 total traffic volumes have been analyzed using the same methodology as under existing and background traffic conditions.

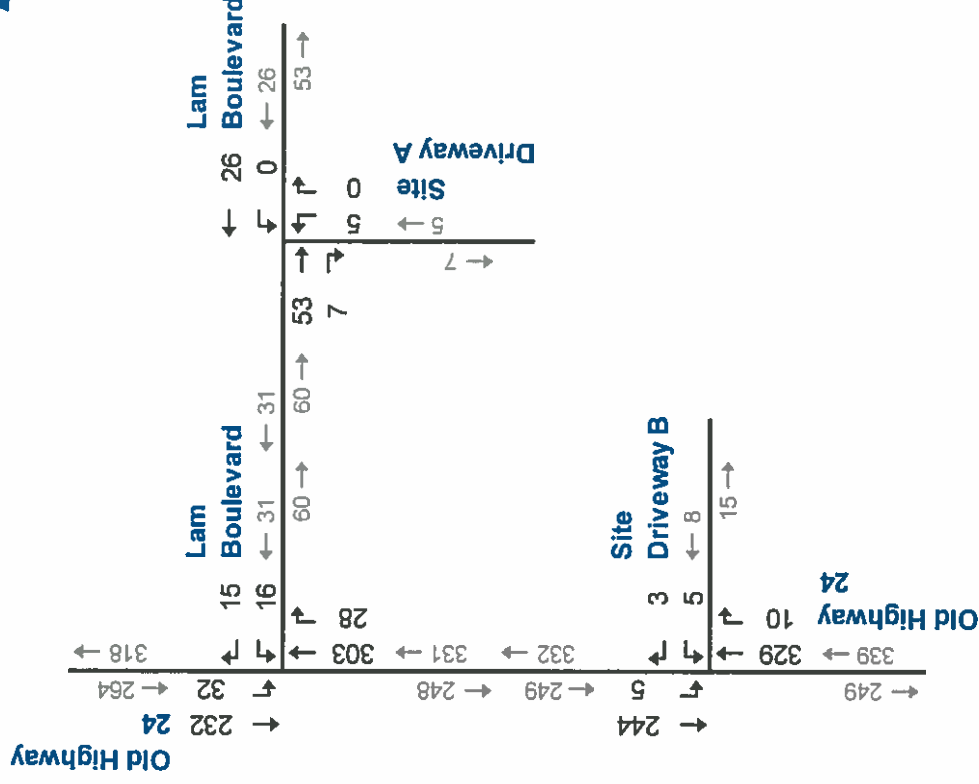
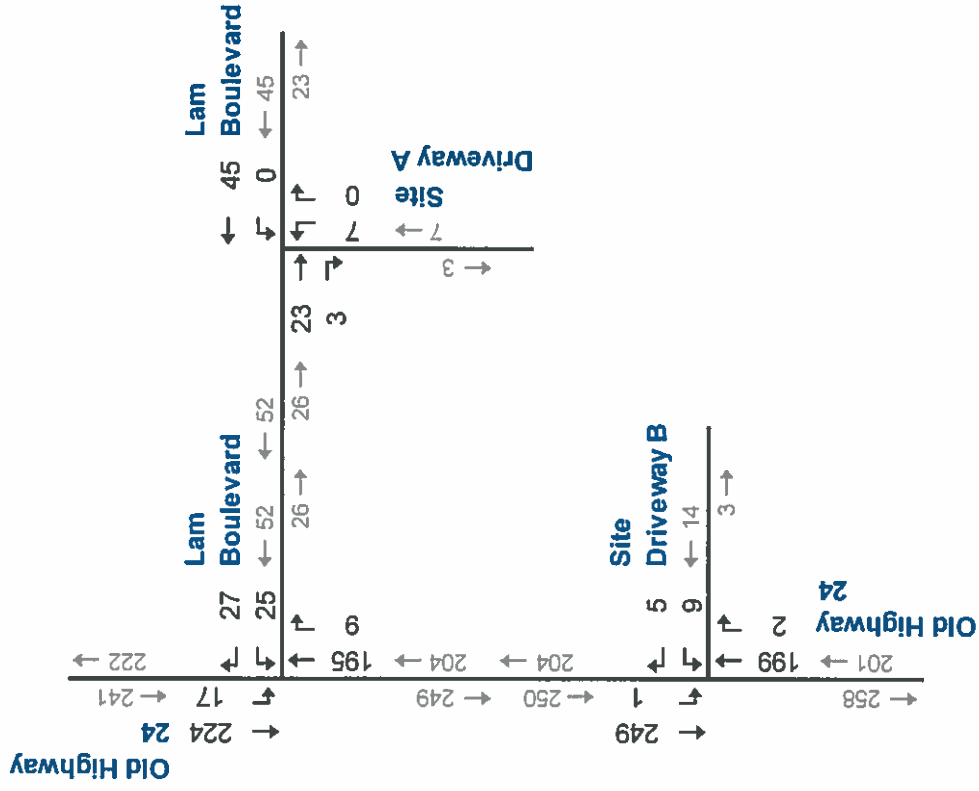
Table 4.3 summarizes the results of the 2022 total traffic operations. The results indicate that the study area intersection and the access intersections are forecast to operate at acceptable levels of service during the AM and PM peak hours.

Appendix E contains the supporting detailed Synchro 10 reports.



AM Peak Hour

PM Peak Hour



2022 Total Traffic Volumes

TABLE 4.3: 2022 TOTAL TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Old Highway 24 & Lam Boulevard	TWSC	LOS Delay V/C Q					B 11 0.09 2		>	B 11		A 0 0.00 0	>	A 0	<	A 8 0.01 0		A 0	
	Site Driveway A & Lam Boulevard	TWSC	LOS Delay V/C Q		A 0 0.00 0	>	A 0	<	A 0		A 0	A 9 0.01 0	>	A 9						
	Old Highway 24 & Site Driveway B	TWSC	LOS Delay V/C Q					B 11 0.03 1		>	B 11		A 0 0.00 0	>	A 0	<	A 8 0.00 0		A 0	
PM Peak Hour	Old Highway 24 & Lam Boulevard	TWSC	LOS Delay V/C Q					B 12 0.07 2		>	B 12		A 0 0.00 0	>	A 0	<	A 8 0.03 1		A 1	
	Site Driveway A & Lam Boulevard	TWSC	LOS Delay V/C Q		A 0 0.00 0	>	A 0	<	A 0		A 0	A 9 0.01 0	>	A 9						
	Old Highway 24 & Site Driveway B	TWSC	LOS Delay V/C Q					B 12 0.02 1		>	B 12		A 0 0.00 0	>	A 0	<	A 8 0.01 0		A 0	

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

TWSC - Two-Way Stop Control

</> - Shared with through movement



4.4 2027 Background Traffic Operations

Figure 4.5 illustrates the 2027 background traffic volumes, including road traffic growth and other area development traffic.

The 2027 background traffic volumes have been analyzed using the same methodology as under existing traffic conditions.

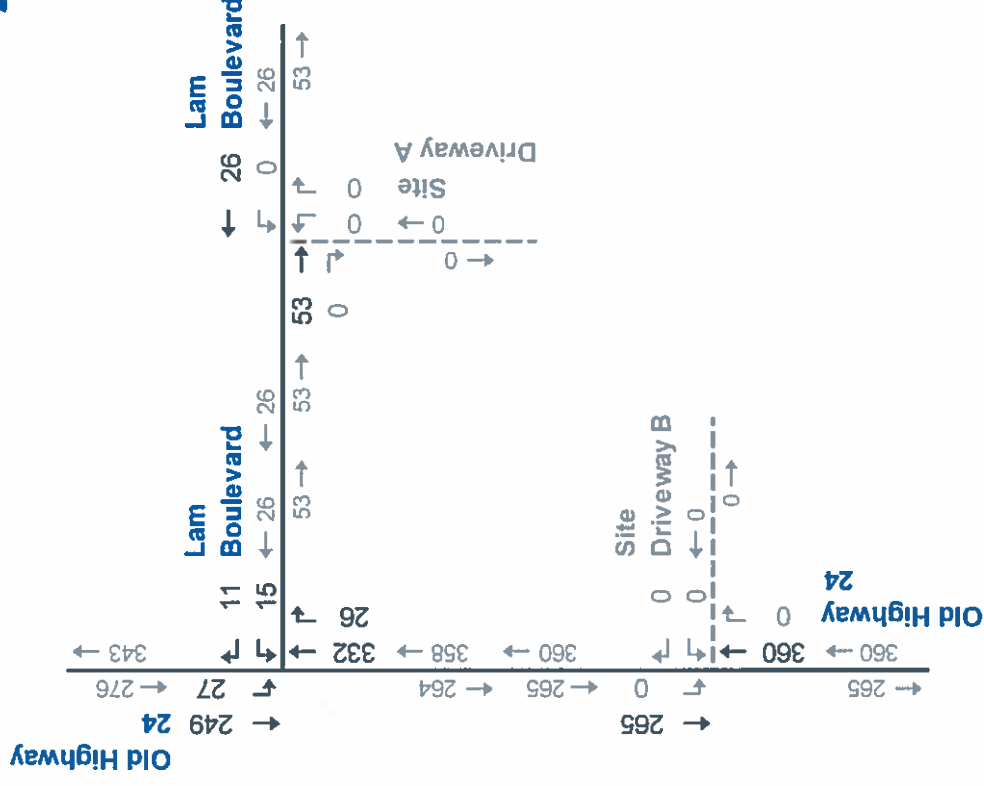
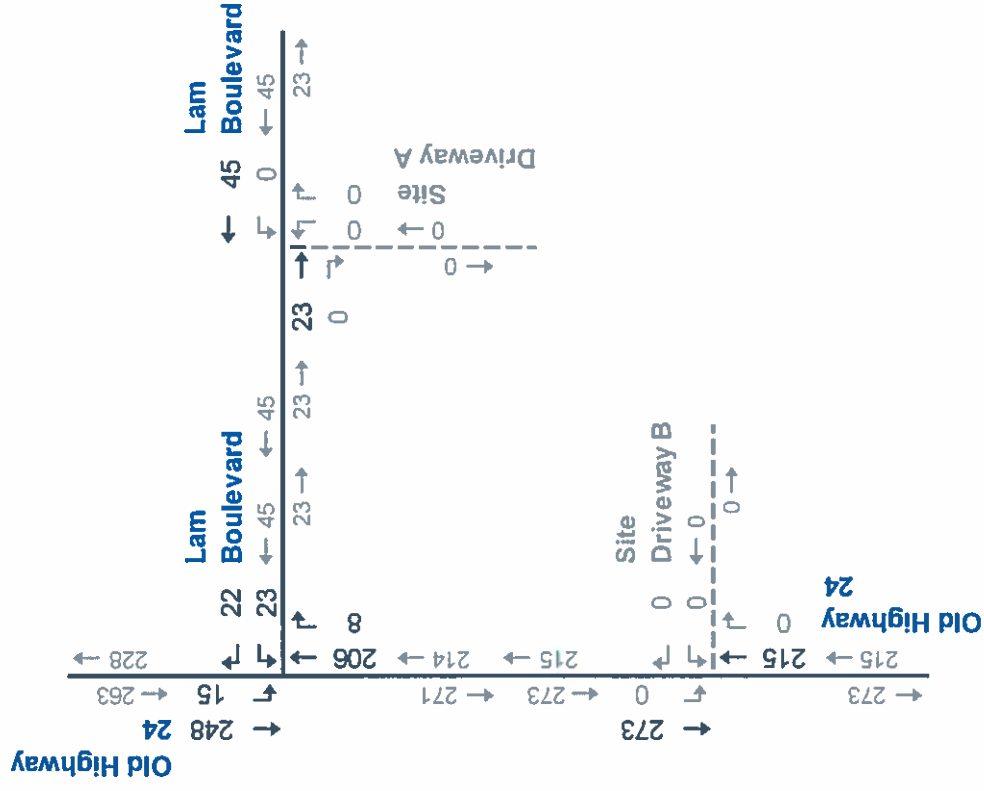
Table 4.4 summarizes the results of the 2027 background traffic operations. The results indicate that the study area intersection is forecast to operate at acceptable levels of service during the AM and PM peak hours.

Appendix F contains the supporting detailed Synchro 10 reports.



AM Peak Hour

PM Peak Hour



2027 Background Traffic Volumes

TABLE 4.4: 2027 BACKGROUND TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Old Highway 24 & Lam Boulevard	TWSC	LOS Delay V/C Q					B 11 0.08 2		> > > >	B 11		A 0 0.00 0	< < < <	A 8 0.01 0		A 0			
PM Peak Hour	Old Highway 24 & Lam Boulevard	TWSC	LOS Delay V/C Q					B 13 0.06 2		> > > >	B 13		A 0 0.00 0	< < < <	A 8 0.03 1		A 1			

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

TWSC - Two-Way Stop Control

</> - Shared with through movement



4.5 2027 Total Traffic Operations

Figure 4.6 illustrates the 2027 total traffic volumes, including trips generated by the proposed development.

The 2027 total traffic volumes have been analyzed using the same methodology as under existing and background traffic conditions.

Table 4.5 summarizes the results of the 2027 total traffic operations. The results indicate that the study area intersection and the access intersections are forecast to operate at acceptable levels of service during the AM and PM peak hours.

Appendix G contains the supporting detailed Synchro 10 reports.



AM Peak Hour

PM Peak Hour

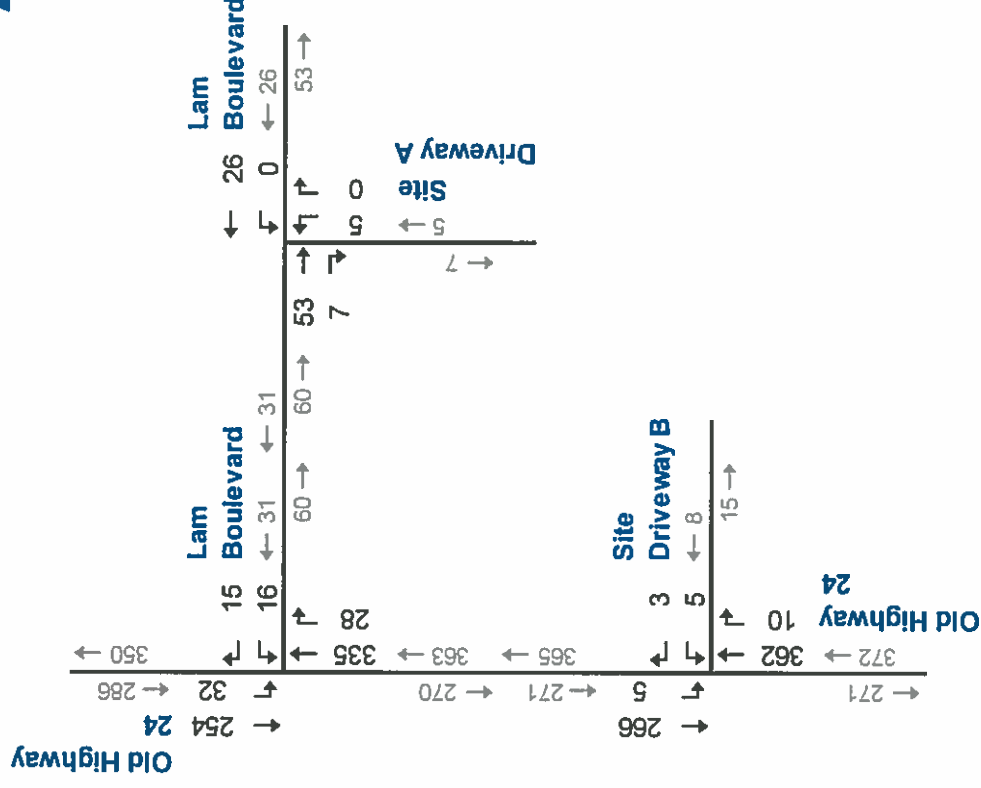
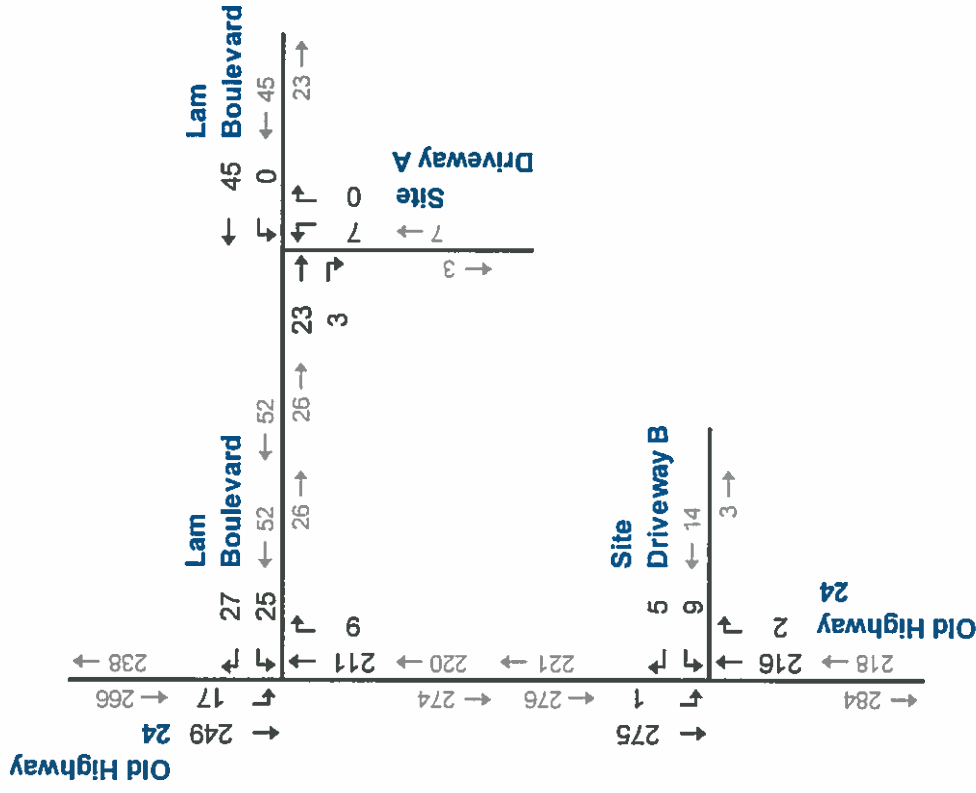


TABLE 4.5: 2027 TOTAL TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Old Highway 24 & Lam Boulevard	TWSC	LOS Delay V/C Q					B 11 0.09 2		>	B 11		A 0 0.00 0	>	A 0	<	A 8 0.01 0		A 0	
	Site Driveway A & Lam Boulevard	TWSC	LOS Delay V/C Q		A 0 0.00 0	>	A 0	<	A 0		A 0	A 9 0.01 0		>	A 9					
	Old Highway 24 & Site Driveway B	TWSC	LOS Delay V/C Q					B 11 0.03 1		>	B 11		A 0 0.00 0	>	A 0	<	A 8 0.00 0		A 0	
PM Peak Hour	Old Highway 24 & Lam Boulevard	TWSC	LOS Delay V/C Q					B 13 0.07 2		>	B 13		A 0 0.00 0	>	A 0	<	A 8 0.03 1		A 1	
	Site Driveway A & Lam Boulevard	TWSC	LOS Delay V/C Q		A 0 0.00 0	>	A 0	<	A 0		A 0	A 9 0.01 0		>	A 9					
	Old Highway 24 & Site Driveway B	TWSC	LOS Delay V/C Q					B 13 0.02 1		>	B 13		A 0 0.00 0	>	A 0	<	A 8 0.01 0		A 0	

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

TWSC - Two-Way Stop Control

</> - Shared with through movement



4.6 2032 Background Traffic Operations

Figure 4.7 illustrates the 2032 background traffic volumes, including road traffic growth and other area development traffic.

The 2032 background traffic volumes have been analyzed using the same methodology as under existing traffic conditions.

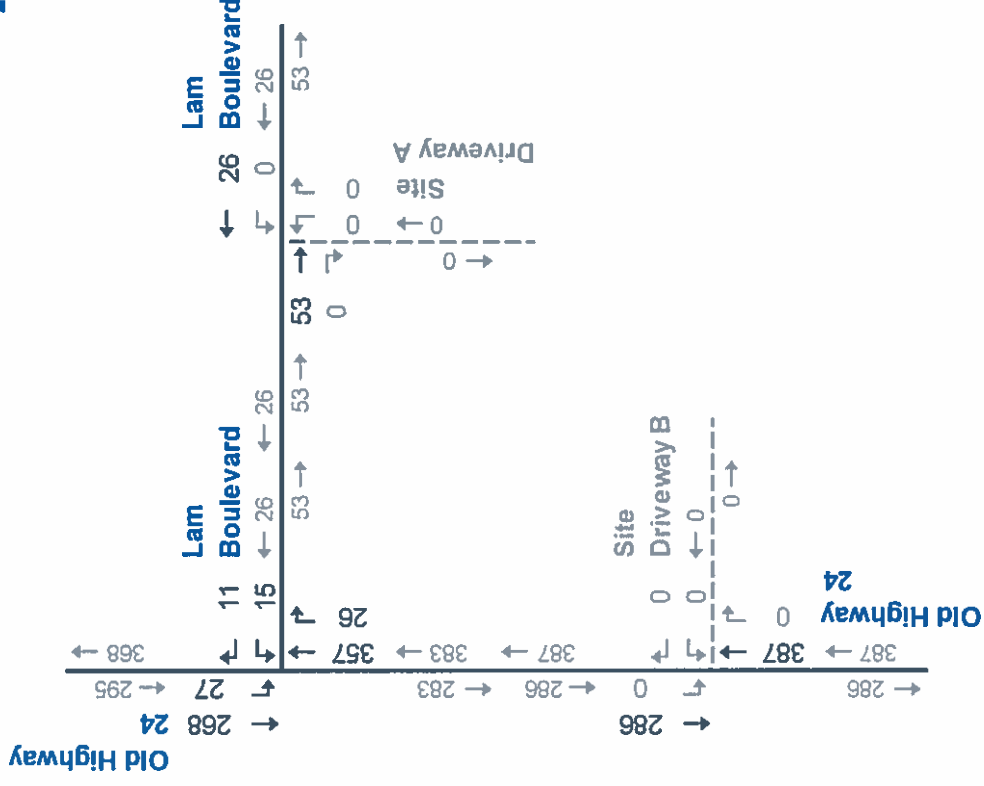
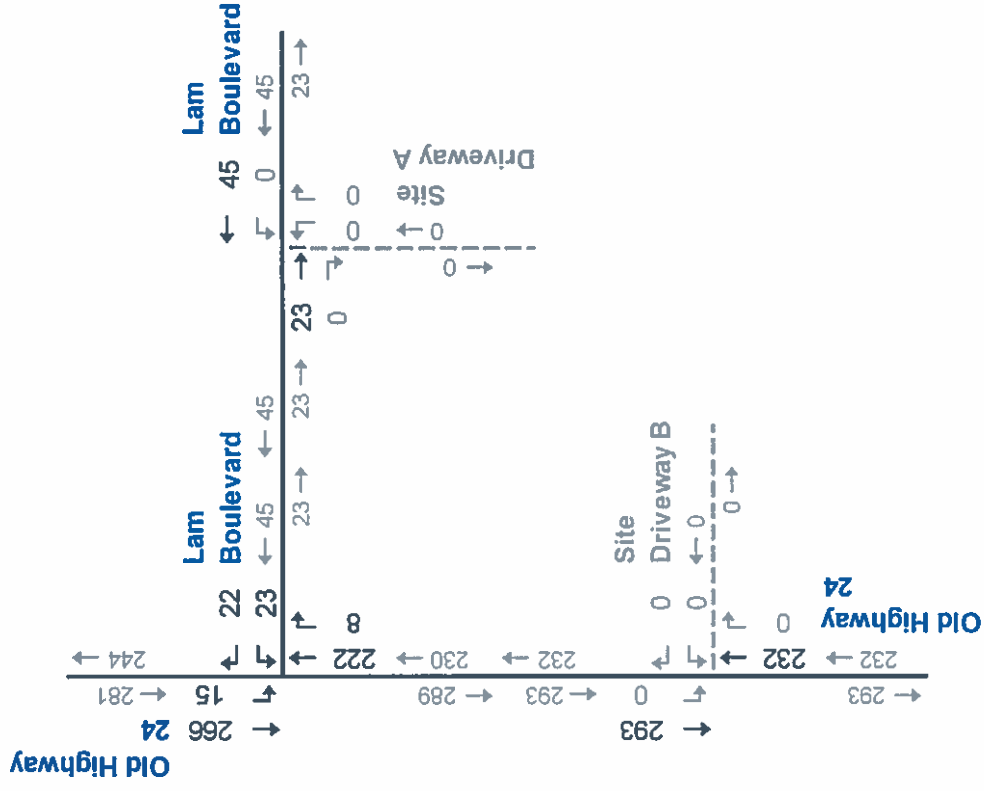
Table 4.6 summarizes the results of the 2032 background traffic operations. The results indicate that the study area intersection is forecast to operate at acceptable levels of service during the AM and PM peak hours.

Appendix H contains the supporting detailed Synchro 10 reports.



AM Peak Hour

PM Peak Hour



2032 Background Traffic Volumes

Old Highway 24 & Lam Boulevard Townhouses TIS
210475

Figure 4.7

TABLE 4.6: 2032 BACKGROUND TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Old Highway 24 & Lam Boulevard	TWSC	LOS Delay V/C Q					B 12 0.08 2		> > > >	B 12		A 0 0.00 0	> > > >	A 0	< < < <	A 8 0.01 0		A 0	
PM Peak Hour	Old Highway 24 & Lam Boulevard	TWSC	LOS Delay V/C Q					B 14 0.06 2		> > > >	B 14		A 0 0.00 0	> > > >	A 0	< < < <	A 8 0.03 1		A 1	

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

TWSC - Two-Way Stop Control

</> - Shared with through movement



4.7 2032 Total Traffic Operations

Figure 4.8 illustrates the 2032 total traffic volumes, including trips generated by the proposed development.

The 2032 total traffic volumes have been analyzed using the same methodology as under existing and background traffic conditions.

Table 4.7 summarizes the results of the 2032 total traffic operations. The results indicate that the study area intersection and the access intersections are forecast to operate at acceptable levels of service during the AM and PM peak hours.

Appendix I contains the supporting detailed Synchro 10 reports.

4.8 Roadway Traffic Volumes

As stated in **Section 2.3**, the peak hour, peak direction traffic volume on Old Highway 24 is less than 350 vph and well within the lane capacity of 900 vph. The 2032 background peak hour, peak direction traffic volume on Old Highway 24 will be less than 400 vph.

The additional traffic volumes generated by the subject development will be minimal. The peak hour, peak direction traffic volume on Old Highway 24 is expected to be around 400 vph. As under existing conditions, the directional peak will be well within capacity of Old Highway 24.

Similarly, the peak hour, peak directional volume on Lam Boulevard will be less than 100 vph and well within capacity under the 2032 total traffic scenario.

The Average Daily Traffic (ADT) volume is a measurement of the two-way, daily traffic volumes along a road segment. When 24-hour traffic count data are not available, the ADT is typically estimated by assuming the daily PM peak hour traffic volume to be 10% of the ADT.

The current ADT volume along Old Highway 24 adjacent to the subject site is 5610 vehicles and is estimated to increase to 6910 vehicles by 2032. Over an 11-year period, this is an average increase of approximately 120 vehicles per year. The increase will have minimal impacts on Old Highway 24 traffic flows.



AM Peak Hour

PM Peak Hour

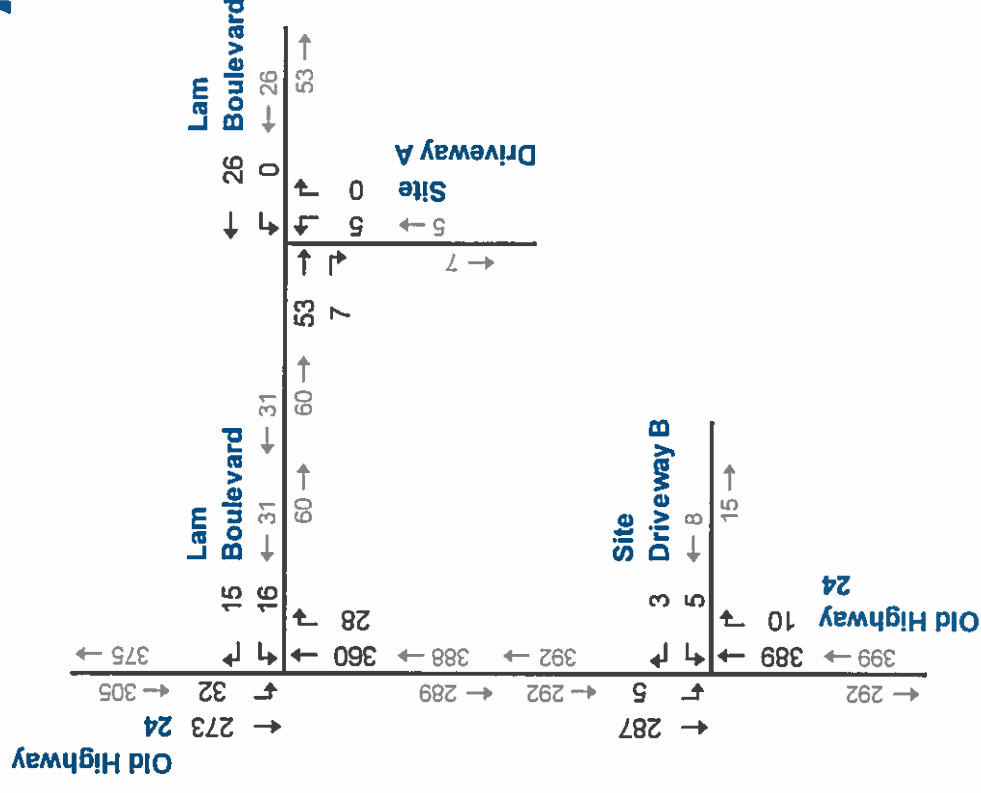
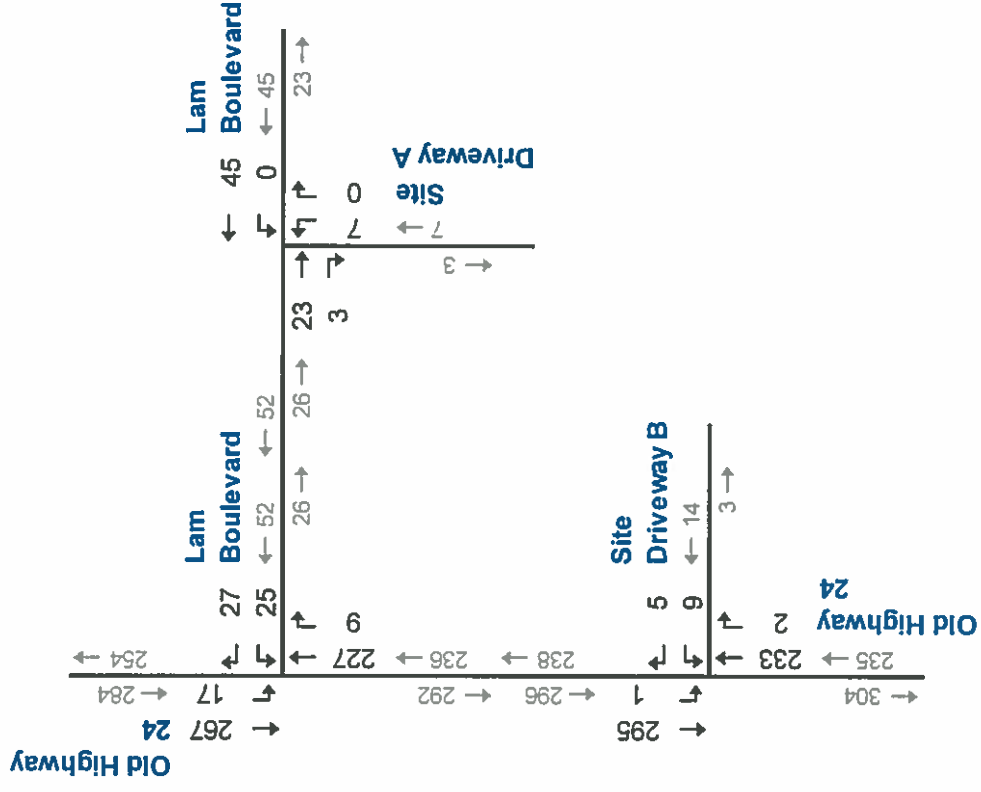


TABLE 4.7: 2032 TOTAL TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Old Highway 24 & Lam Boulevard	TWSC	LOS Delay V/C Q					B 12 0.10 2		> > >	B 12		A 0 0.00 0	> > >	A 0	< < <	A 8 0.01 0		A 0	
	Site Driveway A & Lam Boulevard	TWSC	LOS Delay V/C Q		A 0 0.00 0	> > >	A 0	< < <	A 0		A 0	A 9 0.01 0	> > >	> > >	A 9					
	Old Highway 24 & Site Driveway B	TWSC	LOS Delay V/C Q					B 12 0.03 1		> > >	B 12		A 0 0.00 0	> > >	A 0	< < <	A 8 0.00 0		A 0	
PM Peak Hour	Old Highway 24 & Lam Boulevard	TWSC	LOS Delay V/C Q					B 14 0.07 2		> > >	B 14		A 0 0.00 0	> > >	A 0	< < <	A 8 0.03 1		A 1	
	Site Driveway A & Lam Boulevard	TWSC	LOS Delay V/C Q		A 0 0.00 0	> > >	A 0	< < <	A 0		A 0	A 9 0.01 0	> > >	> > >	A 9					
	Old Highway 24 & Site Driveway B	TWSC	LOS Delay V/C Q					B 13 0.02 1		> > >	B 13		A 0 0.00 0	> > >	A 0	< < <	A 8 0.01 0		A 0	

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

TWSC - Two-Way Stop Control

</> - Shared with through movement



4.9 Left-Turn Lanes

The need for an auxiliary left-turn turning lane on Old Highway 24 at the proposed driveway was assessed for 2032 total traffic conditions, based on the requirements and procedures detailed in the Ministry of Transportation Design Supplement for the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads⁴. The warranted requirements were assessed using the nomographs for left-turn lanes on a two-lane undivided highway at an unsignalized intersection with a design speed of 10 kilometres per hour over the posted speed limit (70 km/h).

Based on these criteria, a southbound left-turn lane on Old Highway 24 at Site Driveway B is not warranted under 2032 total traffic conditions.

The need for an auxiliary southbound left-turn turning lane on Old Highway 24 at the intersection of Lam Boulevard was also assessed. The results indicate that a left-turn lane is not warranted on Old Highway 24 at Lam Boulevard.

Appendix J contains the warrant nomographs.

⁴ MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads, June 2017.



5 Conclusions and Recommendations

5.1 Conclusions

Based on the investigations carried out, it is concluded that:

- ▶ **Existing Traffic Conditions:** The intersection at Old Highway 24 and Lam Boulevard is currently operating within acceptable levels of service.
- ▶ **Development Trip Generation:** The development is forecast to generate 27 and 35 trips during the AM and PM peak hours, respectively.
- ▶ **Background Traffic Conditions:** The intersection at Old Highway 24 and Lam Boulevard is forecast to operate at acceptable levels of service under the 2022, 2027, and 2032 horizon years.
- ▶ **Total Traffic Conditions:** The study area intersection and the access intersections are forecast to operate within acceptable levels of service under the 2022, 2027, and 2032 horizon years.
- ▶ **Roadway Traffic Volumes:** The peak hour, peak direction traffic volume on Old Highway 24 is currently less than 350 vph, well within the capacity of 900 vph. Under the 2032 total traffic scenario, the peak hour, peak direction traffic volume will increase to approximately 400 vph. The projected increase will have minimal impacts on Old Highway 24 traffic flows.

5.2 Recommendations

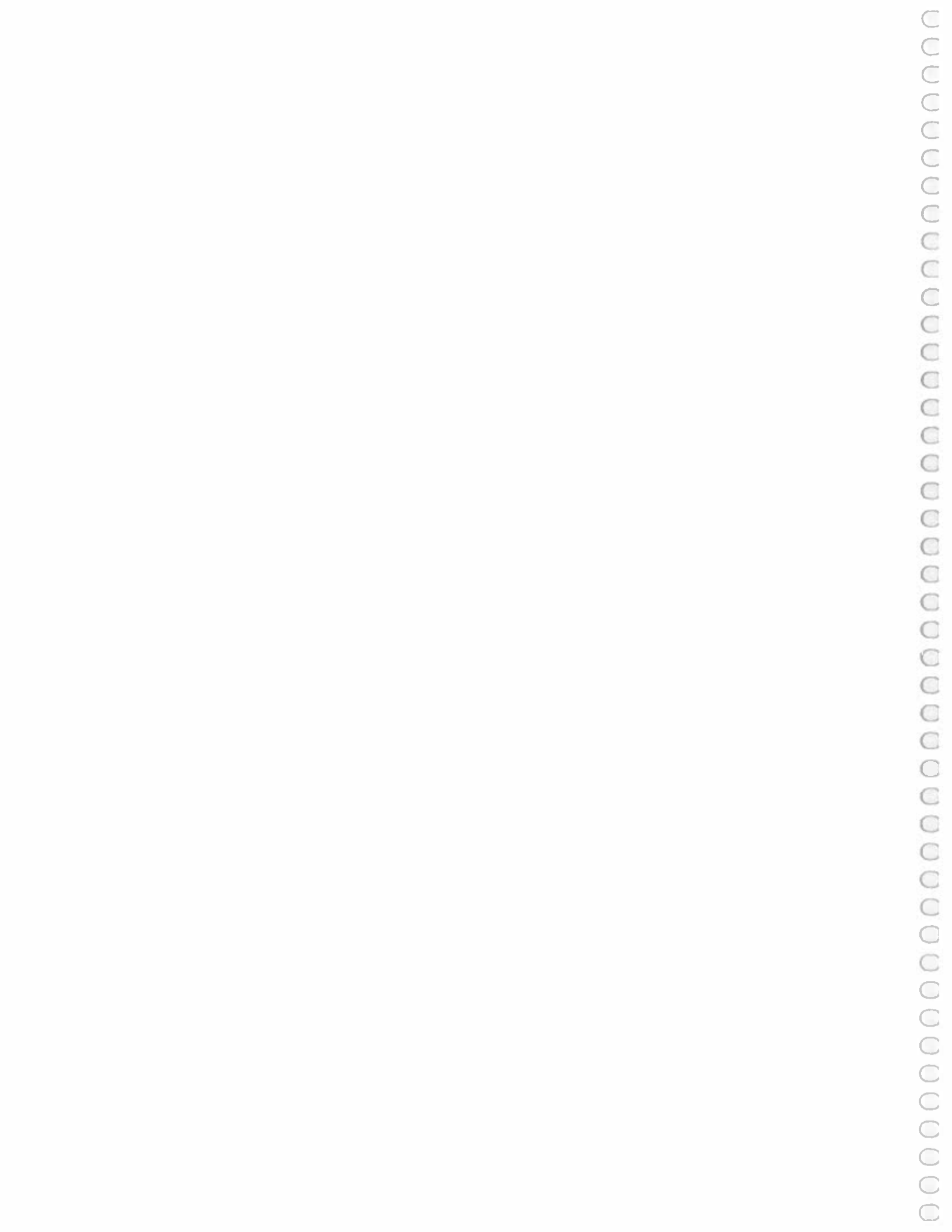
Based on the findings of this study, it is recommended that the subject development be considered for approval as proposed.



Appendix A

Pre-Study Consultation





From: [Stephen Gradish](#)
To: [Rajan Philips](#); [Patrick Neal](#)
Cc: johniezzi@gdvallee.ca
Subject: RE: (210475) O'Hara Townhouses TIS Terms of Reference
Date: September 27, 2021 4:37:02 PM
Attachments: [image001.png](#)

Hello Rajan

I would suggest a short paragraph within the TIS to capture what you have said below in reference to the intersection would be fine. I agree if the total peak hour is that low it should have little impact on the intersection.

If we have a small comment in the TIS I can always say it was considered. I don't believe any further impact assessment is necessary.

Thank you for your response

Regards,
Stephen

Stephen Gradish
Development Technologist
Engineering
Environmental and Infrastructure Services Division
185 Robinson Street
Suite 200, Simcoe, Ontario, N3Y 5L6
519-426-5870 x. 8015



Working together with our community

From: Rajan Philips [mailto:rphilips@ptsl.com]
Sent: Monday, September 27, 2021 12:52 PM
To: Stephen Gradish <Stephen.Gradish@norfolkcounty.ca>; Patrick Neal <pneal@ptsl.com>
Cc: johniezzi@gdvallee.ca
Subject: RE: (210475) O'Hara Townhouses TIS Terms of Reference

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Hi Stephen,

Thank you for your comments.

We will include the Condo dev to the north (52 units) in background traffic estimates.

Re the intersection of Old Hwy 24 & Thompson Road, we did not include this intersection in the scope of work given the low trip generation of the development (56 units - 27 AM trips and 35 PM trips).

Approximately 10 vph from this development will impact the Thompson Rd intersection in the peak direction during either peak hour.

Another 10 vph will impact the intersection from the Condo development.

A total of 20 new trips are not likely to make a significant impact at the signalized intersection, located approx. 500 metres north of Lam Road.

We have completed the traffic counts at Lam Rd & Old Hwy 24.
And the peak hour traffic on Old Hwy 24 is also low – 200-300 vph in the peak direction during either peak hour.

We will analyse the Lam/Hwy 24 intersection and the two access intersections primarily to see if left-turn lanes are required. Operationally, they should have good levels of service.

Analysing Hwy 24/Thompson intersection is not likely to provide anything significant for impact assessment.

However, if you think it is necessary, we will include the intersection.
Kindly let us know if recent traffic counts are available for the Hwy 24/Thompson intersection.

Thank you.

Rajan Philips, M.Sc. (PI), P.Eng.
Senior Transportation Consultant



Paradigm Transportation Solutions Limited

5A-150 Pinebush Road, Cambridge ON N1R 8J8

p: 519.896.3163 x207

e: rphilips@ptsl.com

w: www.ptsl.com

From: Stephen Gradish <Stephen.Gradish@norfolkcounty.ca>

Sent: September 27, 2021 10:14 AM

To: Patrick Neal <pneal@ptsl.com>
Cc: Rajan Philips <rphilips@ptsl.com>; johniezzi@gdvallee.ca
Subject: RE: (210475) O'Hara Townhouses TIS Terms of Reference

Hello Patrick

I have been able to review your proposed Terms of Reference and have the following comments:

I am good with everything you have proposed below.

Reviewing the ISMP I had a couple of things to possibly look at as well:

- Norfolk would like confirmation that this proposed development does not have any adverse effects on the existing signalized intersection at Old Hwy 24 and Thompson Road.
- Norfolk County recently had another pre-con for a proposed Condo development on the vacant land directly north of this site on Lam BLVD. At that Pre-con they were proposing 52 units with a single entrance onto Old HWY 24.

If you have any further questions do not hesitate to ask.

Regards,
Stephen

Stephen Gradish
Development Technologist
Engineering
Environmental and Infrastructure Services Division
185 Robinson Street
Suite 200, Simcoe, Ontario, N3Y 5L6
[519-426-5870](tel:519-426-5870) x. 8015



Working together with our community

From: Patrick Neal [<mailto:pneal@ptsl.com>]
Sent: Monday, September 20, 2021 11:35 AM
To: Stephen Gradish <Stephen.Gradish@norfolkcounty.ca>
Cc: Rajan Philips <rphilips@ptsl.com>; johniezzi@gdvallee.ca
Subject: RE: (210475) O'Hara Townhouses TIS Terms of Reference

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Stephen,

I'm following up to my email below to check if you have had a chance to review our proposed terms of reference.

Please feel free to contact us if you have any questions or concerns.

Regards,

Patrick Neal, BCE
Transportation Consultant



Paradigm Transportation Solutions Limited

p: 416.479.9684 x510
m: 416.688.7338

From: Patrick Neal
Sent: September 2, 2021 12:45 PM
To: Stephen Gradish <Stephen.Gradish@norfolkcountv.ca>
Cc: Rajan Philips <rphilips@ptsl.com>; johniezzi@gdvallee.ca
Subject: (210475) O'Hara Townhouses TIS Terms of Reference

Hi Stephen,

Paradigm has been retained to undertake a Traffic Impact Study (TIS) for the proposed residential development at the southeast corner of Old Highway 24 and Lam Boulevard in the Town of Waterford, Norfolk County. The proposed development will include 56 townhouse dwelling units. Access is proposed via two all-movements access points: one to Highway 24 and one to Lam Boulevard. The preliminary site concept plan is attached.

Based on Pre-consultation Comments and Norfolk County's (Appendix J) TIS Guidelines, we are proposing the following TIS scope of work, for your review and approval:

- Weekday AM and PM peak hour analysis of adjacent roadways. **YES**
- Study area intersections:
 - Old Highway 24 and Lam Boulevard; **YES**
 - Access intersection on Old Highway 24; and **YES**
 - Access intersection on Lam Boulevard. **YES**

Need to add the intersection of Thompson and Old HWY 214 with Trip distribution.

- Traffic Data: we will undertake weekday traffic counts at the Old Highway 24 and Lam Boulevard intersection. **As well as the main intersection**
- Horizon Years: (1) Year of development opening, (2) five years after development opening, and (3) 10 years after development opening.
- Background Growth Rate: 1.5% per annum.
- Trip Generation: ITE Trip Generation Manual 10th Edition.

- Site traffic distribution will be based on the existing traffic volumes at Old Highway 24 and Lam Boulevard.

Plus need to add recommendations on any upgrades .

Please let us know if you have any comments or questions.

Regards,

Patrick Neal, BCE
Transportation Consultant



Paradigm Transportation Solutions Limited

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Appendix B

Existing Traffic Data







Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Old Highway 24 & Lam Blvd
Site Code: 210475
Start Date: 09/14/2021
Page No: 1

Turning Movement Data

Start Time	Lam Blvd Westbound					Old Highway 24 Northbound					Old Highway 24 Southbound				
	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	Int. Total
7:00 AM	4	6	0	0	10	31	0	0	0	31	1	46	0	0	88
7:15 AM	5	6	0	0	11	39	1	0	0	40	4	35	0	0	90
7:30 AM	4	3	0	0	7	43	2	0	0	45	2	51	0	0	105
7:45 AM	4	5	0	0	9	51	2	0	0	53	3	47	0	3	112
Hourly Total	17	20	0	0	37	164	5	0	0	169	10	179	0	3	395
8:00 AM	8	3	0	0	11	35	3	0	0	38	5	36	0	0	92
8:15 AM	5	5	0	0	10	58	4	0	0	62	3	44	0	0	119
8:30 AM	8	12	0	0	20	50	3	0	0	53	5	73	0	0	151
8:45 AM	5	2	0	0	7	36	0	0	0	36	4	81	0	0	108
Hourly Total	26	22	0	0	48	179	10	0	0	189	17	216	0	0	470
9:00 AM	5	3	0	0	8	43	1	0	0	44	3	42	0	0	87
9:15 AM	4	3	0	0	7	38	4	0	0	42	5	37	0	0	81
9:30 AM	10	2	0	0	12	37	2	0	0	39	3	39	0	0	83
9:45 AM	4	5	0	0	9	52	4	0	0	56	3	64	0	0	132
Hourly Total	23	13	0	0	39	170	11	0	0	181	14	182	0	0	413
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:30 AM	12	4	0	0	16	55	2	0	0	57	4	63	0	0	140
11:45 AM	5	6	0	0	11	56	7	0	0	63	5	48	0	0	127
Hourly Total	17	10	0	0	27	111	9	0	0	120	9	111	0	0	267
12:00 PM	7	8	0	1	16	63	2	0	0	65	4	56	0	0	141
12:15 PM	7	3	0	1	10	64	0	0	0	64	5	51	0	0	130
12:30 PM	6	1	0	2	7	60	6	0	0	66	1	46	0	0	120
12:45 PM	3	4	0	1	7	61	9	0	0	70	6	47	0	0	130
Hourly Total	23	17	0	5	40	248	17	0	0	265	16	200	0	0	521
1:00 PM	4	8	0	0	12	66	8	0	0	72	1	49	0	0	134
1:15 PM	2	2	0	0	4	48	9	0	0	57	4	48	0	0	113
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	6	10	0	0	16	114	15	0	0	129	5	97	0	0	247
4:00 PM	2	7	0	0	9	98	5	0	0	101	6	63	0	0	179
4:15 PM	3	1	0	0	4	60	8	0	0	68	10	49	0	0	131
4:30 PM	5	2	0	1	7	68	8	0	0	76	5	70	0	0	158
4:45 PM	5	1	0	0	6	72	5	0	0	77	6	42	0	0	131
Hourly Total	15	11	0	1	28	298	26	0	0	322	27	224	0	0	599
5:00 PM	4	5	0	0	9	71	8	0	0	79	5	60	0	0	153
5:15 PM	3	8	0	0	11	60	9	0	0	69	5	59	0	0	144
5:30 PM	2	4	0	0	6	55	2	0	0	57	5	51	0	0	119



Turning Movement Data Plot

Turning Movement Peak Hour Data (8:15 AM)

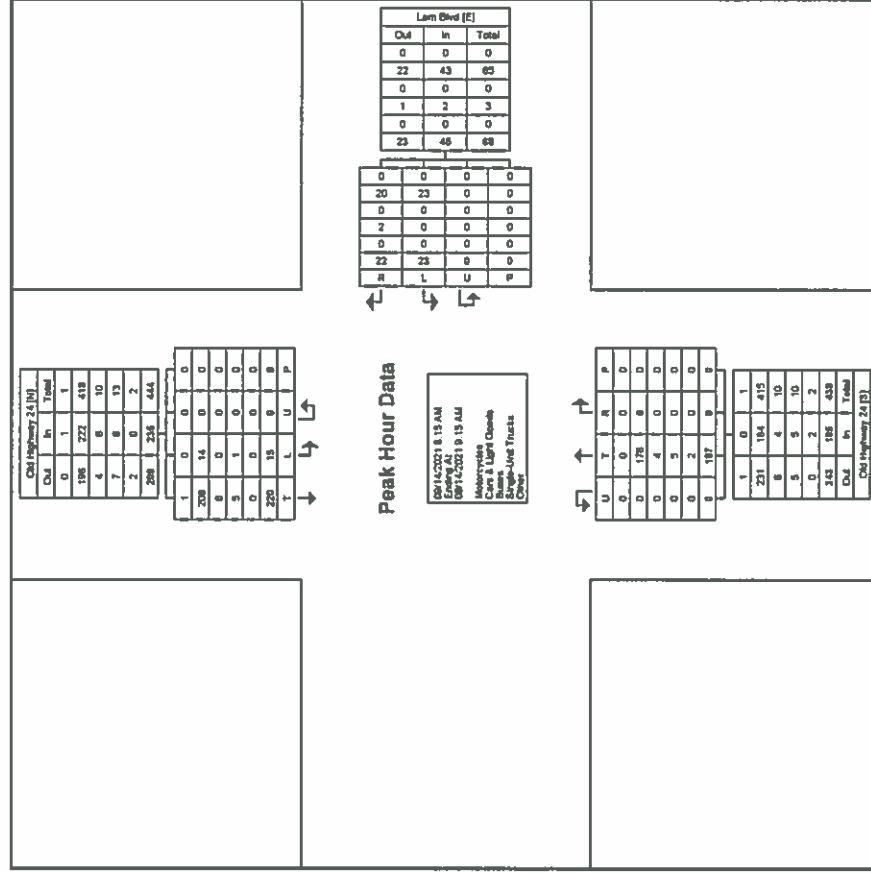
[illegible]



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cdowness@ptsl.com

Count Name: Old Highway 24 & Lam Blvd
Site Code: 210475
Start Date: 09/14/2021
Page No: 5



Turning Movement Peak Hour Data Plot (8:15 AM)

Turning Movement Peak Hour Data (11:30 AM)

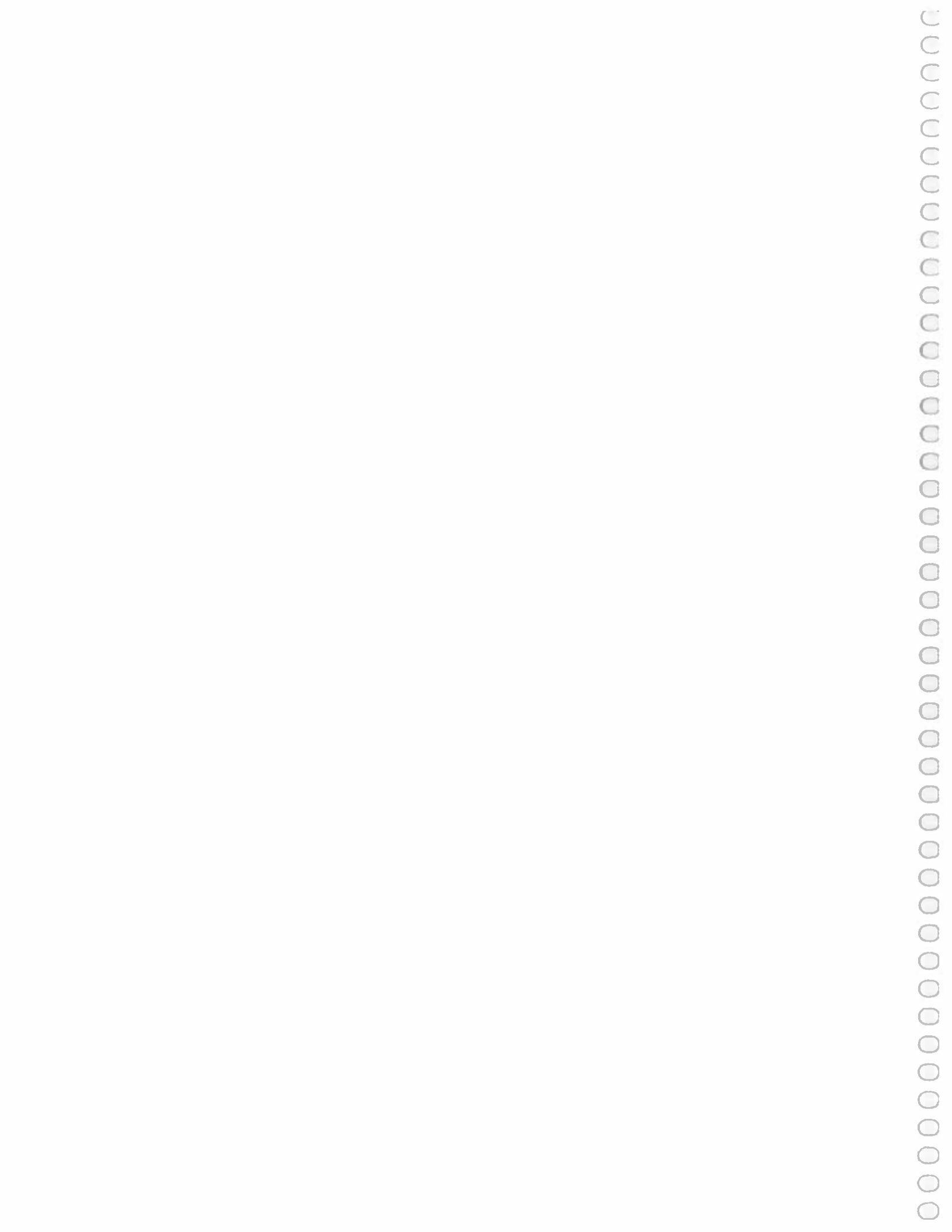
[illegible]



Turning Movement Peak Hour Data (4:00 PM)

Start Time	Lam Blvd Westbound				Old Highway 24 Northbound				Old Highway 24 Southbound				Int. Total			
	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Thru		U-Turn	Peds	App. Total
4:00 PM	2	7	0	0	9	58	5	0	0	101	8	63	0	0	69	179
4:15 PM	3	1	0	0	4	60	8	0	0	68	10	49	0	0	59	131
4:30 PM	5	2	0	1	7	68	8	0	0	76	5	70	0	0	75	158
4:45 PM	5	1	0	0	6	72	5	0	0	77	8	42	0	0	48	131
Total	15	11	0	1	28	298	28	0	0	322	27	224	0	0	251	599
Approach %	57.7	42.3	0.0	-	-	91.8	8.1	0.0	-	-	10.8	89.2	0.0	-	-	-
Total %	2.5	1.8	0.0	-	4.3	49.4	4.3	0.0	-	53.8	4.5	37.4	0.0	-	41.9	-
PHF	0.750	0.383	0.000	-	0.722	0.771	0.613	0.000	-	0.797	0.675	0.800	0.000	-	0.837	0.837
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	2	0	-	2	2
% Motorcycles	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.9	-	-	0.8	0.3
Cars & Light Goods	15	11		-	26	273	25		-	298	27	218		-	243	567
% Cars & Light Goods	100.0	100.0		-	100.0	92.2	96.2		-	92.5	100.0	98.4		-	96.8	94.7
Buses	0	0	0	-	0	1	0	0	-	1	0	1	0	-	1	2
% Buses	0.0	0.0	-	-	0.0	0.3	0.0		-	0.3	0.0	0.4		-	0.4	0.3
Single-Unit Trucks	0	0	0	-	0	18	1	0	-	19	0	5	0	-	5	24
% Single-Unit Trucks	0.0	0.0	-	-	0.0	6.1	3.8		-	5.9	0.0	2.2		-	2.0	4.0
Articulated Trucks	0	0	0	-	0	4	0	0	-	4	0	0	0	-	0	4
% Articulated Trucks	0.0	0.0	0	-	0.0	1.4	0.0		-	1.2	0.0	0.0		-	0.0	0.7
Bicycles on Road	0	0	0	-	0	0		0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.0		-	0.0	0.0	0.0		-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-		-		0		-	-		0	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-		-		-	-	-	-		-	-	-
Pedestrians	-	-	-	1	-		-		0		-	-		0	-	-
% Pedestrians	-	-	-	100	-		-		0		-	-		0	-	-

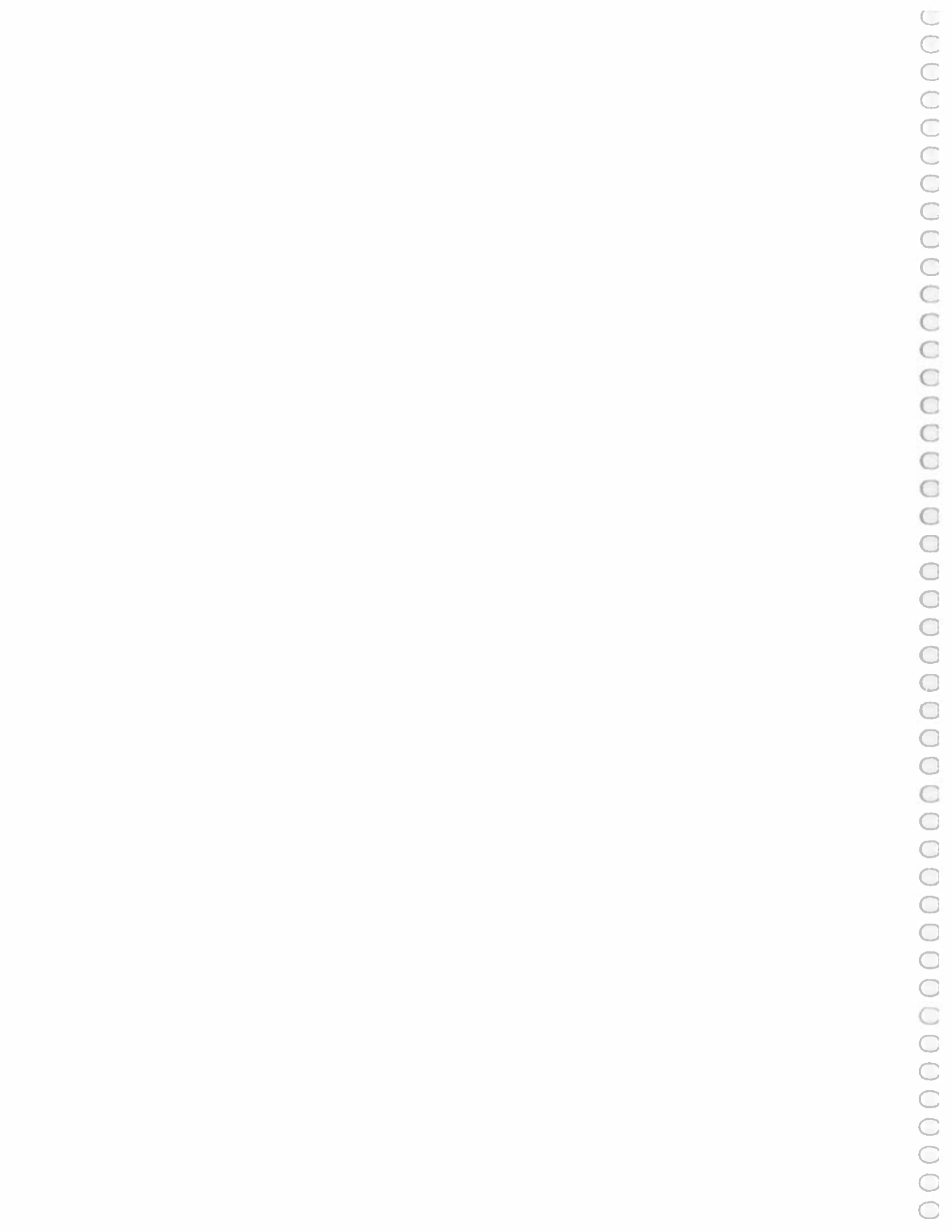
Turning Movement Peak Hour Data Plot (4:00 PM)



Appendix C

Existing Traffic Operations Reports





Lanes, Volumes, Timings
1: Old Highway 24 & Lam Boulevard

Existing AM Peak Hour
2/10/75

Lane Group	W	L	W	R	N	E	S	E	S	E
Lane Configurations	23	22	187	8	15	220	4			
Future Volume (veh)	23	22	187	8	15	220				
Peak Flow (veh)	1900	1900	1900	1900	1900	1900				
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00				
Eff	0.924		0.995							
Flt Protected	0.975						0.997			
Satd. Flow (prot)	1657	0	1821	0	0	1851				
Flt Permitted	0.975						0.997			
Satd. Flow (perm)	1657	0	1821	0	0	1851				
Link Speed (kph)	50		60			60				
Link Distance (m)	176.6		221.5			121.7				
Travel Time (s)	12.7		13.3			7.3				
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79				
Heavy Vehicles (%)	0%	9%	4%	0%	7%	2%				
Adj. Flow (veh)	29	28	237	10	19	218				
Shared Lane Traffic (%)										
Lane Group Flow (veh)	57	0	247	0	0	297				
Enter Blocked Intersection	No	No	No	No	No	No				
Lane Alignment	Left	Right	Left	Right	Left	Left				
Median Width (m)	3.6		0.0			0.0				
Link Offset (m)	0.0		0.0			0.0				
Crosswalk Width (m)	4.8		4.8			4.8				
Two-way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00				
Turning Speed (kph)	25	15	15	15	25	15				
Sign Control	Stop	Free	Free	Free	Free	Free				
Intersection Summary										
Area Type:	Other									
Control Type:	Unsignalized									
Intersection Capacity Utilization	33.9%									
Analysis Period (min)	15									

HCM 6th TWSC
1: Old Highway 24 & Lam Boulevard

Existing AM Peak Hour
2/10/75

Intersection	14									
In Delay, s/veh										
W	L	W	R	N	E	S	E	S	E	
Lane Configurations	23	22	187	8	15	220	4			
Future Volume (veh)	23	22	187	8	15	220				
Peak Flow (veh)	1900	1900	1900	1900	1900	1900				
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00				
Eff	0.924		0.995							
Flt Protected	0.975						0.997			
Satd. Flow (prot)	1657	0	1821	0	0	1851				
Flt Permitted	0.975						0.997			
Satd. Flow (perm)	1657	0	1821	0	0	1851				
Link Speed (kph)	50		60			60				
Link Distance (m)	176.6		221.5			121.7				
Travel Time (s)	12.7		13.3			7.3				
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79				
Heavy Vehicles (%)	0%	9%	4%	0%	7%	2%				
Adj. Flow (veh)	29	28	237	10	19	218				
Shared Lane Traffic (%)										
Lane Group Flow (veh)	57	0	247	0	0	297				
Enter Blocked Intersection	No	No	No	No	No	No				
Lane Alignment	Left	Right	Left	Right	Left	Left				
Median Width (m)	3.6		0.0			0.0				
Link Offset (m)	0.0		0.0			0.0				
Crosswalk Width (m)	4.8		4.8			4.8				
Two-way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00				
Turning Speed (kph)	25	15	15	15	25	15				
Sign Control	Stop	Free	Free	Free	Free	Free				
Intersection Summary										
Area Type:	Other									
Control Type:	Unsignalized									
Intersection Capacity Utilization	33.9%									
Analysis Period (min)	15									

Lanes, Volumes, Timings
1: Old Highway 24 & Lam Boulevard

Existing PM Peak Hour
210475

Lane Group	WB	WB	NB	NB	SB	SB
Lane Configurations	15	11	296	26	27	224
Traffic Volume (veh/h)	15	11	296	26	27	224
Future Volume (veh/h)	1900	1900	1900	1900	1900	1900
Ideal Flow (veh/h)	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.943	0.989				
Flt	0.972	0.972	0.995			
Flt Permitted	1742	0	1745	0	0	1857
Satd. Flow (prot)	0.972	0.972	0.995			
Satd. Flow (perm)	1742	0	1745	0	0	1857
Link Speed (km/h)	50	60	60			
Link Distance (m)	176.6	221.5	121.7			
Travel Time (s)	12.7	13.3	7.3			
Confl. Peds. (#/hr)			1			
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	0%	0%	4%	0%	2%	
Adj. Flow (veh/h)	18	13	352	31	32	267
Shared Lane Traffic (%)						
Lane Group Flow (veh/h)	31	0	383	0	0	299
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Left
Median Width (m)	3.6	0.0	0.0			
Link Offset (m)	0.0	0.0	0.0			
Crosswalk Width (m)	4.8	4.8				
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (km/h)	25	15	15	25		
Sign Control	Stop	Free	Free	Free	Free	Free

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 43.8%
Analysis Period (min): 15
ICU Level of Service A

HCM 6th TWSC
1: Old Highway 24 & Lam Boulevard

Existing PM Peak Hour
210475

Intersection	0.9									
In Delay, s/veh	0.9									
Movement	WB	WB	NB	NB	SB	SB				
Lane Configurations	15	11	296	26	27	224				
Traffic Vol. veh/h	15	11	296	26	27	224				
Future Vol. veh/h	15	11	296	26	27	224				
Conflicting Peds. #/hr	0	0	0	1	1	0				
Sign Control	Stop	Stop	Free	Free	Free	Free				
RT Channelized	-	None	-	None	-	None				
Storage Length	0	-	-	-	-	-				
Veh. in Median Storage, #	0	-	0	-	-	0				
Grade, %	0	-	0	-	-	0				
Peak Hour Factor	84	84	84	84	84	84				
Heavy Vehicles, %	0	0	8	4	0	2				
Heavy Flow	18	13	352	31	32	267				

Major/Minor	Minor 1	Minor 2	Major 1	Major 2
Conflicting Flow All	700	369	0	384
Stages 1	369	-	-	-
Stages 2	331	-	-	-
Critical Hdwy	6.4	6.2	-	4.1
Critical Hdwy Stg 1	5.4	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-
Follow-up Hdwy	3.5	3.3	-	2.2
Ped Cap-1 Maneuver	409	681	-	1186
Stages 1	704	-	-	-
Stages 2	732	-	-	-
Platoon blocked, %	-	-	-	-
Max Cap-1 Maneuver	396	680	-	1185
Max Cap-2 Maneuver	396	-	-	-
Stages 1	793	-	-	-
Stages 2	769	-	-	-

Formulas	WB	NB	SB
HCM Control Delay, s	13	0	0.9
HCM LOS	B		

Minor Lane Major	Minor 1	Minor 2	Major 1	Major 2
Capacity (veh/h)	-	-	481	1185
HCM Lane V/C Ratio	-	-	0.064	0.027
HCM Control Delay (s)	-	-	13	0.1
HCM Lane LOS	-	-	B	A
HCM 95th %ile Q(veh)	-	-	0.2	0.1

Appendix D

2022 Background Traffic Operations Reports





Appendix E

2022 Total Traffic Operations Reports





Lanes, Volumes, Timings
 1: Old Highway 24 & Lam Boulevard

2022 Total AM Peak Hour
 210475

Lane Group	WB	WBK	NBT	NBR	SBL	SBT
Lane Configurations	25	27	195	9	17	224
Traffic Volume (vph)	25	27	195	9	17	224
Future Volume (vph)	1900	1900	1900	1900	1900	1900
Max Flow (vph)	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.930	0.994				
RT Protected	0.976					0.996
Satd. Flow (prot)	1948	0	1819	0	0	1949
RT Permitted	0.976					0.996
Satd. Flow (perm)	1848	0	1819	0	0	1849
Link Speed (km/h)	50		60			60
Link Distance (m)	78.3		139.8			121.7
Travel Time (s)	5.8		8.4			7.3
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles (%)	0%	9%	4%	0%	7%	2%
Adj Flow (vph)	32	34	247	11	22	284
Shared Lane Traffic (%)						
Lane Group Flow (vph)	66	0	258	0	0	306
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width (m)	3.5		0.0			0.0
Link Offset (m)	0.0		0.0			0.0
Crosswalk Width (m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (km/h)	25	15	15	15	25	Free
Sign Control	Stop	Free	Free	Free	Free	Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	35.8%					
Analysis Period (min)	15					
ICU Level of Service A						

HCM 6th TWSC
 1: Old Highway 24 & Lam Boulevard

2022 Total AM Peak Hour
 210475

Intersection	1.5					
Int Delay, s/veh						
Lane Configurations	WB	WBK	NBT	NBR	SBL	SBT
Traffic Vol with	25	27	195	9	17	224
Future Vol with	25	27	195	9	17	224
Conflicting Peak, Mov	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	9	4	0	7	2
Minit Flow	32	34	247	11	22	284
Right Turn	Minor 1	Major 1	Minor 1	Major 2		
Conflicting Flow All	581	253	0	0	258	0
Stage 1	253	-	-	-	-	-
Stage 2	328	-	-	-	-	-
Critical Flow	6.4	6.29	-	-	4.17	-
Critical Flow Sig 1	5.4	-	-	-	-	-
Critical Flow Sig 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.81	-	-	2.263	-
Prot Cap-1 Maneuver	478	769	-	-	1278	-
Stage 1	794	-	-	-	-	-
Stage 2	734	-	-	-	-	-
Platoon blocked, %						
Mov Cap-1 Maneuver	469	769	-	-	1278	-
Mov Cap-2 Maneuver	469	-	-	-	-	-
Stage 1	794	-	-	-	-	-
Stage 2	719	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay s	11.9	0	0.6			
HCM LOS	B					
Other Lane Major Movt	NBT	NBR	SBL	SBT		
Capacity (veh/h)	-	-	580	1278	-	-
HCM Lane V/C Ratio	-	-	0.112	0.017	-	-
HCM Control Delay (s)	-	-	11.9	7.9	0	-
HCM Lane LOS	-	-	B	A	A	-
HCM 95th Pctile d (veh)	-	-	0.4	0.3	-	-

Lanes, Volumes, Timings
2: Site Driveway A & Lam Boulevard

2022 Total AM Peak Hour
210475

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	1	4	4	4	4	4	
Traffic Volume (vph)	23	3	0	45	7	0	
Future Volume (vph)	23	3	0	45	7	0	
Mean Flow (vph/s)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Fr	0.985						
Fr Protected					0.950		
Satd. Flow (prot)	1837	0	0	1853	1770	0	
Fr Permitted					0.950		
Satd. Flow (perm)	1837	0	0	1853	1770	0	
Link Speed (k/h)	50			50	50		
Link Distance (m)	78.3			98.3	105.3		
Travel Time (s)	5.6			7.1	7.6		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	25	3	0	49	8	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	28	0	0	49	8	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width (m)	0.0			0.0	3.6		
Link Offset (m)	0.0			0.0	0.0		
Crosswalk Width (m)	4.8			4.8	4.8		
Two way Left Turn Lane							
Highway Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (k/h)	15	25	25	Free	Stop	15	
Sign Control	Free						
Intersection Summary							
Area Type:	Other						
Control Type:	Unsignalized						
Intersection Capacity Utilization	11.3%						ICU Level of Service A
Analysis Period (min)	15						

HCM 6th TWSC
2: Site Driveway A & Lam Boulevard

2022 Total AM Peak Hour
210475

Intersection	EBT	EBR	WBL	WBT	NBL	NBR	
Int Delay, s/veh	0.8						
Movement	1	4	4	4	4	4	
Lane Configurations	1	4	4	4	4	4	
Traffic Vol, veh/h	23	3	0	45	7	0	
Future Vol, veh/h	23	3	0	45	7	0	
Conflicting Peds, #/hr	0	0	0	0	0	0	
Sign Control	Free	Free	Free	Free	Stop	Stop	
RT Channelized	-	None	-	None	-	None	
Storage Length	-	-	-	-	-	-	
Vehicle in Median Storage, #	0	-	-	0	0	-	
Grade, %	0	-	-	0	0	-	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles, %	2	2	2	2	2	2	
Mount Flow	25	3	0	49	8	0	
Flow Group	EBT	EBR	WBL	WBT	NBL	NBR	
Conflicting Flow All	0	0	28	0	76	27	
Stage 1	-	-	-	-	-	27	
Stage 2	-	-	-	-	49	-	
Critical Hwy	-	-	4.12	-	6.42	6.22	
Critical Hwy Sg 1	-	-	-	-	-	5.42	
Critical Hwy Sg 2	-	-	-	-	-	5.42	
Follow-up Hwy	-	-	2.218	-	3.518	3.318	
Per Cap-1 Manuever	-	-	1585	-	927	1048	
Stage 1	-	-	-	-	-	996	
Stage 2	-	-	-	-	-	973	
Platoon blocked, %	-	-	-	-	-	-	
Man Cap-1 Manuever	-	-	1585	-	927	1048	
Man Cap-2 Manuever	-	-	-	-	-	927	
Stage 1	-	-	-	-	-	996	
Stage 2	-	-	-	-	-	973	
Approach	EB	WB	WB	EB	NB	WB	
HCM Control Delay, s	0	0	0	0	8.9	8.9	
HCM LOS	A						
Flow Lane Major	EBT	EBR	WBL	WBT	NBL	NBR	
Capacity (veh/h)	927	-	-	-	1945	-	
HCM Lane V/C Ratio	0.008	-	-	-	-	-	
HCM Control Delay (s)	8.9	-	-	-	0	-	
HCM Lane LOS	A	-	-	-	A	-	
HCM 95th %ile Q(veh)	0	-	-	-	0	-	

Lanes, Volumes, Timings
 3: Old Highway 24 & Site Driveway B

2022 Total AM Peak Hour
 2/10/75

Lane Group	WB	WB	NB	NB	SB	SB
Lane Configurations	9	5	199	2	1	249
Traffic Volume (vph)	9	5	199	2	1	249
Future Volume (vph)	1900	1900	1900	1900	1900	1900
Peak Flow (vph)	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.965					
RT Protected	0.968					
Left Flow (vph)	1722	0	1861	0	0	1863
RT Permitted	0.968					
Left Flow (vph)	1722	0	1861	0	0	1863
Left Speed (mph)	50					
Left Distance (ft)	78.5					
Travel Time (s)	5.7					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	5	216	2	1	271
Shared Lane Traffic (%)	15	0	218	0	0	272
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width (ft)	3.6	0.0	0.0	0.0	0.0	0.0
Link Offset (ft)	0.0	0.0	0.0	0.0	0.0	0.0
Crosswalk Width (ft)	4.8	4.8	4.8	4.8	4.8	4.8
Two way Left Turn Lane	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	25	15	15	15	25	Free
Sign Control	Stop	Free	Free	Free	Free	Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	23.9%					
Analysis Period (min)	15					

HCM 6th TWSC
 3: Old Highway 24 & Site Driveway B

2022 Total AM Peak Hour
 2/10/75

Intersection	0.3											
Approach	WB	WB	NB	NB	SB	SB						
Lane Configurations	Y	Y	1	1	4	4						
Traffic Vol, veh/h	9	5	199	2	1	249						
Future Vol, veh/h	9	5	199	2	1	249						
Conflicting Pch, #/h	0	0	0	0	0	0						
Sign Control	Stop	Stop	Free	Free	Free	Free						
RT Channelized	-	None	-	None	-	None						
Storage Length	0	-	-	-	-	-						
Veh In Median Storage, #	0	-	0	-	-	0						
Grade, %	0	-	0	-	-	0						
Peak Hour Factor	92	92	92	92	92	92						
Heavy Vehicles, %	2	2	2	2	2	2						
Minor Flow	10	5	216	2	1	271						
Approach	Major 1	Major 2	Major 1	Major 2	Major 1	Major 2						
Conflicting Flow Adj	490	217	0	0	218	0						
Stage 1	217	-	-	-	-	-						
Stage 2	273	-	-	-	-	-						
Critical Heavy	6.42	6.22	-	-	4.12	-						
Critical Heavy Sig 1	5.42	-	-	-	-	-						
Critical Heavy Sig 2	5.42	-	-	-	-	-						
Follow-up Heavy	3.518	3.318	-	-	2.218	-						
Rel Cap-1 Maneuver	537	823	-	-	1342	-						
Stage 1	619	-	-	-	-	-						
Stage 2	773	-	-	-	-	-						
Platoon blocked, %	-	-	-	-	-	-						
Max Cap-1 Maneuver	536	823	-	-	1342	-						
Max Cap-2 Maneuver	536	-	-	-	-	-						
Stage 1	619	-	-	-	-	-						
Stage 2	772	-	-	-	-	-						
Approach	WB	NB	SB	SB								
HCM Control Delay, s	11	0	0	0								
HCM LOS	B											
Approach	WB	NB	SB	SB								
Future Lane Minor Delay	-	-	-	-								
Capacity (veh/h)	-	-	612	1342								
HCM Lane VC Ratio	-	-	0.025	0.001								
HCM Control Delay, (s)	-	-	11	7.7								
HCM Lane LOS	-	-	B	A								
HCM 55th Mile Offset	-	-	0.1	0								

Lanes, Volumes, Timings 1: Old Highway 24 & Lam Boulevard 2022 Total PM Peak Hour 210475

Lane Group	WSL	WBL	NBT	NBL	SBL	SRT
Lane Configurations	16	15	303	28	32	232
Traffic Volume (veh/h)	16	15	303	28	32	232
Future Volume (vph)	16	15	303	28	32	232
Mass Flow (veh/h)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped. Bldg Factor	0.934	0.989				
Fit	0.934	0.989				
Fit Predicted	0.975					0.994
Satd. Flow (prot)	1730	0	1745	0	0	1856
Fit Permitted	0.975					0.994
Satd. Flow (perm)	1730	0	1745	0	0	1856
Link Speed (km/h)	50	60				60
Link Distance (m)	80.0	120.8				121.7
Travel Time (s)	5.8	7.2				7.3
Conf. Peds. (veh/h)				1	1	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	0%	0%	0%	4%	0%	2%
Adj. Flow (veh/h)	19	18	361	33	38	276
Shared Lane Traffic (%)						
Lane Group Flow (veh/h)	37	0	394	0	0	314
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width (m)	3.6	0.0				0.0
Link Offset (m)	0.0	0.0				0.0
Crosswalk Width (m)	4.8	4.8				4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Tuning Speed (km/h)	25	15		15	25	
Sign Control	Stop	Free		Free	Free	
Intersection Summary						
Area Type	Other					
Control Type	Unsignalized					
Intersection Capacity Utilization	45.0%					
Analysis Period (min)	15					
ICU Level of Service A						

HCM 6th TWSC 1: Old Highway 24 & Lam Boulevard 2022 Total PM Peak Hour 210475

Intersection	WSL	WBL	NBT	NBL	SBL	SRT
Int Delay, s/veh	1.1					
Lane Configurations	16	15	303	28	32	232
Traffic Vol, veh/h	16	15	303	28	32	232
Future Vol, veh/h	16	15	303	28	32	232
Conflicting Peds. (veh/h)	0	0	0	1	1	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	-	-	-	-	-
Storage Length	0	-	-	-	-	-
Vehicle Median Storage, ft	0	-	-	-	-	0
Grade, %	0	-	-	-	-	0
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles, %	0	0	0	4	0	2
Minut Flow	19	18	361	33	38	276
Major/Minor	Major1	Minor1	Major2	Minor2		
Conflicting Flow All	731	379	0	0	395	0
Stage 1	379	-	-	-	-	-
Stage 2	352	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Spt 1	5.4	-	-	-	-	-
Critical Hdwy Spt 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Ped Cap-1 Maneuver	392	672	-	-	1175	-
Stage 1	696	-	-	-	-	-
Stage 2	716	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
MoV Cap-1 Maneuver	377	671	-	-	1174	-
MoV Cap-2 Maneuver	377	-	-	-	-	-
Stage 1	695	-	-	-	-	-
Stage 2	689	-	-	-	-	-
Approach	WB	EB	NE	SE		
HCM Control Delay, s	13.2	0		1		
HCM LOS	B					
Flow Line Major	Major	Minor	Major	Minor	Major	Minor
Capacity (veh/h)	-	-	-	-	478	1174
HCM Lane V/C Ratio	-	-	-	-	0.077	0.032
HCM Control Delay (s)	-	-	-	-	13.2	8.2
HCM Lane LOS	-	-	-	-	B	A
HCM 95th %ile Q(veh)	-	-	-	-	0.2	0.1

Lanes, Volumes, Timings
 2: Site Driveway A & Lam Boulevard

2022 Total PM Peak Hour
 210475



Lane Group	EBT	TBT	WBT	WLT	NBT	NLT
Lane Configurations	53	7	0	26	5	0
Traffic Volume (vph)	53	7	0	26	5	0
Future Volume (vph)	1900	1900	1900	1900	1900	1900
Initial Flow (vph)	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.994					
FL Protected					0.950	
Satd. Flow (prot)	1833	0	0	1833	1770	0
FL Permitted					0.950	
Satd. Flow (perm)	1833	0	0	1833	1770	0
Link Speed (kph)	50			50	50	
Link Distance (m)	80.0			96.7	100.7	
Travel Time (s)	5.8			7.0	7.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	8	0	28	5	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	66	0	0	28	5	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Right	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (kph)		15	25	15	25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.3%					
Analysis Period (min)	15					

ICU Level of Service A

HCM 6th TWSC
 2: Site Driveway A & Lam Boulevard

2022 Total PM Peak Hour
 210475

Intersection	EBT	TBT	WBT	WLT	NBT	NLT
Int Delay, s/veh	0.5					
Lane Configurations	53	7	0	26	5	0
Traffic Vol. veh/h	53	7	0	26	5	0
Future Vol. veh/h	53	7	0	26	5	0
Conflicting Paths, #/hr	0	0	0	0	0	0
RT Channelized	Free	Free	Free	Free	Stop	Stop
Storage Length	-	-	-	-	-	-
Veh In Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Minut Flow	58	8	0	28	5	0
Major Minor	Major 1	Major 2	Major 3	Major 4	Major 5	Major 6
Conflicting Flow All	0	0	66	0	90	62
Stage 1	-	-	-	-	82	-
Stage 2	-	-	-	-	28	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Sig 1	-	-	-	-	5.42	-
Critical Hdwy Sig 2	-	-	-	-	3.18	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Plat Cap-1 Maneuver	-	-	1536	-	910	1003
Stage 1	-	-	-	-	961	-
Stage 2	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	1536	-
Mov Cap-2 Maneuver	-	-	-	-	910	-
Stage 1	-	-	-	-	961	-
Stage 2	-	-	-	-	995	-
Approach	EB	WB	NB	SB		
HCM Control Delay, s	0	0	9	9		
HCM LOS			A	A		
Base Lane-Move Demand	EBT	TBT	WBT	WLT	NBT	NLT
Capacity (veh/h)	910	-	-	1536	-	-
HCM Lane V/C Ratio	0.006	-	-	-	-	-
HCM Control Delay (s)	9	-	-	0	-	-
HCM Lane LOS	A	-	-	A	-	-
HCM 95th Pctile Delay (s)	0	-	-	0	-	-

Lane Group	WBL	WBRT	NBT	NBR	SBL	SBR
Lane Configurations	5	3	323	10	5	244
Traffic Volume (vph)	5	3	323	10	5	244
Future Volume (vph)	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	1,000	1,000	1,000	1,000	1,000	1,000
Lane Util. Factor	0.949	0.996				
Fd	0.970					0.999
Flt Protected	1715	0	1855	0	0	1851
Satd. Flow (prot)	0.970					0.999
Flt Permitted	1715	0	1855	0	0	1861
Satd. Flow (perm)	50		60			60
Link Speed (mi/h)	78.8		100.7			120.8
Link Distance (mi)	5.7		6.0			7.2
Travel Time (s)	0.92	0.92	0.92	0.92	0.92	0.92
Peak Hour Factor	5	3	358	11	5	265
Adj. Flow (vph)						
Shared Lane Traffic (%)	8	0	369	0	0	270
Lane Group Flow (vph)	No	No	No	No	No	No
Enter Blocked Intersection	Left	Right	Left	Right	Left	Left
Lane Alignment	3.6		0.0		0.0	0.0
Median Width(m)	0.0		0.0		0.0	0.0
Link Offset(m)	4.8		4.8		4.8	4.8
Crosswalk Width(m)	1.00	1.00	1.00	1.00	1.00	1.00
Two way LBR turn Lane	25	15			25	
Highway Factor	Stop		Free		Free	
Turning Speed (mi/h)						
Sign Control						
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	27.9%					
Analysis Period (min)	15					
	ICU Level of Service A					

Intersection												
Int Delay, s/wht 0.2												
Approach	WB	WBK	WBK	WBK	WBK	WBK	WBK	WBK	WBK	WBK	WBK	WBK
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
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Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
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Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
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Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
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Through	1	2	3	4	5	6	7	8	9	10	11	12
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Left	1	2	3	4	5	6	7	8	9	10	11	12
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Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
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Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1	2	3	4	5	6	7	8	9	10	11	12
Through	1	2	3	4	5	6	7	8	9	10	11	12
Right	1	2	3	4	5	6	7	8	9	10	11	12
Left	1											

Appendix F

2027 Background Traffic Operations Reports





Lanes, Volumes, Timings
 1: Old Highway 24 & Lam Boulevard

2027 Background AM Peak Hour
 210475

Lane Group	WBL	WBR	NBT	NBR	SBL	SBR
Lane Configurations	23	22	206	8	15	248
Traffic Volume (veh/h)	23	22	206	8	15	248
Future Volume (veh/h)	1900	1900	1900	1900	1900	1900
Base Flow (veh/h)	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.934	0.995				
RT Protected	0.975					0.997
Base Flow (prot)	1657	0	1820	0	0	1852
RT Permitted	0.975					0.997
Base Flow (perm)	1657	0	1820	0	0	1852
Link Speed (km/h)	50		60			60
Link Distance (m)	178.6		221.5			121.7
Travel Time (s)	12.7		13.3			7.3
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles (%)	0%	9%	4%	0%	7%	2%
Adj. Flow (veh/h)	29	26	261	10	19	314
Shared Lane Traffic (%)						
Lane Group Flow (veh/h)	97	0	271	0	0	333
Enter Blocked Intersection	No	No	No	No	No	No
Lane Assignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two-way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (km/h)	25	15	15	15	25	Free
Sign Control	Stop	Free	Free	Free	Free	Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	35.3%					
Analysis Period (min)	15					

HCM 6th TWSC
 1: Old Highway 24 & Lam Boulevard

2027 Background AM Peak Hour
 210475

Intersection	1.3					
Int Delay, s/veh						
Lane Configurations	WBL	WBR	NBT	NBR	SBL	SBR
Lane Configurations	23	22	206	8	15	248
Traffic Vol, veh/h	23	22	206	8	15	248
Future Vol, veh/h	23	22	206	8	15	248
Conflicting Ped, Mov	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	9	4	0	7	2
Minor Flow	29	26	261	10	19	314
Major Flow	Major 1	Major 2				
Conflicting Flow All	618	266	0	0	271	0
Stage 1	266	-	-	-	-	-
Stage 2	352	-	-	-	-	-
Critical Heavy	6.4	6.29	-	-	4.17	-
Critical Heavy Sig 1	5.4	-	-	-	-	-
Critical Heavy Sig 2	5.4	-	-	-	-	-
Follow-up Heavy	3.5	1.381	-	-	2.263	-
Platoon blocked, %	455	796	-	-	1264	-
Stage 1	783	-	-	-	-	-
Stage 2	716	-	-	-	-	-
Platoon blocked, %	446	746	-	-	1264	-
Mov Cap-1 Maneuver	448	-	-	-	-	-
Mov Cap-2 Maneuver	448	-	-	-	-	-
Stage 1	783	-	-	-	-	-
Stage 2	703	-	-	-	-	-
Approach	WBL	NBR	SBL			
HCM Control Delay, s	12.2	0	0.5			
HCM LOS	B					
Base Lane Name (Mov)	NBT	NBR	SBL			
Capacity (veh/h)	-	-	559	1264	-	-
HCM Lane VC Ratio	-	-	0.102	0.015	-	-
HCM Control Delay (s)	-	-	12.2	7.9	0	-
HCM Lane LOS	-	-	B	A	A	-
HCM 95th Line Q(veh)	-	-	0.3	0	-	-

Lanes, Volumes, Timings
 1: Old Highway 24 & Lam Boulevard

2027 Background PM Peak Hour
 210475

Lane Group	Vol	Wght	NBT	SBL	SRT
Lane Configurations	W	11	332	26	27 249
Traffic Volume (vph)	15	11	332	26	27 249
Future Volume (vph)	15	11	332	26	27 249
Ideal Flow (veh/h)	1900	1900	1900	1900	1900
Lane Util Factor	1.00	1.00	1.00	1.00	1.00
Per Bit Factor	0.943	0.990			
Flt Protected	0.972				0.995
Satd. Flow (prot)	1742	0	1746	0	0 1657
Flt Permitted	0.972				0.995
Satd. Flow (perm)	1742	0	1746	0	0 1857
Link Speed (ft/s)	50	60			60
Link Distance (m)	176.6	221.5			121.7
Travel Time (s)	12.7	13.3			7.3
Conf. Pcts. (ft/s)			1	1	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	0%	8%	4%	0%
Adj. Flow (vph)	18	13	395	31	32 296
Shared Lane Traffic (%)	31	0	426	0	0 328
Lane Group Flow (vph)	No	No	No	No	No
Enter Blocked Intersection	Left	Right	Left	Right	Left
Lane Alignment	Left	Right	Left	Right	Left
Median Width(m)	3.6	0.0			0.0
Link Offset(m)	0.0	0.0			0.0
Crosswalk Width(m)	4.8	4.8			4.8
Two way Left Turn Lane	1.00	1.00	1.00	1.00	1.00
Headway Factor	25	15			25
Tuning Speed (ft/s)	Stop	Free			Free
Sign Control	Stop	Free			Free
Area Type:	Other				
Control Type:	Unsignalized				
Intersection Capacity Utilization	46.6%				
Analysis Period (min) '15	ICU Level of Service A				

HCM 6th TWSC
 1: Old Highway 24 & Lam Boulevard

2027 Background PM Peak Hour
 210475

Intersection	Vol	Wght	NBT	SBL	SRT
In Delay, s/veh	0.9				
Lane Configurations	W	11	332	26	27 249
Traffic Vol. veh/h	15	11	332	26	27 249
Future Vol. veh/h	15	11	332	26	27 249
Conflicting Pcts. #/h	0	0	0	1	1 0
Sign Control	Stop	Stop	Free	Free	Free
RT Channelized	-	-	-	-	-
Storage Length	0	-	-	-	-
Veh In Median Storage, #	0	-	-	-	-
Grade, %	0	-	-	-	-
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	0	0	8	4	0 2
Minor Flow	18	13	395	31	32 296
Major/Minor	Minor1	Minor2	Minor1	Minor2	
Conflicting Flow All	772	412	0	0	427 0
Stage 1	412	-	-	-	-
Stage 2	360	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2
Pot Cap-1 Maneuver	371	644	-	-	1143
Stage 1	673	-	-	-	-
Stage 2	710	-	-	-	-
Platoon blocked, %	-	-	-	-	-
Minor Cap-1 Maneuver	359	643	-	-	1142
Minor Cap-2 Maneuver	359	-	-	-	-
Stage 1	672	-	-	-	-
Stage 2	686	-	-	-	-
Approach	WB	NB	SB	SB	
HCM Control Delay, s	13.9	0	0	0.9	
HCM LOS	B				
Minor Lane/Minor	Minor	NBT	NB/SBL	SBL	SRT
Capacity (veh/h)	-	-	-	441	1142
HCM Lane V/C Ratio	-	-	-	0.07	0.028
HCM Control Delay (s)	-	-	-	13.9	8.2
HCM Lane LOS	-	-	-	B	A
HCM 95th %ile Q(veh)	-	-	-	0.2	0.1

Appendix G

2027 Total Traffic Operations Reports





Lanes, Volumes, Timings
1: Old Highway 24 & Lam Boulevard

2027 Total AM Peak Hour
210475

Lane Group	WBL	WBR	NBLT	NBR	SBL	SBR	SBT
Lane Configurations	W	W	W	W	W	W	W
Traffic Volume (vph)	25	27	211	9	17	249	4
Future Volume (vph)	25	27	211	9	17	249	4
Base Flow (vph)	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PH	0.930	0.995					
PH Protected	0.976						0.997
Base Flow (vph)	1648	0	1821	0	0	1851	
PH Permitted	0.976						0.997
Base Flow (vph)	1648	0	1821	0	0	1851	
Link Speed (vph)	50	60	60	60	60	60	60
Link Distance (mi)	78.3	159.9					121.7
Travel Time (s)	5.6	8.4					7.3
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles (%)	0%	9%	4%	0%	7%	2%	2%
Adj. Flow (vph)	32	34	267	11	22	315	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	66	0	278	0	0	307	
Enter Blocked Intersection	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left
Median Width (m)	3.5	0.0	0.0	0.0	0.0	0.0	0.0
Link Capacity	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crosswalk Width (m)	4.8	4.8					4.8
Two-way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (km/h)	25	15		15	25		
Sign Control	Stop	Free		Free	Free		Free
Intersection Summary							
Area Type:	Other						
Control Type:	Unsignalized						
Intersection Capacity Utilization	37.1%						
Analysis Period (min)	15						

HCM 6th TWSC
1: Old Highway 24 & Lam Boulevard

2027 Total AM Peak Hour
210475

Intersection	1.4						
Int Delay, s/veh							
Lane Configurations	W	W	W	W	W	W	W
Traffic Vol, veh/h	25	27	211	9	17	249	4
Future Vol, veh/h	25	27	211	9	17	249	4
Conflicting Veh, #/h	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None	-
Storage Length	0	-	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	-	0
Grade, %	0	-	0	-	-	-	0
Peak Hour Factor	79	79	79	79	79	79	79
Heavy Vehicles, %	0	9	4	0	7	2	
Minrt Flow	32	34	267	11	22	315	
Base Flow	Major 1	Major 1	Major 2	Major 2	Major 2	Major 2	
Conflicting Flow All	632	273	0	0	278	0	
Stage 1	273	-	-	-	-	-	
Stage 2	359	-	-	-	-	-	
Critical Flow	6.4	6.29	-	-	4.17	-	
Critical Flow Sig 1	5.4	-	-	-	-	-	
Critical Flow Sig 2	5.4	-	-	-	-	-	
Follow-up Hwy	3.5	3.381	-	-	2.263	-	
PH Cap-1 Maneuver	448	749	-	-	1257	-	
Stage 1	778	-	-	-	-	-	
Stage 2	711	-	-	-	-	-	
Platoon blocked, %	-	-	-	-	-	-	
PH Cap-1 Maneuver	439	749	-	-	1257	-	
PH Cap-2 Maneuver	439	-	-	-	-	-	
Stage 1	778	-	-	-	-	-	
Stage 2	696	-	-	-	-	-	
Approach	W/B	N/B	S/B				
HCM Control Delay, s	12.3	0	0	0.5			
HCM LOS	B						
PH Cap-1 Maneuver	Major 1	Major 1	Major 2	Major 2	Major 2	Major 2	
Capacity (veh/h)	-	-	599	1257	-	-	
HCM Lane VC Ratio	-	-	0.118	0.017	-	-	
HCM Control Delay (s)	-	-	12.3	7.9	0	-	
HCM Lane LOS	-	-	B	A	A	-	
HCM 95th Vile Q (veh)	-	-	0.3	0.1	-	-	

Lanes, Volumes, Timings
2: Site Driveway A & Lam Boulevard

2027 Total AM Peak Hour
210475

Lane Group	EB	EB	WB	WB	NB	NB
Lane Configurations	1	3	0	45	7	0
Traffic Volume (vph)	23	3	0	45	7	0
Future Volume (vph)	23	3	0	45	7	0
Mass Flow (vph)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
PH	0.986					
PH Protected					0.950	
Satd. Flow (vph)	1437	0	0	1863	1770	0
PH Permitted					0.950	
Satd. Flow (vph)	1837	0	0	1863	1770	0
Link Speed (mi/h)	50			50	50	
Link Distance (mi)	78.3			98.3	105.3	
Travel Time (s)	5.6			7.1	7.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	3	0	49	8	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	28	0	0	49	8	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Right	Right
Median Width (m)	0.0			0.0	3.6	
Link Offset (m)	0.0			0.0	0.0	
Crosswalk Width (m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Heavily Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mi/h)	15	25	25	25	15	
Sign Control	Free	Free	Free	Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	11.7%					
Analysis Period (min)	15					

ICU Level of Service A

HCM 6th TWSC
2: Site Driveway A & Lam Boulevard

2027 Total AM Peak Hour
210475

Intersection												
Int Delay, s/veh	0.8											
Movement	EB	EB	WB	WB	NB	NB	EB	EB	WB	WB	NB	NB
Lane Configurations	1	3	0	45	7	0	1	3	0	45	7	0
Traffic Vol, veh/h	23	3	0	45	7	0	23	3	0	45	7	0
Future Vol, veh/h	23	3	0	45	7	0	23	3	0	45	7	0
Conflicting Peak, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	-	-	-	-	-	-	-	-	-	-
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Vol In Median Storage, #	0	-	-	-	0	0	0	-	-	-	0	0
Grade, %	0	-	-	-	0	0	0	-	-	-	0	0
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Heavy Flow	25	3	0	49	8	0	25	3	0	49	8	0
Major Minor	Major	Minor	Major	Minor	Major	Minor	Major	Minor	Major	Minor	Major	Minor
Conflicting Flow All	0	0	28	0	76	27	0	0	28	0	76	27
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Flow	-	-	4.12	-	6.42	6.22	-	-	4.12	-	6.42	6.22
Critical Flow Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Flow Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Heavy	-	-	2.218	-	3.518	3.318	-	-	2.218	-	3.518	3.318
Pol Cap-1 Maneuver	-	-	1585	-	927	1048	-	-	1585	-	927	1048
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Man Cap-1 Maneuver	-	-	1585	-	927	1048	-	-	1585	-	927	1048
Man Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Approach	EB	WB	WB	NB	NB	EB	EB	WB	WB	NB	NB	EB
HCM Control Delay, s	0	0	0	8.9	8.9	8.9	0	0	0	8.9	8.9	8.9
HCM LOS	A	A	A	A	A	A	A	A	A	A	A	A
Minor Lane Major Minor	NB	EB	WB	WB	NB	EB	NB	EB	WB	WB	NB	EB
Capacity (veh/h)	927	-	-	-	1585	-	927	-	-	-	1585	-
HCM Lane V/C Ratio	0.008	-	-	-	-	-	0.008	-	-	-	-	-
HCM Control Delay (s)	0.9	-	-	-	0	-	0.9	-	-	-	0	-
HCM Lane LOS	A	-	-	-	A	-	A	-	-	-	A	-
HCM 95th %ile Q(veh)	0	-	-	-	0	-	0	-	-	-	0	-

Lanes, Volumes, Timings
3: Old Highway 24 & Site Driveway B

2027 Total AM Peak Hour
210475

Lane Group	WBL	WBR	NBL	NBR	EBL	EBR	SBT
Lane Configurations	9	5	216	2	1	1	215
Traffic Volume (vph)	9	5	216	2	1	1	215
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900
Base Flow (vph)	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane UTR Factor	0.955		0.968				
RT Protected	0.968						
Base Flow (vph)	1722	0	1861	0	0	0	1863
RT Permitted	0.968						
Base Flow (vph)	1722	0	1861	0	0	0	1863
Link Speed (km/h)	50		60				60
Link Distance (m)	78.5		81.6				139.9
Travel Time (s)	5.7		4.9				8.4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	5	235	2	1	1	259
Shared Lane Traffic (%)							
Lane Group Flow (vph)	15	0	237	0	0	0	300
Enter Blocked Intersection	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left	Left
Median Width (m)	3.6		0.0		0.0		0.0
Link Offset (m)	0.0		0.0		0.0		0.0
Overlap Width (m)	4.8		4.8				4.8
Two Way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (km/h)	25	15	15	15	25	25	25
Sign Control	Stop	Free	Free	Free	Free	Free	Free
Intersection Summary							
Area Type:	Other						
Control Type: Unsignalized							
Intersection Capacity Utilization 25.3%	ICU Level of Service A						
Analysis Period (min) 15							

HCM 6th TWSC
3: Old Highway 24 & Site Driveway B

2027 Total AM Peak Hour
210475

Intersection										
Int Delay, s/veh	0.3									
Lane Configurations	WBL	WBR	NBL	NBR	EBL	EBR	SBT			
Traffic Vol, veh/h	9	5	216	2	1	1	215			
Future Vol, veh/h	9	5	216	2	1	1	215			
Conflicting Peds, Mov	0	0	0	0	0	0	0			
Sign Control	Stop	Stop	Free	Free	Free	Free	Free			
RT Channelized	-	Move	-	None	-	None	-			
Storage Length	0	-	-	-	-	-	-			
Veh in Median Storage, #	0	-	0	-	-	-	0			
Grade, %	0	-	0	-	-	-	0			
Peak Hour Factor	92	92	92	92	92	92	92			
Heavy Vehicles, %	2	2	2	2	2	2	2			
Minut Flow	10	5	235	2	1	1	259			
Maneuver	Maneuver	Maneuver	Maneuver	Maneuver	Maneuver	Maneuver	Maneuver			
Conflicting Flow All	537	236	0	0	237	0	0			
Stage 1	236	-	-	-	-	-	-			
Stage 2	301	-	-	-	-	-	-			
Critical Hwy	5.42	5.22	-	-	4.12	-	-			
Critical Hwy Stg 1	5.42	-	-	-	-	-	-			
Critical Hwy Stg 2	5.42	-	-	-	-	-	-			
Follow-up Hwy	3.518	3.318	-	-	2.218	-	-			
Pst Cap-1 Maneuver	585	803	-	-	1330	-	-			
Stage 1	803	-	-	-	-	-	-			
Stage 2	751	-	-	-	-	-	-			
Platoon blocked, %	-	-	-	-	-	-	-			
Mov Cap-1 Maneuver	584	803	-	-	1330	-	-			
Mov Cap-2 Maneuver	504	-	-	-	-	-	-			
Stage 1	803	-	-	-	-	-	-			
Stage 2	750	-	-	-	-	-	-			
Approach	WBL	WBR	NBL	NBR	EBL	EBR	SBT			
HCM Control Delay, s	11.4	-	0	-	0	-	0			
HCM LOS	B	-	-	-	-	-	-			
Final Lane Group Delay	WBL	WBR	NBL	NBR	EBL	EBR	SBT			
Capacity (veh/h)	-	-	-	-	581	1330	-			
HCM Lane V/C Ratio	-	-	-	-	0.026	0.001	-			
HCM Control Delay (s)	-	-	-	-	11.4	7.7	0			
HCM Lane LOS	-	-	-	-	B	A	A			
HCM 95th Xile Q(veh)	-	-	-	-	0.1	0	-			

Lanes, Volumes, Timings
 1: Old Highway 24 & Lam Boulevard

2027 Total PM Peak Hour
 210475

Lane Group	WB	WBRT	WBRT	WBRT	WBRT	WBRT	WBRT	WBRT	WBRT
Lane Configurations	16	15	335	28	32	254	4		
Traffic Volume (vph)	16	15	335	28	32	254			
Future Volume (vph)	16	15	335	28	32	254			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00			
Per Bit Factor	0.934	0.990							
Flt Protected	0.975					0.994			
Satd. Flow (pcu)	1730	0	1747	0	0	1855			
Flt Permitted	0.975					0.994			
Satd. Flow (pcu)	1730	0	1747	0	0	1855			
Link Speed (mi/h)	50	60				60			
Link Distance (mi)	80.0	120.8				121.7			
Travel Time (s)	5.8	7.2				7.3			
Cont. Peds. (ft/hr)									
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84			
Heavy Vehicles (%)	0%	0%	8%	4%	0%	2%			
Adj. Flow (vph)	19	18	399	33	38	302			
Shared Lane Traffic (%)									
Lane Group Flow (vph)	37	0	432	0	0	340			
Enter Blocked Intersection	No	No	No	No	No	No			
Lane Alignment	Left	Right	Left	Right	Left	Left			
Median Width (m)	3.6	0.0				0.0			
Link Offset (m)	0.0	0.0				0.0			
Crosswalk Width (m)	4.8	4.8				4.8			
Two way Left Turn Lane									
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00			
Turning Speed (mi/h)	25	15				25			
Sign Control	Stop	Free				Free			
Intersection Summary									
Area Type:	Other								
Control Type:	Unsignalized								
Intersection Capacity Utilization	47.6%								
Analysis Period (min)	15								

HCM 6th TWSC
 1: Old Highway 24 & Lam Boulevard

2027 Total PM Peak Hour
 210475

Intersection	WB	WBRT	WBRT	WBRT	WBRT	WBRT	WBRT	WBRT	WBRT
Int Delay, sveh	1								
Lane Configurations	16	15	335	28	32	254	4		
Traffic Vol. veh/h	16	15	335	28	32	254			
Future Vol. veh/h	16	15	335	28	32	254			
Conflicting Peds. #/hr	0	0	0	1	1	0			
Sign Control	Stop	Stop	Free	Free	Free	Free			
RT Channelized	-	None	-	None	-	None			
Storage Length	0	-	-	-	-	-			
Veh in Median Storage, #	0	-	0	-	-	0			
Grade, %	0	-	0	-	-	0			
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84			
Heavy Vehicles, %	0	0	8	4	0	2			
Adj. Flow	19	18	399	33	38	302			
Major Minor	Major1	Major2							
Conflicting Flow All	795	417	0	0	433	0			
Stage 1	417	-	-	-	-	-			
Stage 2	378	-	-	-	-	-			
Critical Hdwy	6.4	6.2	-	-	4.1	-			
Critical Hdwy Stg 1	5.4	-	-	-	-	-			
Critical Hdwy Stg 2	5.4	-	-	-	-	-			
Follow-up Hdwy	3.5	3.3	-	-	-	2.2			
Per Cap-1 Maneuver	359	640	-	-	137	-			
Stage 1	669	-	-	-	-	-			
Stage 2	697	-	-	-	-	-			
Platoon blocked, %									
Minor Cap-1 Maneuver	344	639	-	-	136	-			
Minor Cap-2 Maneuver	344	-	-	-	-	-			
Stage 1	668	-	-	-	-	-			
Stage 2	669	-	-	-	-	-			
Approach	WB	WB	WB	WB	WB	WB			
HCM Control Delay, s	13.9	0	0	0	0.9				
HCM LOS	B								
Minor Lane Major Minor	NET	NET	NET	NET	NET	NET			
Capacity (veh/h)	-	-	-	-	443	1136			
HCM Lane V/C Ratio	-	-	-	-	0.083	0.034			
HCM Control Delay (s)	-	-	-	-	13.9	8.3			
HCM Lane LOS	-	-	-	-	B	A			
HCM 95th %ile Q(veh)	-	-	-	-	0.3	0.1			

Lanes, Volumes, Timings
3: Old Highway 24 & Site Driveway B

Lane Group	WBL	WBH	NBT	SBL	SST
Lane Configurations	5	3	362	10	5
Traffic Volume (vph)	5	3	362	10	5
Future Volume (vph)	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.949	0.986			
FRT	0.970				0.999
Flt Protected	1715	0	1855	0	1861
Bkld. Flow (prot)	0.970				0.999
Flt Permitted	1715	0	1855	0	1861
Bkld. Flow (perm)	50		60		60
Link Speed (mph)	79.8		100.7		120.8
Link Distance (mi)	5.7		6.0		7.2
Travel Time (s)	0.92	0.92	0.92	0.92	0.92
Peak Hour Factor	5	3	393	11	5
Adj. Flow (vph)					289
Shared Lane Traffic (%)					
Lane Group Flow (vph)	8	0	404	0	294
Enter Blocked Intersection	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left
Median Width(m)	3.6		0.0		0.0
Link Offset(mi)	0.0		0.0		0.0
Crosswalk Width(mi)	4.8		4.8		4.8
Two way Left Turn Lane					
Headway Factor	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	25	15		25	
Sign Control	Stop	Free		Free	
Intersection Summary					
Area Type:	Other				
Control Type:	Unsignalized				
Intersection Capacity Utilization	28.7%				
Analysis Period (min)	15				
ICU Level of Service A					

HCM 6th TWSC
3: Old Highway 24 & Site Driveway B

Function	0.2	0.2											
Int Delay, s/veh		WBS	WBS	WBS	WBS	WBS	WBS	WBS	WBS	WBS	WBS	WBS	WBS
Line Configurations		W	W	W	W	W	W	W	W	W	W	W	W
Traffic Vol, veh/h	5	3	362	10	5	266							
Future Vol, veh/h	5	3	362	10	5	266							
Conflicting Peds, #/hr	0	0	0	0	0	0							
Sign Control	Stop	Stop	Free	Free	Free	Free							
RT Channel/food	-	None	-	None	-	None							
Storage Length	0	-	-	-	-	-							
Veh In Median Storage, #	0	-	0	-	0	-							
Grade, %	0	-	0	-	0	-							
Peak Hour Factor	92	92	92	92	92	92							
Heavy Vehicles, %	2	2	2	2	2	2							
Arrival Flow	5	3	363	11	5	269							
Major/Minor	Major1	Major1	Major2	Major2	Major2	Major2							
Conflicting Flow All	698	399	0	0	404	0							
Stage 1	399	-	-	-	-	-							
Stage 2	299	-	-	-	-	-							
Critical Hwy	6.42	6.22	-	-	4.12	-							
Critical Hwy Sig 1	5.42	-	-	-	-	-							
Critical Hwy Sig 2	5.42	-	-	-	-	-							
Follow-up Hwy	3.518	3.318	-	-	2.218	-							
Plat Cap-1 Maneuver	407	651	-	-	1155	-							
Stage 1	678	-	-	-	-	-							
Stage 2	752	-	-	-	-	-							
Platoon blocked, %													
Mov Cap-1 Maneuver	405	651	-	-	1155	-							
Mov Cap-2 Maneuver	405	-	-	-	-	-							
Stage 1	678	-	-	-	-	-							
Stage 2	748	-	-	-	-	-							
Approach	WB	EB	WB	EB	WB	EB							
HCM Control Delay, s	12.8	0	0	0	12								
HCM LOS	B												
Minor Lane/Minor	Minor	Minor	Minor	Minor	Minor	Minor							
Capacity (veh/h)	-	-	472	1155	-	-							
HCM Lane V/C Ratio	-	-	0.018	0.005	-	-							
HCM Control Delay (s)	-	-	12.8	0.1	0	-							
HCM Lane LOS	-	-	B	A	A	-							
HCM 95th Mile Offset	-	-	0.1	0	-	-							

Appendix H

2032 Background Traffic Operations Reports





Lanes, Volumes, Timings

1: Old Highway 24 & Lam Boulevard

2032 Background AM Peak Hour
21M75

Lane Group	WB	WB	WB	NB	NB	SB	SB
Lane Configurations	23	22	22	22	8	15	266
Traffic Volume (vph)	23	22	22	22	8	15	266
Future Volume (vph)	23	22	22	22	8	15	266
Peak Flow (vph)	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
RT	0.934	0.935	0.935	0.935	0.935	0.935	0.937
RT Protected	0.975	0.975	0.975	0.975	0.975	0.975	0.975
RT Permitted	0.975	0.975	0.975	0.975	0.975	0.975	0.975
RT Left	0.975	0.975	0.975	0.975	0.975	0.975	0.975
Link Speed (mi/h)	50	60	60	60	60	60	60
Link Distance (mi)	378.6	221.5	221.5	221.5	221.5	221.5	221.5
Travel Time (s)	12.7	13.3	13.3	13.3	13.3	13.3	13.3
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles (%)	0%	9%	4%	0%	0%	7%	2%
Adj. Flow (vph)	20	26	26	26	10	19	337
Shared Lane Traffic (%)	37	0	29	0	0	0	366
Lane Group Flow (vph)	No	No	No	No	No	No	No
Enter Blocked Intersection	Left	Left	Right	Right	Left	Left	Left
Lane Alignment	Left	Left	Right	Right	Left	Left	Left
Median Width (m)	3.6	0.0	0.0	0.0	0.0	0.0	0.0
Link Width (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crosswalk Width (m)	4.8	4.8	4.8	4.8	4.8	4.8	4.8
Two way Left Turn Lane	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Headway Factor	25	15	15	15	15	25	25
Turning Speed (mi/h)	Stop	Free	Free	Free	Free	Free	Free
Sign Control	Stop	Free	Free	Free	Free	Free	Free
Intersection Summary							
Area Type:	Other						
Control Type:	Unsignalized						
Intersection Capacity Utilization	36.3%						
Analysis Period (min)	15						

HCM 6th TWSC

1: Old Highway 24 & Lam Boulevard

2032 Background AM Peak Hour
21M75

Intersection	WB	WB	WB	NB	NB	SB	SB
Int Delay, s/veh	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Lane Configurations	23	22	22	22	8	15	266
Traffic Vol, veh/h	23	22	22	22	8	15	266
Future Vol, veh/h	23	22	22	22	8	15	266
Conflicting Veh, veh/h	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	None	None	None	None	None	None	None
Storage Length	0	0	0	0	0	0	0
Veh in Median Storage, #	0	0	0	0	0	0	0
Grade, %	0	0	0	0	0	0	0
Peak Hour Factor	79	79	79	79	79	79	79
Heavy Vehicles, %	0	9	4	0	7	2	2
Minor Flow	29	26	26	26	10	19	337
Flow, vph	29	26	26	26	10	19	337
Conflicting Flow All	661	286	0	0	291	0	0
Stage 1	286	-	-	-	-	-	-
Stage 2	375	-	-	-	-	-	-
Critical Hwy	6.4	5.29	-	-	4.17	-	-
Critical Hwy Sig 1	5.4	-	-	-	-	-	-
Critical Hwy Sig 2	5.4	-	-	-	-	-	-
Follow-up Hwy	3.5	3.381	-	-	2.263	-	-
Rel Cap-1 Maneuver	431	737	-	-	1243	-	-
Stage 1	767	-	-	-	-	-	-
Stage 2	699	-	-	-	-	-	-
Pedon blocked, %	-	-	-	-	-	-	-
Rel Cap-1 Maneuver	423	737	-	-	1243	-	-
Rel Cap-2 Maneuver	423	-	-	-	-	-	-
Stage 1	767	-	-	-	-	-	-
Stage 2	686	-	-	-	-	-	-
Approach	WB	NB	SB	WB	NB	SB	WB
HCM Control Delay, s	12.5	0	0.4	12.5	0	0.4	12.5
HCM LOS	B	-	-	B	-	-	B
Flow, vph	29	26	26	26	10	19	337
Capacity (veh/h)	-	-	-	-	524	1243	-
HCM Lane VC Ratio	-	-	-	-	0.107	0.015	-
HCM Control Delay (s)	-	-	-	-	12.5	7.9	0
HCM Lane LOS	-	-	-	-	B	A	A
HCM 95th %ile Q(veh)	-	-	-	-	0.4	0	-

Lanes, Volumes, Timings 1: Old Highway 24 & Lam Boulevard

2032 Background PM Peak Hour
210475

Lane Group	WSL	NSR	NSR	SBL	SBL
Lane Configurations	W	P			4
Traffic Volume (vph)	15	11	357	26	27
Future Volume (vph)	15	11	357	26	27
Model Flow (vph)	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00
Ped/Bike Factor					
FL	0.943	0.991			
FL Provided	0.972				0.995
Satd. Flow (prot)	1742	0	1748	0	0
FL Provided	0.972				0.995
Satd. Flow (prot)	1742	0	1748	0	0
Link Speed (tph)	50	60			60
Link Distance (m)	176.5	221.5			121.7
Travel Time (s)	92.7	13.3			7.3
Cont. Peds. (tph)			1	1	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	0%	8%	4%	0%
Adj. Flow (vph)	18	13	425	31	32
Shared Lane Traffic (%)					
Lane Group Flow (vph)	31	0	455	0	0
Enter Blocked Intersection	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left
Median Width(m)	3.6	0.0			0.0
Link Offset(m)	0.0	0.0			0.9
Crosswalk Width(m)	4.8	4.8			4.8
Two way Left Turn Lane					
Headway Factor	1.00	1.00	1.00	1.00	1.00
Turning Speed (km/h)	25	15		15	25
Sign Control	Stop	Free		Free	Free
Intersection Summary	Other				
Control Type:	Unsignalized				
Intersection Capacity Utilization	46.6%				
Analysis Period (min)	15				
	ICU Level of Service A				

HCM 6th TWSC 1: Old Highway 24 & Lam Boulevard

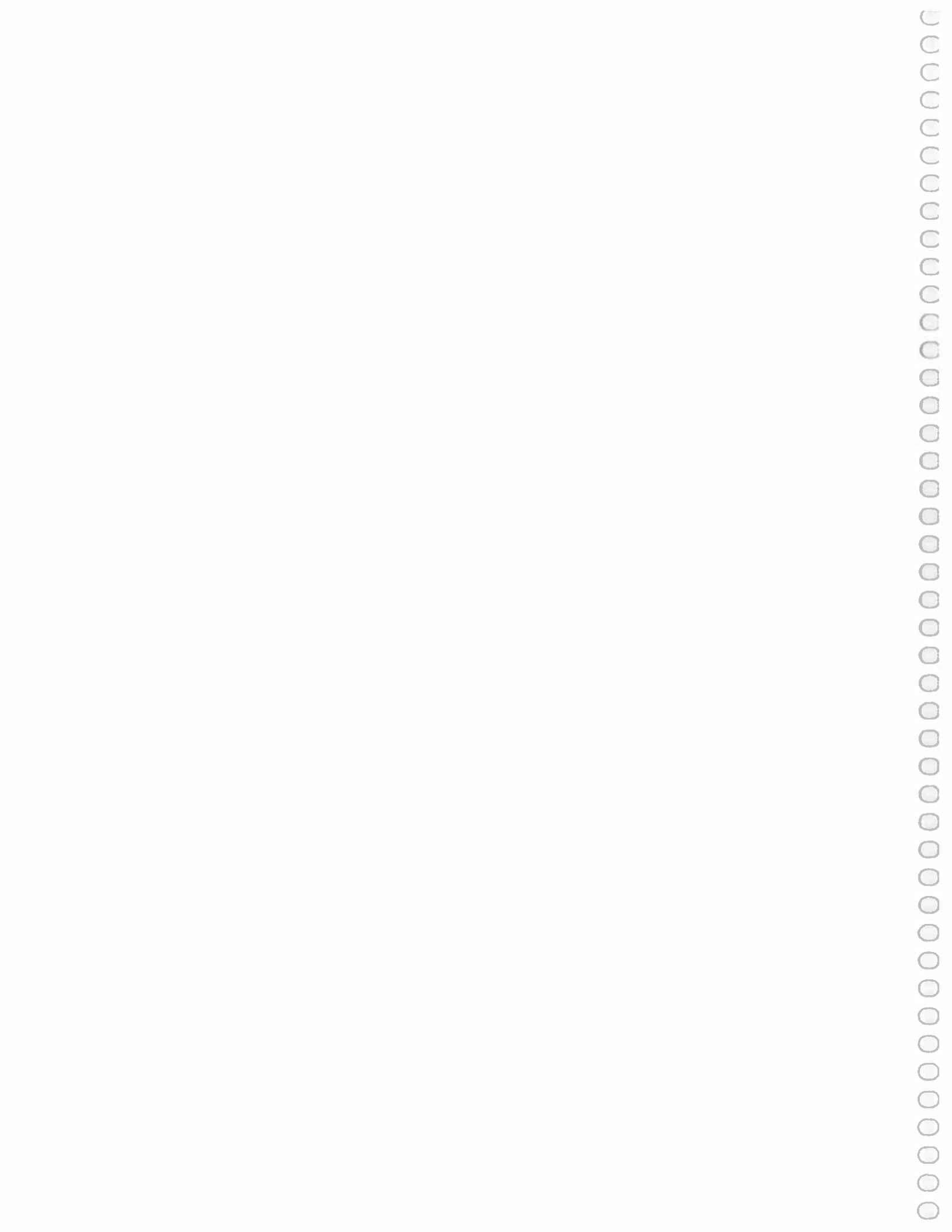
2032 Background PM Peak Hour
210475

Intersection	0.9									
Int Delay, s/veh										
Reversed	W	P								
Lane Configurations	W	P								
Traffic Vol. veh/h	15	11	357	26	27	268				
Future Vol. veh/h	15	11	357	26	27	268				
Conflicting Peds./Hr	0	0	0	1	1	0				
Sign Control	Stop	Stop	Free	Free	Free	Free				
RT Channel/End	-	None	-	None	-	None				
Storage Length	0	-	-	-	-	-				
Veh in Median Storage, #	0	-	0	-	-	0				
Grade, %	0	-	0	-	-	0				
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94				
Heavy Vehicles, %	0	0	8	4	0	2				
Model Flow	18	13	425	31	32	319				
Phase/Move	Move1	Move1	Move1	Move2						
Conflicting Flow All	825	442	0	0	457	0				
Stage 1	442	-	-	-	-	-				
Stage 2	383	-	-	-	-	-				
Critical Hwy	5.4	6.2	-	-	4.1	-				
Critical Hwy Sig 1	5.4	-	-	-	-	-				
Critical Hwy Sig 2	5.4	-	-	-	-	-				
Follow-up Hwy	3.5	3.3	-	-	2.2	-				
Ped Cap-1 Maneuver	345	620	-	-	1114	-				
Stage 1	652	-	-	-	-	-				
Stage 2	694	-	-	-	-	-				
Platoon blocked, %	-	-	-	-	-	-				
Move Cap-1 Maneuver	333	619	-	-	1113	-				
Move Cap-2 Maneuver	333	-	-	-	-	-				
Stage 1	651	-	-	-	-	-				
Stage 2	670	-	-	-	-	-				
Approach	WS	NS	NS	SBL						
HCM Control Delay, s	14.4	9	0	0.6						
HCM LOS	B									
Minor Lane Major Move	NET	NS/WS/BL	NET	SBL	SBL					
Capacity (veh/h)	-	-	-	414	1113	-				
HCM Lane V/C Ratio	-	-	-	0.075	0.029	-				
HCM Control Delay (s)	-	-	-	14.4	8.3	0				
HCM Lane LOS	-	-	-	B	A	A				
HCM 95th Mile Q(veh)	-	-	-	0.2	0.1	-				

Appendix I

2032 Total Traffic Operations Reports





Lanes, Volumes, Timings
1: Old Highway 24 & Lam Boulevard

2032 Total AM Peak Hour
210475

Lane Group	WB	WB	NB	NB	SB	SB
Lane Configurations	W	27	227	9	17	267
Traffic Volume (vph)	25	27	227	9	17	267
Future Volume (vph)	25	27	227	9	17	267
Peak Flow (vph)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
FL	0.930		0.995			
FL Protected	0.975				0.997	
Start Flow (pph)	1648	0	1820	0	0	1852
FL Permitted	0.976					0.997
Start Flow (pph)	1648	0	1820	0	0	1852
Link Speed (kph)	50		60			60
Link Distance (m)	78.3		138.9			121.7
Travel Time (s)	5.6		8.4			7.3
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles (%)	0%	9%	4%	0%	7%	2%
Adj Flow (vph)	32	34	287	11	22	338
Shared Lane Traffic (%)						
Lane Group Flow (vph)	66	0	298	0	0	360
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Check(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (km/h)	25	15	15	15	25	25
Sign Control	Stop	Free	Free	Free	Free	Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	38.0%					
Analysis Period (min)	15					
ICU Level of Service A						

HCM 6th TWSC
1: Old Highway 24 & Lam Boulevard

2032 Total AM Peak Hour
210475

Intersection												
Int Delay, s/veh												
1.4												
Approach												
WBL WBL NB NB SB SB												
Lane Configurations												
Traffic Vol, veh/h												
25 27 227 9 17 267												
Future Vol, veh/h												
25 27 227 9 17 267												
Conflicting Peds, #/h												
0 0 0 0 0 0												
Sign Control												
Stop Stop Free Free Free Free												
RT Channelized												
- None - None - None												
Storage Length												
0 - - - - 0												
Veh in Median Storage, #												
0 - 0 - - 0												
Grade, %												
0 - 0 - - 0												
Peak Hour Factor												
79 79 79 79 79 79												
Heavy Vehicles, %												
0 9 4 0 7 2												
Minor Flow												
32 34 287 11 22 338												
Major Flow												
675 293 0 0 298 0												
Conflicting Flow All												
293 - - - - -												
Stage 1												
382 - - - - -												
Stage 2												
8.4 6.29 - - 4.17 -												
Critical Hwy												
5.4 - - - - -												
Critical Hwy Sig 1												
5.4 - - - - -												
Critical Hwy Sig 2												
3.5 3.381 - - 2.263 -												
Follow-up Hwy												
422 730 - - 1235 -												
Platoon Cap-1 Maneuver												
762 - - - - -												
Stage 1												
694 - - - - -												
Stage 2												
Platoon blocked, %												
413 730 - - 1245 -												
Major Cap-1 Maneuver												
413 - - - - -												
Major Cap-2 Maneuver												
762 - - - - -												
Stage 1												
679 - - - - -												
Stage 2												
Platoon blocked, %												
12.7 0 0 0.5												
HCM Control Delay, s												
HCM LOS												
B												
Approach												
WBL WBL NB NB SB SB												
HCM Control Delay, s												
12.7 0 0 0.5												
HCM LOS												
B												
Platoon Cap-1 Maneuver												
- - 533 1245 -												
Capacity, veh/h												
HCM Lane V/C Ratio												
- 0.123 0.017 -												
HCM Lane V/C Ratio												
- 0.127 8 0												
HCM Control Delay, (s)												
- - B A A												
HCM Lane LOS												
- - B A A												
HCM 95th Mile Offset												
- - 0.4 6.1 -												

Lanes, Volumes, Timings
2: Site Driveway A & Lam Boulevard

2032 Total AM Peak Hour
210475

Lane Group	EB	EB	WB	WB	WB	WB
Lane Configurations	3	3	0	45	7	0
Traffic Volume (vph)	23	3	0	45	7	0
Future Volume (vph)	23	3	0	45	7	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt. Protected	0.986					
Satd. Flow (prot)	1837	0	0	1853	1770	0
Flt. Permitted						
Satd. Flow (perm)	1837	0	0	1853	1770	0
Link Speed (km/h)	50			50	50	
Link Distance (m)	78.3			98.3	105.3	
Travel Time (s)	5.6			7.1	7.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	3	0	49	8	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	28	0	0	49	8	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Assignment	Left	Right	Left	Left	Left	Right
Median Width (m)	0.0			0.0	3.6	
Link Offset (m)	0.0			0.0	0.0	
Crosswalk Width (m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Priority Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (km/h)	15	25		25	15	
Sign Control	Free	Free	Free	Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization	13.7%					
Analysis Period (min)	15					

100 Level of Service A

HCM 6th TWSC
2: Site Driveway A & Lam Boulevard

2032 Total AM Peak Hour
210475

Intersection												
Int Delay, s/veh	0.8											
Movement	EB	EB	WB	WB	WB	WB	WB	WB	WB	WB	WB	WB
Lane Configurations	3	3	0	45	7	0	4	4	4	4	4	4
Traffic Vol, veh/h	23	3	0	45	7	0	45	7	0	45	7	0
Future Vol, veh/h	23	3	0	45	7	0	45	7	0	45	7	0
Conflicting Pkts, #/h	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	-	-	-	-	-	-	-	-	-
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh In Median Storage, #	0	-	-	-	-	0	0	-	-	-	-	-
Grade, %	0	-	-	-	-	0	0	-	-	-	-	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Heavy Flow	25	3	0	49	8	0	49	8	0	49	8	0
Major Minor	Major	Minor	Major	Minor	Major	Minor	Major	Minor	Major	Minor	Major	Minor
Conflicting Flow All	0	0	28	0	76	27	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hwy	-	-	4.12	-	6.42	6.22	-	-	-	-	-	-
Critical Hwy Sig 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hwy Sig 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hwy	-	-	2.218	-	3.518	3.318	-	-	-	-	-	-
Pot Cap-1 Maneuver	-	-	1585	-	927	1048	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Any Cap-1 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Any Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Approach	EB	WB	WB	WB	WB	WB	WB	WB	WB	WB	WB	WB
HCM Control Delay, s	0	0	0	0	8.9	8.9	-	-	-	-	-	-
HCM LOS	A	A	A	A	A	A	-	-	-	-	-	-
Minor Lane Major Mov	EB	WB	WB	WB	WB	WB	WB	WB	WB	WB	WB	WB
Capacity (veh/h)	927	-	-	-	-	-	-	-	-	-	-	-
HCM Lane V/C Ratio	0.008	-	-	-	-	-	-	-	-	-	-	-
HCM Control Delay (s)	8.9	-	-	-	-	-	-	-	-	-	-	-
HCM Lane LOS	A	-	-	-	-	-	-	-	-	-	-	-
HCM 85th Pkts Q(veh)	0	-	-	-	-	-	-	-	-	-	-	-

Lanes, Volumes, Timings 3: Old Highway 24 & Site Driveway B 2032 Total AM Peak Hour 210475

Lane Group	WB	WBRT	NBT	NBR	SBL	SBR
Lane Configurations	9	5	233	2	1	205
Traffic Volume (vph)	9	5	233	2	1	205
Future Volume (vph)	1900	1900	1900	1900	1900	1900
Peak Flow (vphpl)	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.955	0.969				
FL Protected	0.968					
Right Flow (vph)	1722	0	1861	0	0	1863
FL Permitted	0.968					
Left Flow (vph)	1722	0	1861	0	0	1863
Link Speed (mph)	50		60			60
Link Distance (mi)	78.5		81.5			130.9
Travel Time (s)	5.7		4.9			8.4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	5	253	2	1	321
Shared Lane Traffic (%)						
Lane Group Flow (vph)	15	0	255	0	0	322
Enter blocked intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Right	Left	Left
Median Width (m)	3.5		0.0			0.0
Link Offset (m)	0.0		0.0			0.0
Crosswalk Width (m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	25	15	15	15	25	25
Sign Control	Stop	Free	Free	Free	Free	Free
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 26.3%	ICU Level of Service A					
Analysis Period (min) 15						

HCM 6th TWSC 3: Old Highway 24 & Site Driveway B 2032 Total AM Peak Hour 210475

Intersection						
Int Delay, s/vch	0.3					
Approach	WB	WBRT	NBT	NBR	SBL	SBR
Lane Configurations	9	5	233	2	1	205
Future Volume (vph)	1900	1900	1900	1900	1900	1900
Peak Flow (vphpl)	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.955	0.969				
FL Protected	0.968					
Right Flow (vph)	1722	0	1861	0	0	1863
FL Permitted	0.968					
Left Flow (vph)	1722	0	1861	0	0	1863
Link Speed (mph)	50		60			60
Link Distance (mi)	78.5		81.5			130.9
Travel Time (s)	5.7		4.9			8.4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	5	253	2	1	321
Shared Lane Traffic (%)						
Lane Group Flow (vph)	15	0	255	0	0	322
Enter blocked intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Right	Left	Left
Median Width (m)	3.5		0.0			0.0
Link Offset (m)	0.0		0.0			0.0
Crosswalk Width (m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	25	15	15	15	25	25
Sign Control	Stop	Free	Free	Free	Free	Free
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 26.3%	ICU Level of Service A					
Analysis Period (min) 15						

Lanes, Volumes, Timings

Lanes, Volumes, Timings
Old Highway 24 & Lam Boulevard

2032 Total PM Peak Hour
210475

210475

Lane Group	WBT	WBT	NBT	NBT	SBT	SBT
Lane Configurations	FT	15	360	28	32	273
Traffic Volume (vph)	16	15	360	28	32	273
Future Volume (vph)	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.934	0.990				
Red Blk Factor	0.975					
Flt	0.975					
Flt Protected	1730	0	1746	0	0	1857
Satd. Flow (prot)	0.975					
Flt Permitted	1730	0	1746	0	0	1857
Satd. Flow (perm)	50	50				60
Link Speed (k/h)	80.0	120.8				121.7
Link Distance (m)	5.8	7.2				7.3
Travel Time (s)			1			1
Confl. Pcds. (#/hr)	0.04	0.04	0.04	0.04	0.04	0.04
Peak Hour Factor	0%	0%	8%	4%	0%	2%
Heavy Vehicles (%)	19	18	429	33	38	325
Adj. Flow (vph)						
Shared Lane Traffic (%)						
Lane Group Flow (vph)	37	0	462	0	0	363
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0		0.0	0.0
Link Offset(m)	0.0	0.0	0.0	0.0	0.0	0.0
Crosswalk Width(m)	4.8		4.8		4.8	4.8
Two way Left Turn Lane	1.00	1.00	1.00	1.00	1.00	1.00
Headway Factor	25	15		15	25	
Turning Speed (k/h)	Stop	Free		Free		Free
Sign Control						
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	90.1%					
Analysis Period (min)	15					
ICU Level of Service A						

Paradigm Transportation Solutions Limited

Synchro 10 Report

HCM 6th TWSC

HCM 6th TWSC
1: Old Highway 24 & Lam Boulevard

20475 2032 Total PM Peak Hour

210475

	WEL	WER	NST	NBR	SBL	SRT
Lane Configurations	W		R			T
Traffic Vol. veh/h	16	15	360	28	32	273
Future Vol. veh/h	16	15	360	28	32	273
Conflicting Peds. #/hr	0	0	0	1	1	0
Stop Control	-	None	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	0	0	8	4	0	2
Avgd Flow	19	18	429	33	38	325

	Major T	Minor T	Major T	Minor T
Conflicting Flow All	848	447	0	463
Stage 1	447	-	-	-
Stage 2	401	-	-	-
Critical Hwy	6.4	6.2	-	4.1
Critical Hwy Spt 1	5.4	-	-	-
Critical Hwy Spt 2	5.4	-	-	-
Follow-up Hwy	3.5	3.3	-	2.2
Pot Cap-1 Maneuver	334	616	-	1109
Stage 1	649	-	-	-
Stage 2	681	-	-	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	320	615	-	1109
Mov Cap-2 Maneuver	320	-	-	-
Stage 1	648	-	-	-
Stage 2	652	-	-	-

	WB	NB	SB
Approach	WB	NB	SB
HCM Control Delay, s	14.5	0	0.9
HCM LOS	B		

	Minor Lane	Major Lane	NBT	NRW	PLT	SBL	SRT
Capacity (veh/h)	-	-	417	1109	-	-	-
HCM Lane V/C Ratio	-	-	0.889	0.034	-	-	-
HCM Control Delay (s)	-	-	14.5	0.4	0	-	-
HCM Lane LOS	-	-	B	A	A	-	-
HCM g/s/c v/s/c O/Veh/1	-	-	0.3	0.1	-	-	-

Lanes, Volumes, Timings
2: Site Driveway A & Lam Boulevard

2032 Total PM Peak Hour
210475

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	1			4	W	
Traffic Volume (vph)	53	7	0	26	5	0
Future Volume (vph)	53	7	0	26	5	0
Base Flow (vph)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
FI	0.944					
FI Protected					0.950	
Satd. Flow (vph)	1833	0	0	1863	1770	0
FI Permitted					0.950	
Satd. Flow (vph)	1833	0	0	1863	1770	0
Link Speed (kph)	50			50	50	
Link Distance (m)	80.0			96.7	100.7	
Travel Time (s)	5.8			7.0	7.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	8	0	28	5	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	58	0	0	28	5	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Right	Right
Median Width (m)	0.0	0.0	0.0	0.0	3.6	
Link Offset (m)	0.0			0.0	0.0	
Crosswalk Width (m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (kph)	15	25	25	25	25	15
Sign Control	Free	Free	Free	Free	Stop	Stop
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.3%					
Analysis Period (min)	15					
ICU Level of Service A						

HCM 6th TWSC
2: Site Driveway A & Lam Boulevard

2032 Total PM Peak Hour
210475

Intersection	0.5					
Int Delay, s/vch						
Approach	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	53	7	0	26	5	0
Traffic Vol, vch	53	7	0	26	5	0
Future Vol, vch	53	7	0	26	5	0
Conflicting Vch, vch	0	0	0	0	0	0
Spn Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	-	-	-	-
Storage Length	-	-	-	-	-	-
Vch in Median Storage	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mutual Flow	58	8	0	28	5	0
Phase 1	Major 1	Major 2	Minor 1	Minor 2	Minor 3	Minor 4
Conflicting Flow All	0	0	56	0	90	62
Stage 1	-	-	-	-	82	-
Stage 2	-	-	-	-	28	-
Critical Hwy	-	-	-	-	542	622
Critical Hwy Slg 1	-	-	-	-	542	-
Critical Hwy Slg 2	-	-	-	-	542	-
Follow-up Hwy	-	-	-	-	3.18	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	905	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
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Platoon blocked, %	-	-	-	-	995	-
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Platoon blocked, %	-	-	-	-	995	-
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Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
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Platoon blocked, %	-	-	-	-	910	1003
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Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
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Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
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Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
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Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
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Platoon blocked, %	-	-	-	-	961	-
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Platoon blocked, %	-	-	-	-	910	1003
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Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003
Platoon blocked, %	-	-	-	-	910	-
Platoon blocked, %	-	-	-	-	961	-
Platoon blocked, %	-	-	-	-	995	-
Platoon blocked, %	-	-	-	-	910	1003

Lanes, Volumes, Timings	2032 Total PM Peak Hour
3: Old Highway 24 & Site Driveway B	210475

2032 Total PM Peak Hour
210475

Lane Group	WBL	NBR	NBR	SBL	SBL
Lane Configurations	5	3	10	5	287
Traffic Volume (vph)	389	10	5	287	
Future Traffic Volume (vph)	389	10	5	287	
Ideal Flow (veh/hl)	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00
Ft	0.949	0.957			
Pk Protected	0.970				0.999
Satd. Flow (prot)	1715	0	1857	0	1861
Pk Permitted	0.970				0.999
Satd. Flow (perm)	1715	0	1857	0	1861
Link Speed (km/h)	50	60			60
Link Distance (m)	79.8	100.7			120.8
Travel Time (s)	5.7	6.0			7.2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	3	423	11	5
Shared Lane Traffic (%)					
Lane Group Flow (vph)	8	0	434	0	317
Enter Blocked Intersection	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left
Median Width(m)	3.6	0.0	0.0	0.0	0.0
Link Offset(m)	0.0	0.0	0.0	0.0	0.0
Crosswalk Width(m)	4.8	4.8			4.8
Two way Left Turn Lane Headway Factor	1.00	1.00	1.00	1.00	1.00
Turning Speed (km/h)	25	15	15	25	
Sign Control	Stop	Free	Free	Free	Free
Intersection Summary					
Area Type:	Other				
Control type:	Unsignalized				
Intersection Capacity Utilization	31.1%				
Analysis Period (min)	15				
ICU Level of Service A					

HCM 6th TWSC
3: Old Highway 24 & Site Driveway B

2032 Total PM Peak Hour
210475

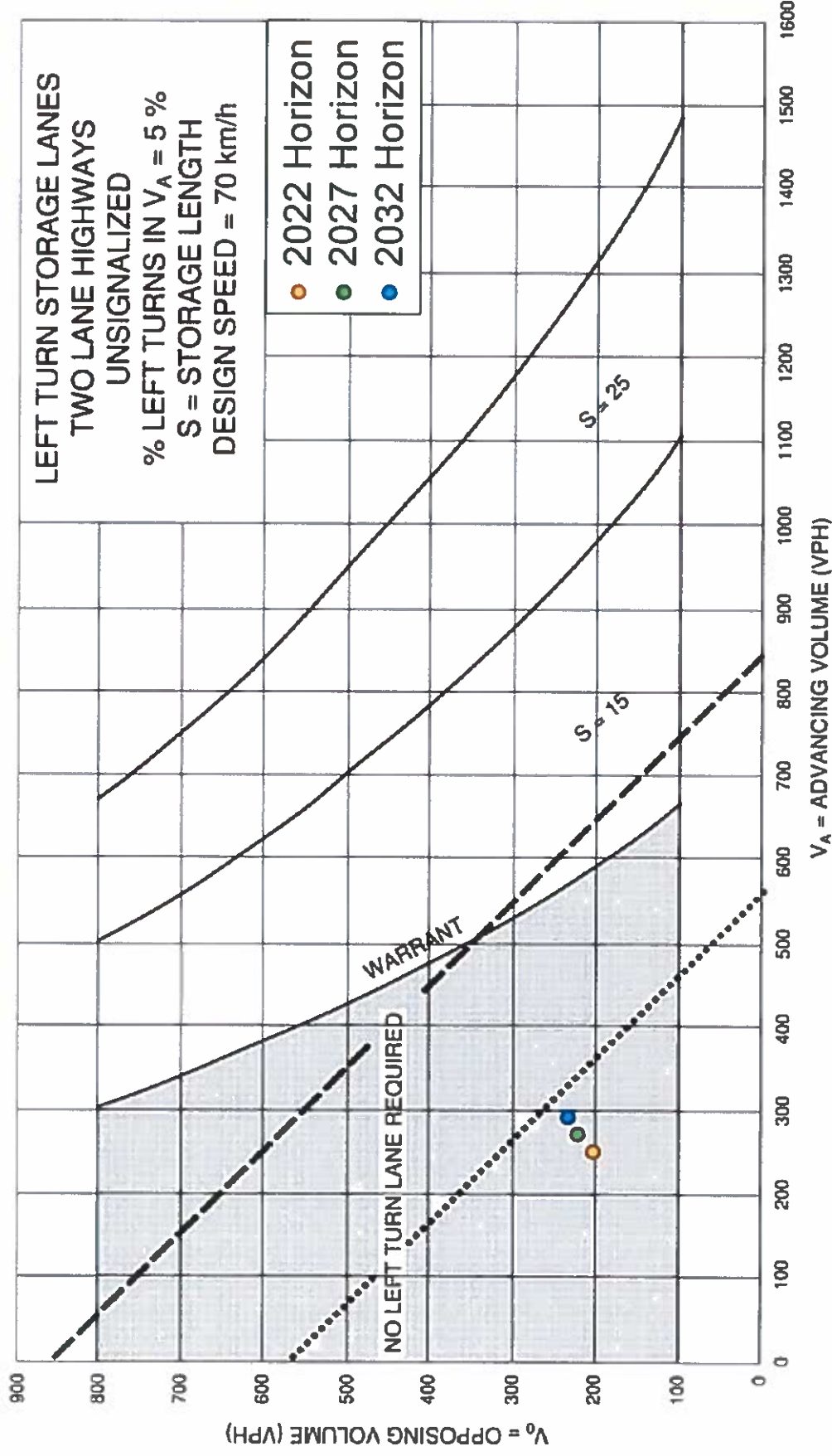
Intersection													
In Delay, s/veh													
Approach	W	W	W	W	N	N	S	S	E	E	S	S	E
Lane Configurations	W	W	W	W	N	N	S	S	E	E	S	S	E
Traffic Vol, veh/h	5	3	389	10	5	287							
Future Vol, veh/h	5	3	389	10	5	287							
Conflicting Peds, #/hr	0	0	0	0	0	0							
Sign Control	Stop	Stop	Free	Free	Free	Free							
RT Channelized	-	None	-	None	-	None							
Storage Length	0	-	-	-	-	-							
Vehicle in Median Storage, #	0	-	0	-	0	-							
Grade, %	0	-	0	-	0	-							
Peak Hour Factor	92	92	92	92	92	92							
Heavy Vehicles, %	2	2	2	2	2	2							
Minor Flow	5	3	423	11	5	312							
Major-Minor													
Minor Flow	751	429	0	0	434	0							
Stage 1	429	-	-	-	-	-							
Stage 2	322	-	-	-	-	-							
Critical Heavy	6.42	6.22	-	-	4.12	-							
Critical Heavy Sig 1	5.42	-	-	-	-	-							
Critical Heavy Sig 2	5.42	-	-	-	-	-							
Follow-up Heavy	3.518	3.318	-	-	2.218	-							
Pot Cap-1 Maneuver	378	626	-	-	1126	-							
Stage 1	657	-	-	-	-	-							
Stage 2	735	-	-	-	-	-							
Platoon blocked, %	-	-	-	-	-	-							
Major Cap-1 Maneuver	376	626	-	-	1126	-							
Major Cap-2 Maneuver	376	-	-	-	-	-							
Stage 1	657	-	-	-	-	-							
Stage 2	731	-	-	-	-	-							
Approach													
W	W	N	N	S	S	E							
FCM Control Delay, s	13.3	0	0	0.1									
HCM LOS	B												
Minor Lane-Major Minor													
Minor Lane	-	-	NBT	NBT	NBT	S							
Capacity (veh/h)	-	-	442	1126	-	-							
HCM Lane V/C Ratio	-	-	0.02	0.005	-	-							
HCM Control Delay (s)	-	-	13.3	0.2	0	-							
HCM Lane LOS	-	-	B	A	A	-							
HCM 95th %ile Delay	-	-	0.1	0	-	-							

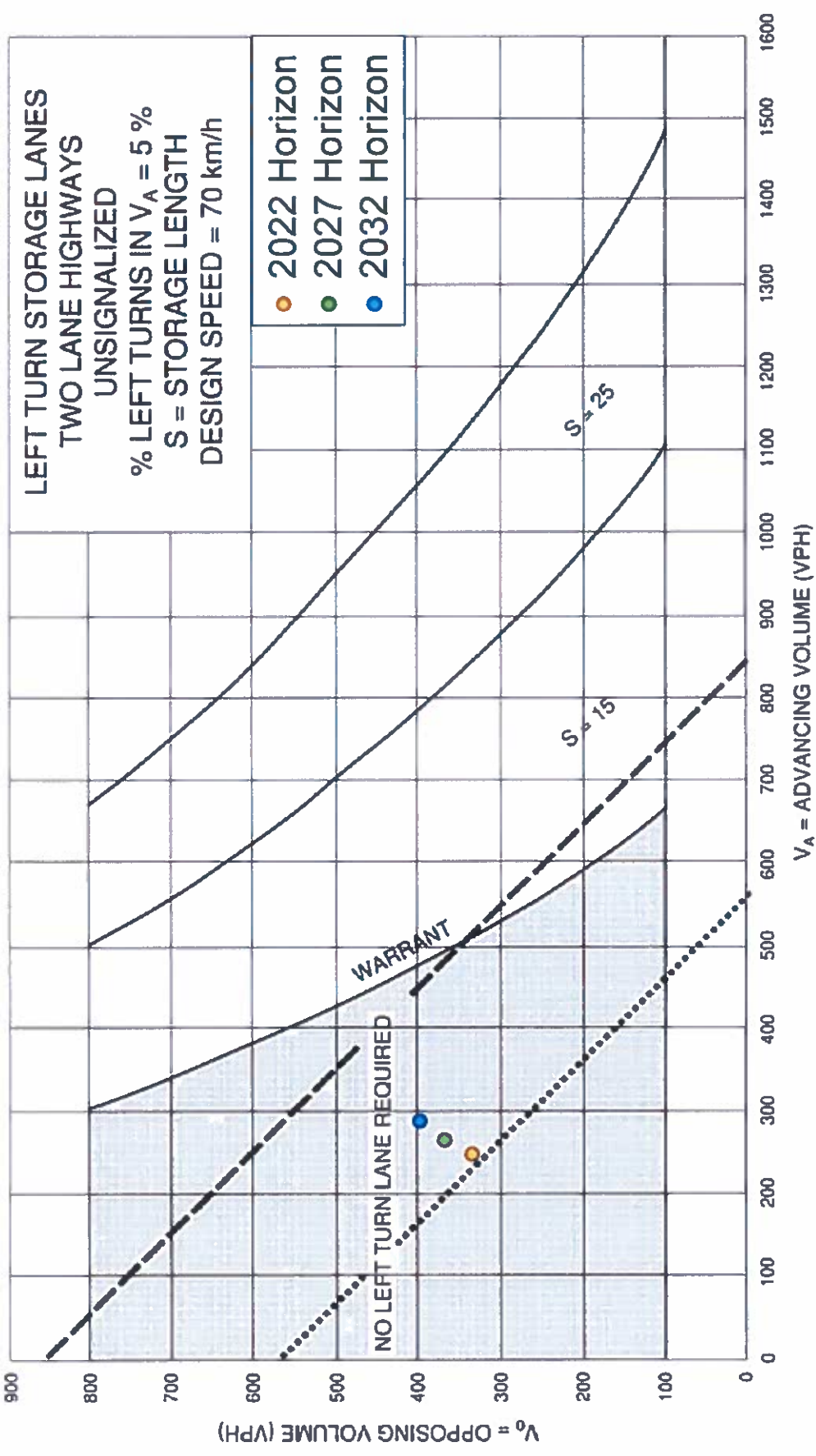
Appendix J

Left-Turn Lane Warrants



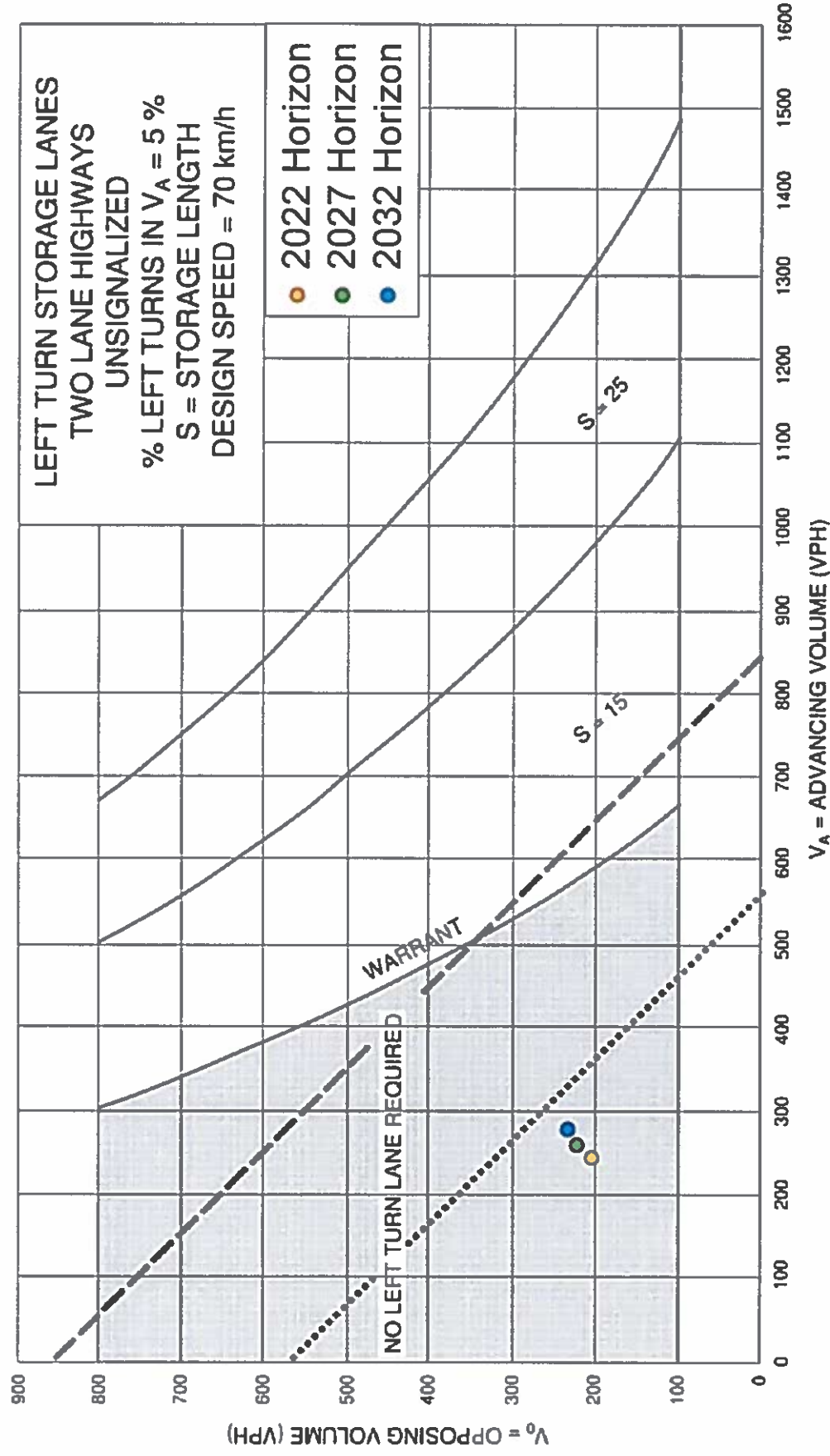




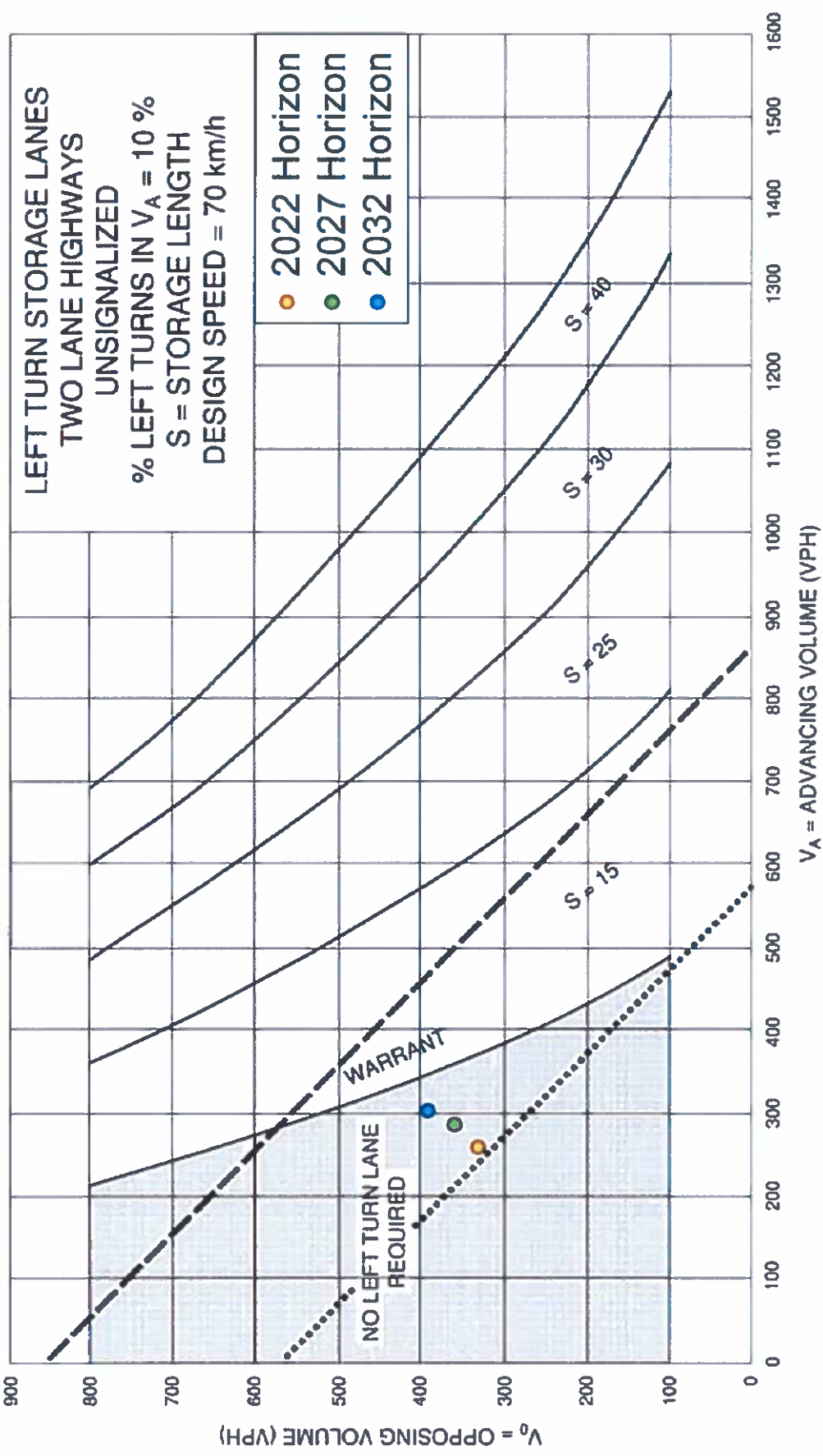


Location: Old Highway 24 & Site Driveway B
Direction: Southbound Left-Turn Lane
Horizon Year: Total Traffic Scenario – PM Peak Hour





Location: Old Highway 24 & Lam Boulevard
Direction: Southbound Left-Turn Lane
Horizon Year: Total Traffic Scenario – AM Peak Hour



Location: Old Highway 24 & Lam Boulevard
Direction: Southbound Left-Turn Lane
Horizon Year: Total Traffic Scenario – PM Peak Hour





**D-6 COMPATIBILITY and NOISE ASSESSMENT
Orchard Square - Old Hwy 24 and Lam Blvd,
Waterford ON**

December 9, 2021 RV1

Prepared for:

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Project 872

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ATTACHMENTS

Attachment A:	Site Location and Zoning Figures
Attachment B:	Proposed Development Layout Drawing
Attachment C:	D6 Industrial Categorization Criteria
Attachment D:	Separation and Influence Zone Figures
Attachment E:	CadnaA Noise Output and Noise Calculation Tables
Attachment F:	STAMSON Noise Calculations and Outputs

EXECUTIVE SUMMARY

CCS Engineering Inc. (CCS) was retained by Orchard Square (Tom O'Hara) to prepare a D-6 Land Use Compatibility Assessment for the proposed development located south of Lam Blvd and East of Old Hwy 24, also known as block 61 PLAN 37M57 BLK 61, in Waterford ON.

The assessment was conducted in accordance with the "Compatibility between Industrial Facilities and Sensitive Land Uses", published by the Ontario Ministry of the Environment Conservation and Parks (MOECP) as Guideline D-6 (D-6 Guideline).

The assessment addresses Pre-Consultation Meeting Minutes dated March 30, 2021, specifically the Planning Department Summary Industrial Activities and D-6 Guidelines.

The proposed development is situated outside of the existing class II industrial potential influence area (300 m) and based on the Guideline D-6 – Land Use Compatibility review for the surrounding industrial and commercial operations, they are not expected to adversely impact the Orchard Square proposed development with noise, dust or odour emissions.

Noise impact predictions from surrounding commercial operations and road traffic noise indicate that road traffic is the dominant noise source during the day, evening and nighttime periods.

Conservative road traffic volume and vehicle type distribution modelled in STAMSON predicts noise impacts at the three storey townhouse units on the west side of the proposed development along Old Highway 24 and at the single storey townhouse units in the southwest corner of the proposed development. Additional measures will be incorporated into the development and construction of the units to mitigate potential road traffic noise impacts including fencing on the southwest portion, triple pane windows for all units and air conditioning for all of the townhouses.

Noise mitigation measures to be incorporated exceed the requirements to mitigate potential road traffic noise from Old Highway 24.

1.0 INTRODUCTION

CCS Engineering Inc. (CCS) was retained by Orchard Square (Tom O'Hara) to prepare a D-6 Land Use Compatibility Assessment for the proposed development located south of Lam Blvd and East of Old Hwy 24, also known as block 61 PLAN 37M57 BLK 61, in Waterford ON.

The purpose of this assessment is to determine if noise, odour, vibration or dust emissions from surrounding sources might adversely impact the proposed townhouse development sensitive land uses.

The assessment was conducted in accordance with the "Compatibility between Industrial Facilities and Sensitive Land Uses", published by the Ontario Ministry of the Environment Conservation and Parks (MOECP) as Guideline D-6 (D-6 Guideline).

The assessment addresses Pre-Consultation Meeting Minutes dated March 30, 2021, specifically the Planning Department Summary Industrial Activities and D-6 Guidelines.

This report describes the surrounding industrial and commercial facilities, focusing on the nearest neighbouring businesses and industries to the proposed development as having the highest potential to cause an adverse impact. Other surrounding facilities within approximately one kilometer diameter have also been identified and reviewed.

The proposed development is situated outside of the existing class II industrial potential influence area (300 m) and based on the Guideline D-6 – Land Use Compatibility review for the surrounding industrial and commercial operations, they are not expected to adversely impact the Orchard Square proposed development with noise, dust or odour emissions.

2.0 SITE AND NEIGHBOURHOOD DESCRIPTION

The proposed townhouse development, named Orchard Square, is on property south of Lam Blvd and East of Old Hwy 24, also known as block 61 PLAN 37M57 BLK 61, in Waterford ON. A satellite site location (Figure 1) and Norfolk zoning map (Figure 2) given in Attachment A show the site location.

The proposed development located is zoned commercial and residential. The proposed development is immediately surrounded by Old Highway 24 to the west, industrial zoned vacant land to the west, industrial zoned land with a commercial truck repair operation (Waterford Truck and Trailer (WTT)) to the west, commercial zoned vacant land the north, residential land to the east, open space land to the west (Yin storm water pond), and agricultural and residential zoned properties to the east and south. The Old Highway 24 is bordered by commercial and residential properties in the area of the proposed development.

Attachment B provides the proposed development layout drawing.

2.1 GUIDELINE D-6 LAND USE COMPATIBILITY

Guideline D-6 – Land Use Compatibility deals with the compatibility between industrial uses and sensitive uses by classification of the industry and identifying an area of influence and establishing recommended minimum setback distances between the industrial operations and sensitive land uses.

D-6 indicates that sensitive land uses can include the following:

- recreational uses which are deemed by the municipality or provincial agency to be sensitive; and/or
- any building or associated amenity area (i.e., may be indoor or outdoor space) which is not directly associated with the industrial use, where humans or the natural environment may be adversely affected by emissions generated by the operation of a nearby industrial facility. For example, the building or amenity area may be associated with residences, senior citizen homes, schools, day care facilities, hospitals, churches and other similar institutional uses, or campgrounds.

The D-6 Industrial Categorization Criteria is summarized in Attachment C. There are three industrial classes:

- Class 1 = light industrial,
- Class 2 = medium industrial and
- Class 3 = heavy industry

The general descriptions of each class are given below:

Class I Industrial Facility – Light Industrial

A place of business for a small scale, self contained plant or building which produces/stores a product which is contained in a package and has low probability of fugitive emissions. Outputs are infrequent and could be point source or fugitive emissions for any of the following: noise, odour, dust and/or vibration. There are daytime operations only, with infrequent movement of products and/or heavy trucks and no outside storage.

Class II Industrial Facility – Medium Industrial

A place of business for medium scale processing and manufacturing with outdoor storage of wastes or materials (i.e., it has an open process) and/or there are periodic outputs of minor annoyance. There are occasional outputs of either point source or fugitive emissions for any of the following: noise, odour, dust and/or vibration, and low probability of fugitive emissions. Shift operations are permitted and there is frequent movement of products and/or heavy trucks during daytime hours.

Class III Industrial Facility – Heavy Industrial

A place of business for large scale manufacturing or processing, characterized by large physical size, outside storage of raw and finished products, large production volumes and continuous movement of products and employees during daily shift operations. It has frequent outputs of major annoyance and there is high probability of fugitive emissions.

The Ministry has identified in the D-6 guideline potential influence areas - areas within which adverse effects may be experienced. The D-6 guideline also outlines recommended minimum separation distances where no development ideally should occur. The D-6 guideline suggests that distances typically be measured between property lines but can also be measured from a specific source to sensitive receptor. These distances are summarized in the table below.

Industry Classification	Recommended Min Separation Distance (m)	Potential Influence Area (m)
Class I – Light Industrial	20	70
Class II – Medium Industrial	70	300
Class III – Heavy Industrial	300	1000

3.0 INDUSTRY CLASSIFICATION AND SURROUNDING LAND USES

The neighbouring properties to the north are zoned service commercial and are not considered to adversely impact the proposed the development. These properties include vacant land, food establishments, banking, grocery, drugstore, and gas station.

Neighbouring properties to the northwest are zoned industrial. Actual industrial operations to the northwest are over 300 m from the proposed development and are not considered to adversely impact the proposed development.

Industrial Facilities

The nearest industrial facility is Norfolk Disposal, a waste transfer station, located over 300 m north west of the proposed development Old Highway 24. Norfolk Disposal is located across from the grocery and gas station on Hwy 24. This class II – medium industrial operation is not considered to adversely impact the proposed development for noise, odour or dust since it is located outside the potential recommended separation distance of 70 m and located out of the potential influence are of 300 m for a medium industrial facility.

Commercial Facilities

Waterford Truck and Trailer (WTT), a commercial truck repair shop, is located to the west of the proposed development on industrial zoned land. It is not an industrial operation.

Continental Carriers, as referenced in the Pre-Consultation Meeting Minutes dated March 30, 2021, does not exist at this location. This company does not exist.

WTT could conservatively be considered a Class I industrial facility (but it is a commercial facility). Measuring property line to property line (WTT to proposed development) is just over 20 m and comprised of mainly Old Highway 24. The proposed development buildings would be located at the 70 m influence zone (based on a Class I Industrial facility) or further away, measured from the WTT shop trailer bay. Layout drawings with separation distances are attached. Typical operations associated with truck servicing repair could result in intermittent noise emissions from power tools or equipment and idling or operation of a vehicle. These activities and associated noise levels are not considered significant at the proposed development. WTT is not considered significant sources of odour or dust. WTT is not expected to adversely impact the proposed development from dust, noise or odour emissions.

Picard Peanuts, a commercial retail and food preparation operation, is located approximately 240 north west of the proposed development. It is located across Old Highway 24 from the

grocery and gas station. This commercial operation could conservatively be considered a Class I industrial facility and is not considered to adversely impact the proposed development for noise, odour or dust, since it is located outside the potential recommended separation distance of 20 m and potential influence are of 70 m for a light industrial facility.

Since the proposed development is near Old Highway 24, road traffic that contributes to the general ambient background sound level is higher than noise intermittently generated from the WTT truck repair shop or other nearby commercial operations.

No other industrial or commercial operations or infrastructure supporting utilities were identified to potentially have an adverse impact on the proposed development.

Figures showing separation distances and influence zones are given in Attachment D.

4.0 NOISE IMPACT ASSESSMENT

4.1 INDUSTRIAL NOISE IMPACTS

NPC 300 is the Environmental Noise Guideline for Stationary and Transportation Sources - Approval and Planning outlining the proper control of sources of noise emissions to the environment. The Ministry of the Environment, Conservation and Parks (MOECP) ensures sources of emissions to the environment are adequately controlled to prevent potential negative effects.

In the province of Ontario, contaminants released by local industrial, and some commercial facilities are regulated by the MOECP under the Environmental Protection Act. Other Acts including the Planning Act, Municipal Act, etc. establish rules that may require assessment of the effects of noise emissions. The definition of "contaminant" includes sound. The industrial facilities are required to meet NPC 300 guidelines that may apply to limit exposure to noise and vibration that can affect human health and the environment.

The MOECP provides guides and resources to conduct noise and sound level assessments in support of an ECA/EASR. <https://www.ontario.ca/page/noise-and-sound-level-assessments-sample-applications-guides-and-resources>

The applicable noise limit at the sensitive point of reception is the higher of the existing ambient sound level from road traffic/existing approved industry (background sound level) or the exclusion limit outlined in the NPC 300 guideline.

MOECP NPC 300 provides various definitions for noise sensitive buildings and uses:

"Noise sensitive commercial purpose building"

means a building used for a commercial purpose that includes one or more habitable rooms used as sleeping facilities such as a hotel and a motel.

"Noise sensitive institutional purpose building"

means a building used for an institutional purpose, including an educational facility, a day nursery, a hospital, a health care facility, a shelter for emergency housing, a community centre, a place of worship and a detention centre. *A place of worship located in commercially or industrially zoned lands is not considered a noise sensitive institutional purpose building.*

"Noise sensitive land use" means:

- a property of a person that accommodates a dwelling and includes a legal nonconforming residential use; or
- a property of a person that accommodates a building used for a noise sensitive commercial purpose; or

- a property of a person that accommodates a building used for a noise sensitive institutional purpose.

"Noise sensitive space"

means the living and sleeping quarters of dwellings and sleeping quarters of noise sensitive commercial or institutional land uses. Examples include, but are not limited to bedrooms, sleeping quarters such as patient rooms, living/dining rooms, eat-in kitchens, dens, lounges, classrooms, therapy or treatment rooms, assembly spaces for worship, sleeping quarters of detention centres.

The Norfolk Waste industrial operation is located approximately 305 m (property line to property line), and approximately 320 m (nearest Norfolk Waste building to proposed development property line) from the proposed development. This class II – medium industrial operation is not considered to adversely impact the proposed development for noise, odour or dust since it is located outside the potential influence area.

No sources of vibration were identified around proposed development.

4.2 COMMERCIAL NOISE IMPACTS

Waterford Truck and Trailer (WTT) noise emission impacts were estimated using CadnaA noise modelling software assuming the following noise sources and characteristics.

Table 1: Sound Source Overview

Source ID	Description	Expected Operating Period	Sound Sequence
TR-WTT	WTT truck route	Daytime, Evening, 6 d/wk, 50 wks/yr	1 truck per hour along route
BD-WTT	Open Bay door - truck idling	Daytime, Evening, 6 d/wk, 50 wks/yr	10 min/hr idling

Table 2: Noise Source Summary Table

Source ID	Source Description	Sound Power Level (dBA)	Source Location ¹	Sound Characteristics ²	Noise Control Measures ³
TR-WTT	WTT truck route	105	O	S	U
BD-WTT	Open Bay door - truck idling	105	O	S	U

O- source location outside, S – steady, U – uncontrolled.

The sound sequences of the potentially significant noise sources at WTT are intermittent based on operating times, potentially occurring during daytime or evening 5 days per week.

The sound level estimates are conservative estimates associated with a transport or heavy truck idling or driving in the yard. The modelling assumes that a transport truck is idling at the building bay door and that a transport truck is driving around the WTT site.

Points of reception (POR) at the proposed development include the first, second, and third floor façade on the closest 3 storey townhouse, and the first floor façade on the closest 1 storey townhouse.

These noise sources and PORS are shown in Attachment E Figure 1 – Noise Impact Contours. This graphic shows the noise sources - transport truck route from Old Highway 24 to the back of the WTT building (yellow/green line), and the idling truck at the bay door (yellow/green plus sign).

Point of Reception noise impact summary tables are attached as Table 3a.

For the purpose of this assessment the area surrounding the proposed development is defined as a Class 2 area subject to NPC-300 criteria. NPC-300 identifies sound level limits for stationary sources located in Class 2 areas as the lower of the existing One Hour Equivalent Sound Level (Leq) due to background, or the exclusionary limits identified for Class 2 areas. Plane of Window performance limits for a Class 2 area with steady state sources is 50 dBA during the daytime (7 am – 7 pm) and evening (7 pm – 11 pm). This is attached in Table 4.

Overall sound levels at each POR are outlined in Table 5 below. Results are from the worst case impacts operating scenario, where all significant sound sources operate continuously and simultaneously. The sound level calculated at each POR is compared to the daytime and evening performance criteria for the worst-case impact scenario assuming all significant sound sources are operating simultaneously, during their respective operating sequence.

Table 5: Acoustic Assessment Summary Table

Point of Reception ID	Point of Reception Description	Sound Pressure Level at POR	Verified by Acoustic Audit (Yes/No)	Performance Limit	Compliance with Performance Limit
		dBA (L _{eq})		dBA (L _{eq})	(Yes/No)
POR1_1st	3 Storey Townhouse - 1st Floor Façade	51	No	50 (day/eve)	No
		0	No	45 (night)	Yes
POR1_2nd	3 Storey Townhouse - 2nd Floor Façade	51	No	50 (day/eve)	No
		0	No	45 (night)	Yes
POR1_3rd	3 Storey Townhouse - 3rd Floor Façade	51	No	50 (day/eve)	No
		0	No	45 (night)	Yes
POR2_1st	1 Storey Townhouse - 1st Floor Façade	51	No	50 (day/eve)	No
		0	No	45 (night)	Yes

These potential noise source activities and associated conservative noise levels at the points of reception on the proposed development are not considered significant.

Site review activities on March 22, 2021 indicated that noise associated with the WTT operation was not audible at the proposed development where the dominant noise impact was from vehicle traffic on Old Highway 24.

4.3 ROAD NOISE IMPACTS

Road noise limits for the proposed development sensitive land use are outlined in NPC-300. Limits for plane of window (POW) living areas were assessed. The POW receptors were the most sensitive locations in the development compared to outdoor living areas and therefore outdoor living areas were not assessed.

Road noise sound level limits for POW are 55 dBA for 7 am to 11 pm, and 50 dBA for 11 pm to 7 am. Road traffic volumes were obtained from Norfolk County Engineering for Old Highway 24.

Table 6 – Old Highway 24 Traffic Volumes

Year	AADT
2016	11,335
2015	8059
2014	7005

Traffic growth of 1.2% per year was estimated to 2022 and apportioned between trucks, medium vehicles and cars at day/evening and night time periods.

Table 7 – Traffic Volumes (inflated to 2022)

	%	Veh/hr	Day/Eve	Night
AADT (2022)	100%	12176	90%	10%
Cars	87%	10593	9534	1059
Medium Vehicles	5%	609	548	61
Heavy Trucks	8%	974	877	97

Table 7 suggests that traffic on Old Highway 24 would have on average 55 heavy trucks per hour over a 16 hour period or 97 heavy trucks over an 8 hour period.

From observation during a site visit on March 22, 2021, heavy truck traffic during the morning time period was approximately 10 heavy trucks per hour maximum. For example, between 10 am and 1030 am no (0) Norfolk Waste trucks drove past the proposed development.

We suspect that the road traffic data is associated with traffic counts north of the proposed development – along Old Highway 24 near Thompson Road – where much more truck and car traffic occurs as a result of the commercial (grocery, bank, gas station, Tim Hortons) and industry (Norfolk Waste, Lafarge), most of which does drive south on Old Highway 24 but drives north up through town or along Thompson Road.

Points of Reception (POR) at the proposed development were the following point of window facades:

- PORA - 3 storey townhouse – 1st storey façade
- PORA - 3 storey townhouse - 3rd storey – most exposed facade
- POR B -1 storey townhouse – 1st storey – most exposed façade west side facing Old Hwy 24
- POR C -1 storey townhouse – 1st storey – south facade
- POR D -1 storey townhouse – 1st storey – south facade
- POR E -1 storey townhouse – 1st storey – south facade

Noise traffic assessment calculations with graphical layouts showing distances, angles and PORs on the various impacted townhouse units are given in Attachment F.

The estimated road traffic noise impacts modelled in the STAMSON model using the conservative and inflated road traffic volumes at the various POR is summarized below.

Table 8 – Estimate Road Traffic Impacts

POR	Distance (road to façade)	Day/ Eve	Night
PORA - 3rd Storey	34	67	60
PORA - 1st Storey	34	66	60
PORB - 1st Storey	23	65	59
PORC - 1st Storey	34	59	52
PORD - 1st Storey	43	57	51
PORE - 1st Storey	60	55	48

STAMSON modelling outputs are given in Attachment F.

The STAMSON modelling predicts the plane of window during the day, evening and night time period for PORA, B, and C which are the western three storey units directly facing Old Highway 24, having noise impacts due to traffic in the range of 60 – 65 dBA. NPC 300 indicates that these housing units should be designed with a provision for the installation of central air conditioning. Warning clause C is recommended to be registered for these units.

STAMSON modelling predictions at the POW receptors are equivalent to actual traffic measurements made at the side of Old Hwy 24 on March 22, 2021 and are considered conservative (modelled results are greater than what was observed and measured on site).

5.0 CONCLUSIONS AND RECOMMENDATIONS

The proposed development is situated outside of the existing class II industrial potential influence area (300 m) and based on the Guideline D-6 – Land Use Compatibility review for the surrounding industrial and commercial operations, they are not expected to adversely impact the Orchard Square proposed development with noise, dust or odour emissions.

Proposed development units will be located outside the D-6 recommended 20 m separation distance from a class 1 industrial operation and 70 m influence area from a class 1 industrial operation. This conservatively assumes that the Waterford Truck and Trailer repair garage (a commercial operation) is an industrial class I facility (there is no production, there is no point source or fugitive emissions, there is no outdoor storage of products or raw materials).

There currently exists other sensitive land uses in much closer proximity to the various industrial and commercial operations along Old Highway 24 in the vicinity of the proposed development. Any potential new industrial operations on the vacant land along Old Highway 24 would necessarily have to address potential impacts at these sensitive receptor sites. The proposed development does not restrict the potential industrial development any more than the existing residential in the vicinity.

Noise impact predictions from surrounding commercial operations and road traffic noise indicate that road traffic is likely the dominant noise source during the day, evening and nighttime periods.

Conservative road traffic volume and vehicle type distribution modelled in STAMSON predicts noise impacts at the three storey townhouse units on the west side of the proposed development along Old Highway 24 and at the single storey townhouse units in the southwest corner of the proposed development be designed with a provision for the installation of central air conditioning.

Warning clause C is recommended to be registered for these units:

“This dwelling unit has been designed with the provision for adding central air conditioning at the occupant’s discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment, Conservation, and Parks (MOECP).”

All other locations of the proposed development except those fronting Old Highway 24 have predicted noise impacts below 55/50dBA during the day/night and do not require noise mitigation or warning clauses.

NPC 300 recommendations for noise mitigation at the most impacted proposed development units along Old Hwy 24 are installation of air conditioning. Additional recommendations to mitigate potential traffic noise impacts include:

- incorporation of triple pane windows for units facing Old Hwy 24, and
- installation of a noise barrier fence along the southwest portion of the proposed development one storey units to mitigate road traffic related noise in potential outdoor living areas (backyards of the one storey units in the south of the proposed development).

Discussions with Orchard Square (Tom Ohara) indicated that these measures will be incorporated into the development and construction of the units:

1. Fencing on the Southwest portion for noise control.
2. Triple Pane windows for all units.
3. Air Conditioning for all of these townhouses.

The incorporation of these additional mitigation measures will further reduce any potential or future potential noise impacts from Old Hwy 24 road traffic noise and exceed the requirements to mitigate potential road traffic noise.

Based on the assessment of the industrial and commercial land uses in the vicinity of the proposed development, review of the MOECP's D-6 guidelines, and review of Pre-Consultation Meeting Minutes dated March 30, 2021, there are no facilities that are expected to adversely impact the proposed development as a result of noise, odour or dust.

The proposed development is not expected to adversely impact the neighbouring land uses.

If you have any questions, please contact the undersigned.

Yours truly,
CCS Engineering Inc.



Jim Anderson, M.Eng., P.Eng.
Principal
JA/JA
Attachments

ATTACHMENT A

SITE LOCATION AND ZONING FIGURES

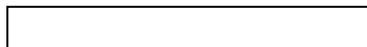


Orchard Square Townhouses
Proposed Development

Source: Google Earth, March 2021

Approximate Scale Metres

0



350



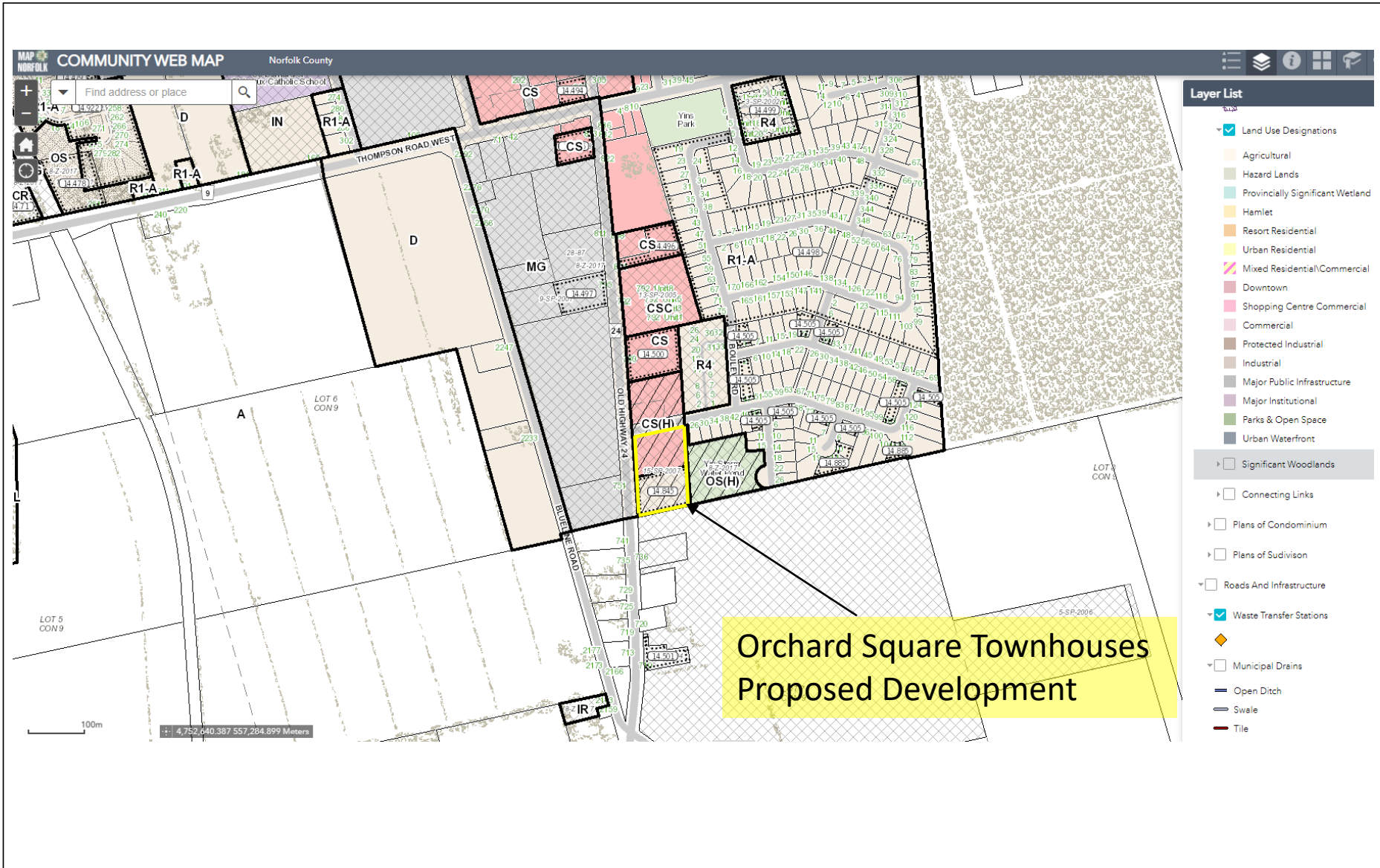
SITE LOCATION
Orchard Square
WATERFORD, ONTARIO

By: JA

Date: 15 May 2021

Project No. 872

Figure 1



Source: Map Norfolk

Approximate Scale Metres

0

300



ZONING
Orchard Square
WATERFORD, ONTARIO

By: JA

Date: 15 May 2021

Project No. 872

Figure 2

ATTACHMENT B

PROPOSED DEVELOPMENT LAYOUT DWG

ATTACHMENT C

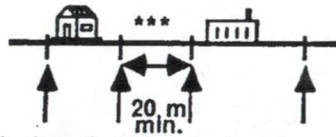
D-6-1 Industrial Categorization Criteria

SEPARATION DISTANCES

(Section View)

CLASS I INDUSTRIAL:

70 m. potential influence area

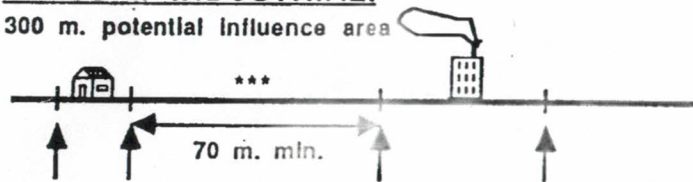


designation, zoning or property lines** of closest existing, committed or proposed Sensitive Land Use

designation, zoning or property lines* of closest existing, committed or proposed Class I Industrial Use

CLASS II INDUSTRIAL:

300 m. potential influence area

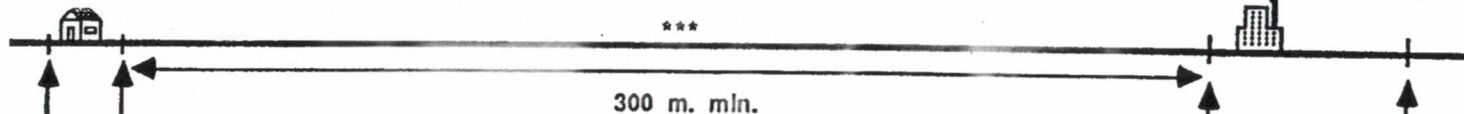


designation, zoning or property lines** of closest existing, committed or proposed Sensitive Land Use

designation, zoning or property lines* of closest existing, committed or proposed Class II Industrial Use

CLASS III INDUSTRIAL:

1000 m. potential influence area



designation, zoning or property lines** of closest existing, committed or proposed Sensitive Land Use

designation, zoning or property lines* of closest existing, committed or proposed Class III Industrial Use

* The set backs established in a zoning by-law can be included in the separation distance measurement if the by-law or site plan control precludes the use of the set back for activities that could create an adverse effect. [See Section 4.4.3, "Zoning/Site Plan Control (Industrial Land Uses)".]

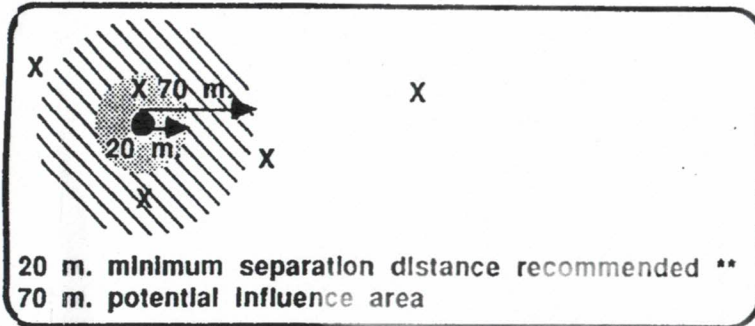
** Where the established use of on-site & ancillary lands associated with a sensitive land use are not of a sensitive nature (e.g. a parking lot or roadway), measurement may be taken to where the sensitive activities actually begin. [See Section 4.4.2, "Site Specific Plans & Section 4.4.4, "Ancillary Uses (Sensitive Land Use)".] This approach may be particularly appropriate for redevelopment/infill proposals. [See Section 4.10, "Redevelopment, Infilling"]

*** No Incompatible development should normally take place within the Recommended Minimum. [See Section 4.3, "Recommended Minimum", Section 4.10, "Redevelopment, Infilling & Mixed Use Areas" and Section 4.2.5, "Off-Site Separation Distances".]

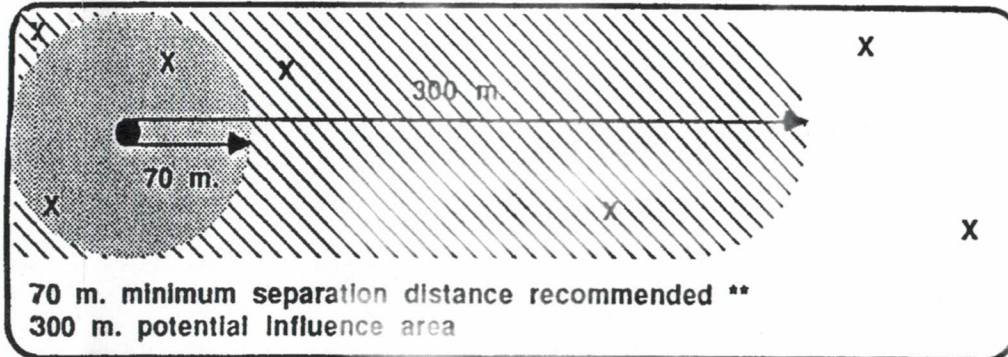
SEPARATION DISTANCES

CLASS I INDUSTRIAL:

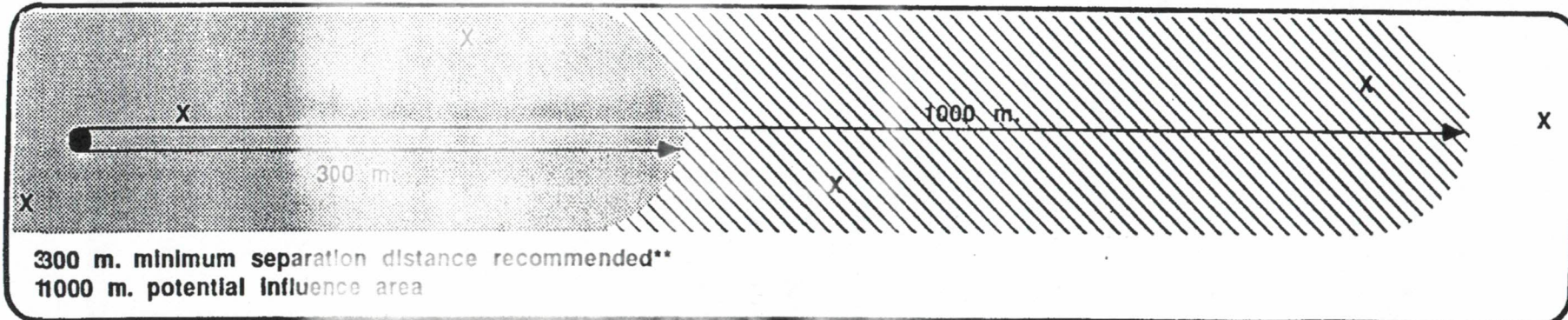
(PLAN VIEW)



CLASS II INDUSTRIAL:



CLASS III INDUSTRIAL:



Legend:

● Existing* Land Use

X Proposed* Land Uses

▨ Recommended Minimum - Incompatible Development should not normally be permitted. [See Section 4.3, "Recommended Minimums" and Section 4.10, "Redevelopment, Infilling", for exceptions.]

▤ Potential Influence Area or Actual Influence Area - "Adverse Effects" need to be identified, mitigation proposed, & an assessment made on the acceptability of the proposal. (See Section 4.1, "Influence Area Concept".)

□ Acceptable Range - Beyond the Potential Influence Area or Actual Influence Area, therefore normally development in this range should not pose a compatibility problem. (See also Section 4.5.2, "Separation Distance Greater than the Potential Influence Area" for exceptions.)

* Note: If the existing use is industrial, then the proposed use is sensitive, and vice versa.

** See Section 4.10, "Redevelopment, Infilling & Mixed Use Areas" for exceptions.

D-6-1 Industrial Categorization Criteria

A guide for land use planning authorities on the appropriate distances between industrial areas and sensitive land uses like people's homes and workplaces.

Industrial categorization criteria *					
Category	Outputs	Scale	Process	Operation /Intensity	Possible examples **
Class I	<ul style="list-style-type: none"> Noise: Sound not audible off property Dust and/or Odour: Infrequent and not intense Vibration: No ground borne vibration on plant property 	<ul style="list-style-type: none"> No outside storage Small scale plant or scale is irrelevant in relation to all other criteria for this Class 	<ul style="list-style-type: none"> Self contained plant or building which produces/stores a packaged product. Low probability of fugitive emissions 	<ul style="list-style-type: none"> Daytime operations only Infrequent movement of products and/or heavy trucks 	<ul style="list-style-type: none"> Electronics manufacturing and repair Furniture repair and refinishing Beverages bottling Auto parts supply Packaging and crafting services Distribution of dairy products Laundry and linen supply
Class II	<ul style="list-style-type: none"> Noise: Sound occasionally audible off property Dust and/or Odour: Frequent and occasionally intense Vibration: Possible ground borne vibration, but cannot be perceived off property 	<ul style="list-style-type: none"> Outside storage permitted Medium level of production allowed 	<ul style="list-style-type: none"> Open process Periodic outputs of minor annoyance Low probability of fugitive emissions 	<ul style="list-style-type: none"> Shift operations permitted Frequent movement of products and/or heavy trucks with the majority of movements during daytime hours 	<ul style="list-style-type: none"> Magazine printing Paint spray booths Metal command Electrical production manufacturing Manufacturing of dairy products Dry cleaning services Feed packing plant
Class III	<ul style="list-style-type: none"> Noise: sound frequently audible off property Dust and/or Odour: Persistent and/or intense Vibration: Ground-borne vibration can frequently be perceived off property 	<ul style="list-style-type: none"> Outside storage of raw and finished products Large production levels 	<ul style="list-style-type: none"> Open process Frequent outputs of major annoyances High probability of fugitive emissions 	<ul style="list-style-type: none"> Continuous movement of products and employees Daily shift operations permitted 	<ul style="list-style-type: none"> Manufacturing of paint and varnish Organic chemicals manufacturing Breweries Solvent recovery plants Soaps and detergent manufacturing Manufacturing of resins and costing

Industrial categorization criteria *				
Category	Outputs	Scale	Process	Operation /Intensity
				Possible examples **
				<ul style="list-style-type: none"> Metal manufacturing

Note: Emissions may be point source or fugitive.

* Note: This Table should not be considered a comprehensive list but is to be used to provide examples of industrial categories.

** Note: The following examples are not limited to the Class indicated on the Table. The categorization of a particular industry will vary with the specifics of the case.

Source: The criteria for categorizing industries into Class I, II or III are derived from Ministry experience and the investigation of complaints related to industrial facilities.

Updated: April 4, 2016
Published: February 26, 2016

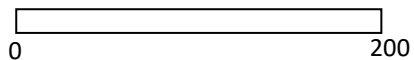
ATTACHMENT D

SEPARATION AND INFLUENCE ZONE FIGURES



Source: Google Earth, March 2021

Approximate Scale Metres



INDUSTRIAL CLASS SEPARATION
Orchard Square
WATERFORD, ONTARIO

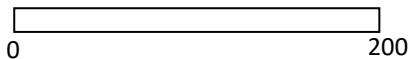
By: JA	Date: 15 May 2021	Project No. 872
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Figure 3



Source: Google Earth, March 2021

Approximate Scale Metres



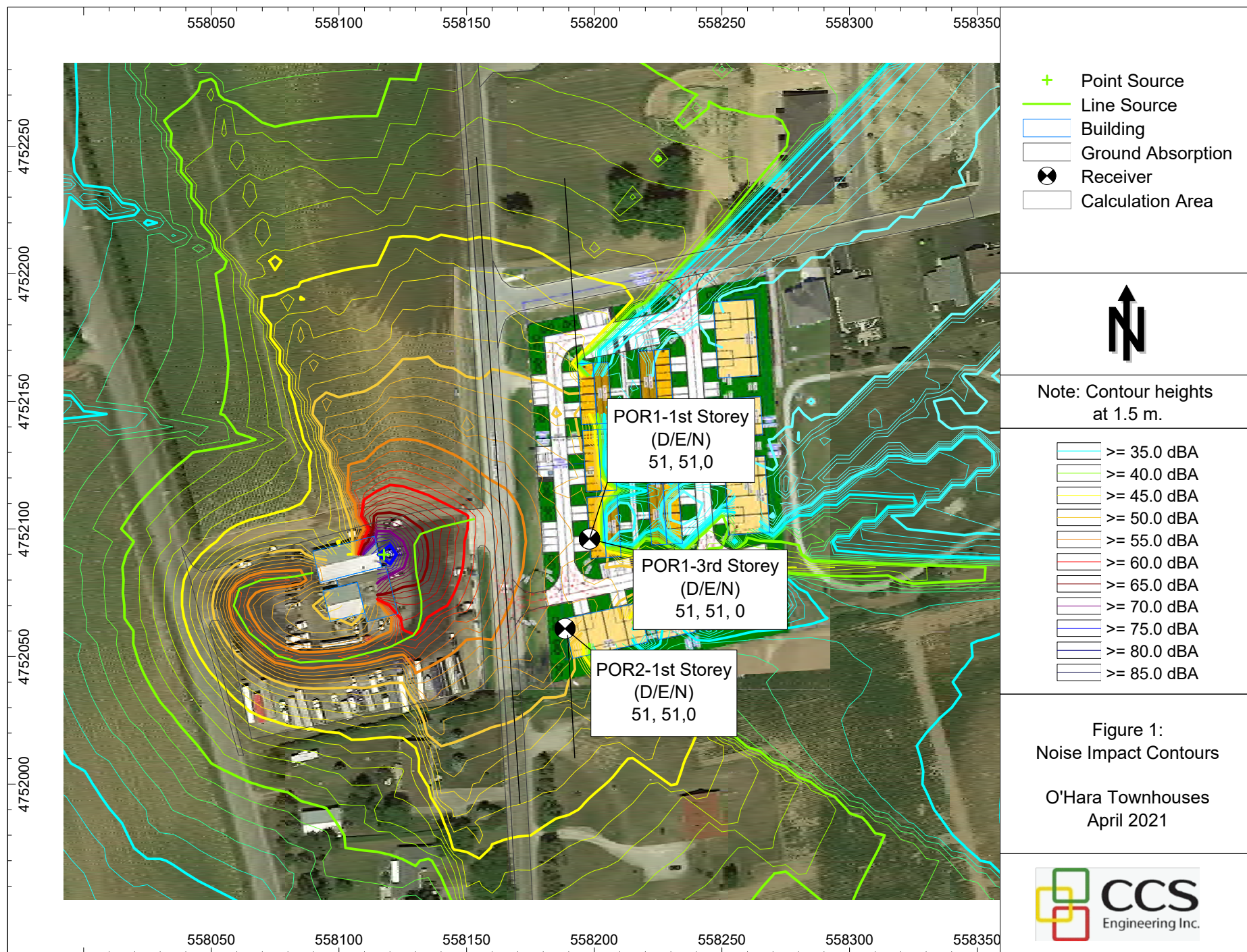
INDUSTRIAL CLASS SEPARATION
Orchard Square
WATERFORD, ONTARIO

By: JA Date: 15 May 2021 Project No. 872

Figure 4

ATTACHMENT E

CadnaA NOISE OUTPUT NOISE CALCULATION TABLES



Revisions

March 16, 2021	Tom Ohara approval D6 review. Proj 872
March 17, 2021	Noise estimates
March 22, 2021	Noise Measurements, site visit review
April 14, 2021	CadnaA - Prelim Model
April 14, 2021	STAMSON - Traffic Noise Modelling

Site Measurements

Lxt 7 at each light pole beside road
Lxt 8 at each light pole beside road
Lxt 9 at each light pole beside road

Can't hear Waterford Truck/Trailer - one door closed, other jammed with a truck
Can't hear Norfolk Waste Disposal
in half an hour no waste trucks drove by
pick up trucks and cars mainly, some transports - 6 or 7 in an hour.



Traffic Noise Assessment

Data Source: Norfolk County (Pedrag Jaksic)
Traffic Data Location: Old Highway 24
Traffic Data Location ID: n/a
Streets Assessed: Old Highway 24
Posted Speed: 60 km/hr
AADT (2016): 11335
AADT (2022 Projection): 12176
Assessment Basis: AADT with Ministry breakdown of automobiles, med trucks and heavy trucks

Class Data:

	%	Veh/hr	Day/Eve	Night
AADT (2022)	100%	12176	90%	10%
Cars	87%	10593	9534	1059
Medium Vehicles	5%	609	548	61
Heavy Trucks	8%	974	877	97

STAMSON Modelling Summary:

POR	Distance (road to façade)	Day/ Eve	Night
PORA - 3rd Storey	34	67	60
PORA - 1st Storey	34	66	60
PORB - 1st Storey	23	65	59
PORC - 1st Storey	34	59	52
PORD - 1st Storey	43	57	51
PORE - 1st Storey	60	55	48

PORA (3 Storey - 1st storey)

	day/eve	night
Time Period:	16 hr	8 hr
Automobiles:	9534	1059
Med. Trucks	548	61
Heavy Trucks	877	97
Speed Limit:	60 km/hr	
Road Gradient:	0%	
Road Pavement:	1 (asphalt or concrete)	
Source-Receiver Distance:	34 m	
Receiver Height:	1.5 m (1st storey)	
Intermediate Surface:	2 (reflecting)	
Topography:	1 (flat)	
Wood Depth:	0 (no woods)	
Rows of Houses:	0 (no houses)	
Source Height:	1.68 m	
Segments:	1	
Segment 1:	-82 deg to 90 deg	



PORA (3 Storey - most exposed façade - 3rd storey)

Time Period:	16 hr	8 hr
Automobiles:	9534	1059
Med. Trucks	548	61
Heavy Trucks	877	97
Speed Limit:	60 km/hr	
Road Gradient:	0%	
Road Pavement:	1 (asphalt or concrete)	
Source-Receiver Distance:	34 m	
Receiver Height:	7.5 m (3rd storey)	
Intermediate Surface:	2 (reflecting)	
Topography:	1 (flat)	
Wood Depth:	0 (no woods)	
Rows of Houses:	0 (no houses)	
Source Height:	1.68 m	
Segments:	1	
Segment 1:	-90 deg to 90 deg	



PORB (1 Storey - most exposed façade)

Time Period:	16 hr	8 hr
Automobiles:	9534	1059
Med. Trucks	548	61
Heavy Trucks	877	97
Speed Limit:	60 km/hr	
Road Gradient:	0%	
Road Pavement:	1 (asphalt or concrete)	
Source-Receiver Distance:	34 m	
Receiver Height:	7.5 m (3rd storey)	
Intermediate Surface:	1 (absorbing)	
Topography:	1 (flat)	
Wood Depth:	0 (no woods)	
Rows of Houses:	0 (no houses)	
Source Height:	1.68 m	
Segments:	1	
Segment 1:	-88 deg to 80 deg	



PORC (1 Storey - south façade)

Time Period:	16 hr	8 hr
Automobiles:	9534	1059
Med. Trucks:	548	61
Heavy Trucks:	877	97
Speed Limit:	60 km/hr	
Road Gradient:	0%	
Road Pavement:	1 (asphalt or concrete)	
Source-Receiver Distance:	36 m	
Receiver Height:	1.5 m (1st Storey)	
Intermediate Surface:	1 (absorbing)	
Topography:	1 (flat)	
Wood Depth:	0 (no woods)	
Rows of Houses:	0 (no houses)	
Source Height:	1.68 m	
Segments:	1	
Segment 1:	-85 deg to -9 deg	



PORD (1 Storey - south façade)

Time Period:	16 hr	8 hr
Automobiles:	9534	1059
Med. Trucks:	548	61
Heavy Trucks:	877	97
Speed Limit:	60 km/hr	
Road Gradient:	0%	
Road Pavement:	1 (asphalt or concrete)	
Source-Receiver Distance:	43 m	
Receiver Height:	1.5 m (1st Storey)	
Intermediate Surface:	1 (absorbing)	
Topography:	1 (flat)	
Wood Depth:	0 (no woods)	
Rows of Houses:	0 (no houses)	
Source Height:	1.68 m	
Segments:	1	
Segment 1:	-82 deg to -9 deg	



PORE(1 Storey - south façade)

Time Period:	16 hr	8 hr
Automobiles:	9534	1059
Med. Trucks	548	61
Heavy Trucks	877	97
Speed Limit:	60 km/hr	
Road Gradient:	0%	
Road Pavement:	1 (asphalt or concrete)	
Source-Receiver Distance:	60 m	
Receiver Height:	1.5 m (1st Storey)	
Intermediate Surface:	1 (absorbing)	
Topography:	1 (flat)	
Wood Depth:	0 (no woods)	
Rows of Houses:	0 (no houses)	
Source Height:	1.68 m	
Segments:	1	
Segment 1:	-80 deg to -9 deg	



POR List

POR1		3 storey residence	Trailer	> 300 m	27 m	34 m
POR2		1 storey residence		> 300 m	33 m	
POR3		1 storey residence		> 300 m	15-20 m	
POR4	741 Old hwy 24	1storey residence				
POR5						

HATCH IDENTIFICATION LEGEND

	AREA OF ASPHALT
	LANDSCAPING
	1-STORY RESIDENTIAL DWELLINGS STACKED (VEHICULAR - x1 EXTERNAL) - ZONING AMENDMENT 4.9a) (6000mm W x 12000mm D) (72m² (775R²))
	3-STORY RESIDENTIAL DWELLINGS STACKED (VEHICULAR - x1 GARAGE, x1 LANEWAY) (6000mm W x 12000mm D) (126m² (1350R² + GARAGE))
	1-STORY RESIDENTIAL DWELLING (VEHICULAR - x1 GARAGE, x1 LANEWAY) (7500mm W x 16000mm D) (102m² (1100R²) + GARAGE)



vallee
Consulting Engineers,
Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 4W3
(519) 426-6270



Project Title
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA,

**PRELIMINARY
NOT TO BE
USED FOR
CONSTRUCTION**

PROJECT No.
20-128
Drawing Title
ZONING AMENDMENT
Drawing No.
Z101

Table B1: Insignificant Source Listing

Source ID	Source Description	Rationale
PB-NWS	Norfolk Waste South paint booth	fan and motor inside building, not audible above trucks, open bay door
MR-NWS	Norfolk Waste South mix room	fan and motor inside building, not audible above trucks, open bay door
W-NWS	Norfolk Waste South mtce welding	intermittent, not heard above truck traffic
	Norfolk Waste	Bay doors and site truck traffic blocked Picards building
PP	Picards Peanuts	commercial
	Grocery, gas, banks, and restaurants	commercial

Table B2: Source/CadnaA Input Table

Source ID	Source Description	Intermittency (min/hr)	Data Source, File #	Tonal	Source Height (m)	Sound Power Lw (dBA)	Sphere Partition	Sound Pressure Levels		Frequency (Hz)								
								Ref. Distance (m)	Lp (dBA)	31.5	63	125	250	500	1000	2000	4000	8000
	Waterford Truck and Trailer																	
TR-WTT	WTT truck route	1 truck per hour, day/eve, 7 am - 11 pm	DB Heavy Truck	N	2.5	104.9	50%	5.8	81.6	53.6	59.5	60.8	69.6	72.3	76.8	76.0	73.9	67.3
BD-WTT	Open Bay door - truck idling	1 truck idling for 10 min/hr, 7 am - 11 pm	DB Heavy Truck	N	2.5	104.9	50%	5.8	81.6	53.6	59.5	60.8	69.6	72.3	76.8	76.0	73.9	67.3

WTT**HIRING NOW****LICENSED/APPRENTICE 310T TRUCK & COACH TECHNICIAN**

Waterford Truck & Trailer is seeking a full-time Licensed Truck & Coach Technician and a Truck & Coach Technician Apprentice.

Waterford Truck & Trailer is a small shop in a growing industry, we need someone who can join the team in providing excellent and efficient services to our large customer base.

Shift: Days and Afternoons

**Norfolk south ECA - Air - May 2019****2. NOISE**

1. The *Company* shall, at all times, ensure that the noise emissions from the *Facility* comply with the limits set out in *Ministry Publication NPC-300*.
2. The *Company* shall restrict operation of the *Facility* to the daytime period between 7:00 AM to 7:00 PM.

Norfolk south ECA - Waste - June 2020**12.0 Hours of Operation**

12.1 The *Company* shall ensure that waste processing operations, limited to sorting and compaction, at the *Site* are restricted to the following hours only, excluding statutory holidays:

- (a) Monday to Friday 6:00 a.m. to 6:00 p.m.; and
- (b) Saturday 7:00 a.m. to 4:00 p.m.

12.2 The *Company* shall ensure that waste receiving and transfer operations at the *Site* are restricted to the following hours only:

- (a) Monday to Friday 6:00 a.m. to 10:00 p.m.; and
- (b) Saturday, Sundays and statutory holidays 7:00 a.m. to 6:00 p.m.

14.0 Approved Quantities

14.1 (a) The *Company* shall ensure the maximum quantity of waste (including processed, unprocessed and residual waste) stored at this *Site* does not exceed 300 tonnes at any time.

(b) The *Company* shall ensure the maximum quantity of waste received at this *Site*, on any one day, shall not exceed 550 tonnes.

14.2 The *Company* shall ensure the total amount of residual waste transported from this *Site* does not exceed 200 tonnes on any day.

**15.0 Nuisance Control**

15.1 The *Company* shall ensure that any dirt, dust, smoke, noise, odour and/or other airborne contaminant, resulting from activities at this *Site*, is controlled and does not cause an adverse effect.

15.2 The *Company* shall ensure that vehicles leaving this *Site* do not drag out onto roads, dirt and/or other material that may become a contaminant or cause an adverse effect.

15.6 (a) The *Company* shall not operate the proposed electric grinder until the Ministry has received and reviewed the *Company's* Environmental Compliance Approval (Section 9) application, including a noise assessment, and the review of the application concludes the shredder may be operated in compliance with the Ministry's noise standards.

(c) Subject to Condition 15.6(a), the *Company* shall ensure the electric grinder is operated in a manner which does not cause an adverse effect, including but not limited to noise and dust.

Table 1: Sound Source Overview

Source ID	Description	Expected Operating Period	Sound Sequence
TR-WTT	WTT truck route	Daytime, Evening, 6 d/wk, 50 wks/yr	1 truck per hour along route
BD-WTT	Open Bay door - truck idling	Daytime, Evening, 6 d/wk, 50 wks/yr	10 min/hr idling

Table 2: Noise Source Summary Table

Source ID	Source Description	Sound Power Level (dBA)	Source Location ¹	Sound Characteristics ²	Noise Control Measures ³
TR-WTT	WTT truck route	105	O	S	U
BD-WTT	Open Bay door - truck idling	105	O	S	U

¹ O: located/installed outside the building, including on the roof

I: located/installed inside the building

² S: Steady

Q: Quasi Steady Impulsive

I: Impulsive

B: Buzzing

T: Tonal

C: Cyclic

O: Occasional

³ S: silencer, acoustic louvre, muffler

A: acoustic lining, plenum

B: barrier, berm, screening

L: lagging

E: acoustic enclosure

O: other

U: uncontrolled

Table 3a: Point of Reception Noise Impact Table (Day/Eve)

Source ID	Source Description	3 Storey Townhouse - 1st Floor Façade		3 Storey Townhouse - 2nd Floor Façade		3 Storey Townhouse - 3rd Floor Façade		1 Storey Townhouse - 1st Floor Façade	
		POR1_1st		POR1_2nd		POR1_3rd		POR2_1st	
		Distance to POR (m)	Sound Level at POR (dBA)	Distance to POR (m)	Sound Level at POR (dBA)	Distance to POR (m)	Sound Level at POR (dBA)	Distance to POR (m)	Sound Level at POR (dBA)
TR-WTT	WTT truck route	Varies	38.1	Varies	38.7	Varies	38.7	Varies	38.8
BD-WTT	Open Bay door - truck idling	81	50.4	81	50.8	81	50.8	77	50.4

Table 4: Performance Limits

Time Of Day	Class 2 Area - Steady Source Limits	
	Plane of Window	Outdoor Receptor
07:00-19:00	50	50
19:00-23:00	50	45
23:00-07:00	45	N/A - no criteria for this time period

Table 5: Acoustic Assessment Summary Table

Point of Reception ID	Point of Reception Description	Sound Pressure Level at POR	Verified by Acoustic Audit (Yes/No)	Performance Limit	Compliance with Performance Limit
		dBA (L _{eq})		dBA (L _{eq})	(Yes/No)
POR1_1st	3 Storey Townhouse - 1st Floor Façade	51	No	50 (day/eve)	No
		0	No	45 (night)	Yes
POR1_2nd	3 Storey Townhouse - 2nd Floor Façade	51	No	50 (day/eve)	No
		0	No	45 (night)	Yes
POR1_3rd	3 Storey Townhouse - 3rd Floor Façade	51	No	50 (day/eve)	No
		0	No	45 (night)	Yes
POR2_1st	1 Storey Townhouse - 1st Floor Façade	51	No	50 (day/eve)	No
		0	No	45 (night)	Yes

ATTACHMENT F

**STAMSON NOISE CALCULATION TABLES
STAMSON OUTPUTS**

STAMSON 5.0 NORMAL REPORT Date: 13-04-2021 15:18:51
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: Time Period: Day/Night 16/8 hours
Description: Noise Impacts at Most Impacted 1st Storey Facade

Road data, segment # 1: Old Hwy 24 (day/night)

Car traffic volume : 9534/1059 veh/TimePeriod *
Medium truck volume : 548/61 veh/TimePeriod *
Heavy truck volume : 877/97 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 11335
Percentage of Annual Growth : 1.20
Number of Years of Growth : 6.00
Medium Truck % of Total Volume : 5.00
Heavy Truck % of Total Volume : 8.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Old Hwy 24 (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 34.00 / 34.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Old Hwy 24 (day)

Source height = 1.68 m

ROAD (0.00 + 66.51 + 0.00) = 66.51 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	70.06	0.00	-3.55	0.00	0.00	0.00	0.00	66.51

Segment Leq : 66.51 dBA

Total Leq All Segments: 66.51 dBA

Results segment # 1: Old Hwy 24 (night)

Source height = 1.68 m

ROAD (0.00 + 59.96 + 0.00) = 59.96 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	63.51	0.00	-3.55	0.00	0.00	0.00	0.00	59.96

Segment Leq : 59.96 dBA

Total Leq All Segments: 59.96 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.51
(NIGHT): 59.96

STAMSON 5.0 NORMAL REPORT Date: 13-04-2021 13:42:45
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: PORA_3S Time Period: Day/Night 16/8 hours
Description: Noise Impacts at Most Impacted 3rd Storey Facade

Road data, segment # 1: Old Hwy 24 (day/night)

Car traffic volume : 9534/1059 veh/TimePeriod *
Medium truck volume : 548/61 veh/TimePeriod *
Heavy truck volume : 877/97 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 11335
Percentage of Annual Growth : 1.20
Number of Years of Growth : 6.00
Medium Truck % of Total Volume : 5.00
Heavy Truck % of Total Volume : 8.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Old Hwy 24 (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 34.00 / 34.00 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Old Hwy 24 (day)

Source height = 1.68 m

ROAD (0.00 + 66.51 + 0.00) = 66.51 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	70.06	0.00	-3.55	0.00	0.00	0.00	0.00	66.51

Segment Leq : 66.51 dBA

Total Leq All Segments: 66.51 dBA

Results segment # 1: Old Hwy 24 (night)

Source height = 1.68 m

ROAD (0.00 + 59.96 + 0.00) = 59.96 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	63.51	0.00	-3.55	0.00	0.00	0.00	0.00	59.96

Segment Leq : 59.96 dBA

Total Leq All Segments: 59.96 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.51
(NIGHT): 59.96

STAMSON 5.0 NORMAL REPORT Date: 13-04-2021 23:26:05
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: PORB_1stS Time Period: Day/Night 16/8 hours
Description: Noise Impacts at Most Impacted 1st Storey Facade

Road data, segment # 1: Old Hwy 24 (day/night)

Car traffic volume : 9534/1059 veh/TimePeriod *
Medium truck volume : 548/61 veh/TimePeriod *
Heavy truck volume : 877/97 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 11335
Percentage of Annual Growth : 1.20
Number of Years of Growth : 6.00
Medium Truck % of Total Volume : 5.00
Heavy Truck % of Total Volume : 8.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Old Hwy 24 (day/night)

Angle1 Angle2 : -90.00 deg 80.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 23.00 / 23.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Old Hwy 24 (day)

Source height = 1.68 m

ROAD (0.00 + 65.47 + 0.00) = 65.47 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	80	0.65	70.06	0.00	-3.07	-1.51	0.00	0.00	0.00	65.47

Segment Leq : 65.47 dBA

Total Leq All Segments: 65.47 dBA

Results segment # 1: Old Hwy 24 (night)

Source height = 1.68 m

ROAD (0.00 + 58.93 + 0.00) = 58.93 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	80	0.65	63.51	0.00	-3.07	-1.51	0.00	0.00	0.00	58.93

Segment Leq : 58.93 dBA

Total Leq All Segments: 58.93 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.47
(NIGHT): 58.93

STAMSON 5.0 NORMAL REPORT Date: 13-04-2021 34:53:27
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: PORC_1stS Time Period: Day/Night 16/8 hours
Description: Noise Impacts at Southern Facade

Road data, segment # 1: Old Hwy 24 (day/night)

Car traffic volume : 9534/1059 veh/TimePeriod *
Medium truck volume : 548/61 veh/TimePeriod *
Heavy truck volume : 877/97 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 11335
Percentage of Annual Growth : 1.20
Number of Years of Growth : 6.00
Medium Truck % of Total Volume : 5.00
Heavy Truck % of Total Volume : 8.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Old Hwy 24 (day/night)

Angle1 Angle2 : -85.00 deg -9.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 36.00 / 36.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Old Hwy 24 (day)

Source height = 1.68 m

ROAD (0.00 + 58.61 + 0.00) = 58.61 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-85	-9	0.65	70.06	0.00	-6.29	-5.16	0.00	0.00	0.00	58.61

Segment Leq : 58.61 dBA

Total Leq All Segments: 58.61 dBA

Results segment # 1: Old Hwy 24 (night)

Source height = 1.68 m

ROAD (0.00 + 52.06 + 0.00) = 52.06 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-85	-9	0.65	63.51	0.00	-6.29	-5.16	0.00	0.00	0.00	52.06

Segment Leq : 52.06 dBA

Total Leq All Segments: 52.06 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.61
 (NIGHT): 52.06

STAMSON 5.0 NORMAL REPORT Date: 13-04-2021 34:37:16
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: PORD_1stS Time Period: Day/Night 16/8 hours
Description: Noise Impacts at Southern Facade

Road data, segment # 1: Old Hwy 24 (day/night)

Car traffic volume : 9534/1059 veh/TimePeriod *
Medium truck volume : 548/61 veh/TimePeriod *
Heavy truck volume : 877/97 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 11335
Percentage of Annual Growth : 1.20
Number of Years of Growth : 6.00
Medium Truck % of Total Volume : 5.00
Heavy Truck % of Total Volume : 8.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Old Hwy 24 (day/night)

Angle1 Angle2 : -82.00 deg -9.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 43.00 / 43.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Old Hwy 24 (day)

Source height = 1.68 m

ROAD (0.00 + 57.28 + 0.00) = 57.28 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-82	-9	0.65	70.06	0.00	-7.57	-5.21	0.00	0.00	0.00	57.28

Segment Leq : 57.28 dBA

Total Leq All Segments: 57.28 dBA

Results segment # 1: Old Hwy 24 (night)

Source height = 1.68 m

ROAD (0.00 + 50.73 + 0.00) = 50.73 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	-------	--------

-82	-9	0.65	63.51	0.00	-7.57	-5.21	0.00	0.00	0.00	50.73
-----	----	------	-------	------	-------	-------	------	------	------	-------

Segment Leq : 50.73 dBA

Total Leq All Segments: 50.73 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 57.28

(NIGHT): 50.73

STAMSON 5.0 NORMAL REPORT Date: 13-04-2021 34:52:42
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: PORE_1stS Time Period: Day/Night 16/8 hours
Description: Noise Impacts at Southern Facade

Road data, segment # 1: Old Hwy 24 (day/night)

Car traffic volume : 9534/1059 veh/TimePeriod *
Medium truck volume : 548/61 veh/TimePeriod *
Heavy truck volume : 877/97 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 11335
Percentage of Annual Growth : 1.20
Number of Years of Growth : 6.00
Medium Truck % of Total Volume : 5.00
Heavy Truck % of Total Volume : 8.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Old Hwy 24 (day/night)

Angle1 Angle2 : -80.00 deg -9.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 60.00 / 60.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Old Hwy 24 (day)

Source height = 1.68 m

ROAD (0.00 + 54.84 + 0.00) = 54.84 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-80	-9	0.65	70.06	0.00	-9.96	-5.26	0.00	0.00	0.00	54.84

Segment Leq : 54.84 dBA

Total Leq All Segments: 54.84 dBA

Results segment # 1: Old Hwy 24 (night)

Source height = 1.68 m

ROAD (0.00 + 48.29 + 0.00) = 48.29 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-80	-9	0.65	63.51	0.00	-9.96	-5.26	0.00	0.00	0.00	48.29

Segment Leq : 48.29 dBA

Total Leq All Segments: 48.29 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.84
(NIGHT): 48.29



vallee

*Consulting Engineers,
Architects & Planners*

December 16, 2021

Mr. Tom O'Hara
Box 1152, 26 Main St. South
Waterford, ON
N0E 1Y0

Attention: Mr. Tom O'Hara

Reference: Conceptual Functional Servicing Report
Orchard Square Townhouse Development
Waterford, Norfolk County
Our Project # 20-128

Introduction

This Conceptual Functional Servicing Report has been prepared in support of the zoning by-law amendment application required for the construction of 55-unit townhouse development on the southeast corner of Old Hwy 24 and Lam Boulevard in Waterford - Norfolk County. This report presents the conceptual functional servicing for the proposed development, including sanitary servicing, storm servicing and domestic and fire water servicing.

Background

The proposed 0.31 ha development site is situated southeast of Old Hwy 24 and Lam Boulevard in Waterford, Norfolk County. The subject lands are bounded by an existing subdivision to the west and agricultural land to the south, as shown in Figure 1.

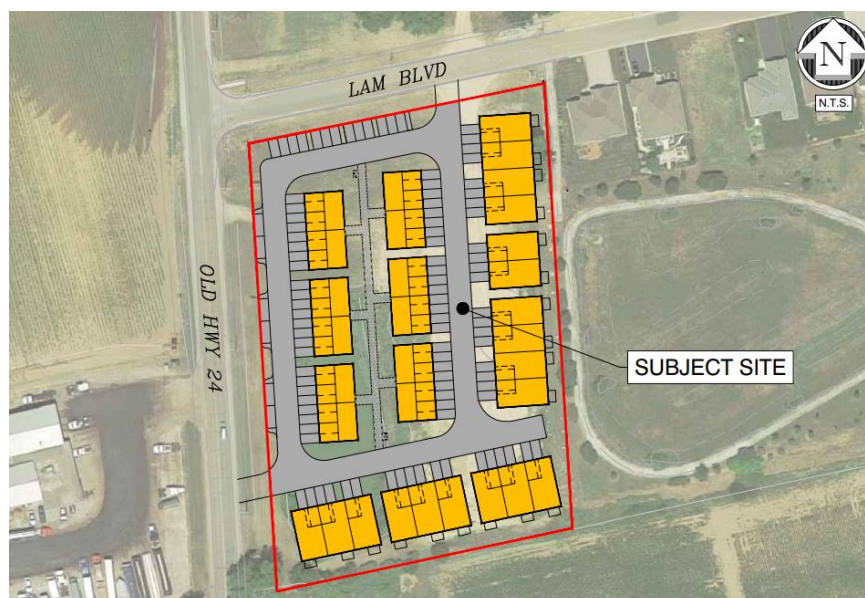


Figure 1 - Site Location

2 Talbot Street North, Simcoe, ON N3Y 3W4 ■ Phone: 519 426-6270 ■ Fax: 519 426-6277 ■ www.gdvallee.ca

G. Douglas Vallee Limited

The development site currently features open landscaped area and a pond, and is zoned as “Hamlet Residential Type 5 – R5(H)” and “Hamlet Service Commercial CS(H)”. The proposed residential development shall consist of the following construction:

- 19 – 2-storey residential dwelling units;
- 24 – 3-storey stacked residential dwelling units;
- 12 – 1-storey stacked residential dwelling units;
- Storm and sanitary infrastructure to support proposed construction;
- Stormwater management facility;
- Curbs, sidewalks, swales and other miscellaneous items to support proposed construction.

Sanitary Servicing

Record drawings from Vallee Project No. 10-034 – Yin Subdivision Phase 5 indicate a 200mm diameter PVC gravity sanitary sewer along Lam Boulevard. As part of this project, a sanitary manhole was also installed on the subject site’s north property line for future development. It is proposed that sanitary flows from the proposed development will discharge to this existing sanitary manhole via a sanitary storm sewer on site.

Sanitary design flows were calculated using the Norfolk County Design Criteria. Table 1 presents the flow information for the proposed development. In summary, the proposed development is anticipated to generate an additional sanitary flow of approximately 3.68 L/s to the existing sanitary sewer along Lam Boulevard.

Table 1 Sanitary Design Flow Information	
Total Number of Units	55
Population Density (persons/units)	2.75
Per Capita Flow (L/person/day)	450
Peak Extraneous Flow (L/sec/hectare)	0.28
Development Area (ha)	1.31
Infiltration Flow (L/s)	0.367
Sewage Flow (L/s)	0.79
Peak Design Flow (L/s)	3.68

As part of the Yin Subdivision Phase 5 project (Vallee Project No. 10-034), a sanitary drainage area plan and sanitary design sheet were created for the sanitary sewer system which discharges to the sanitary main along Lam Boulevard and Old Hwy 24, as shown in Appendix A. The sanitary design sheet has been updated to reflect the proposed 55-unit townhouse development, as shown the revised sanitary design sheet in Appendix A. Based on the calculations completed, it can be concluded that the existing sanitary sewer along Lam Boulevard and Old Hwy 24 has adequate capacity to support the proposed development.

To confirm the calculations presented, it is recommended that sanitary hydraulic modelling be completed by the Norfolk County consultant to determine if the existing County infrastructure provides adequate capacity to accommodate the estimated sanitary design flow from the proposed development.

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Stormwater Management

Under existing condition, the subject site is composed of open grassed area and an irrigation pond. Runoff from the site drains overland in a south westerly direction towards Old Hwy 24. As part of the Yin Subdivision Phase 5 project (Vallee Project No. 10-034), a peak flow allowance of 0.015 m³/s was allocated for subject site during the storm sewer design. Refer drawing 10-034 ST1 – Storm Drainage Areas and the corresponding storm design sheet in Appendix B. Consequently, the stormwater management (SWM) quantity control objective for the proposed development is to reduce and/or control all post-development peak flow rates from the site to levels that do not exceed the 0.015 m³/s flow allowance, for all storm events up to and including the 100-year storm event.

To meet this objective, runoff from the proposed condominium development will be detained and released at a rate such that the peak flow allowance is not exceeded. The post-development site utilizes three storage facilities. Drainage area POST2 and POST3 each feature an infiltration trench system to detain and infiltrate runoff. Drainage area POST1 is comprised of the remainder of the site, and uses an underground SWM storage facility to detain runoff. Refer to drawing 20-128 SWM – Stormwater Management Drainage Areas in Appendix B. Minor storm events (2-year and 5-year) will be conveyed to the proposed SWM storage facility through a storm sewer network and major storm events will flow overland. Runoff released from the storage facility will be directed to the existing municipal 600mm diameter storm sewer along Old Hwy 24.

Visual OTTHYMO was utilized to simulate the post-development condition for the subject site and determine the storage volume and orifice control required to meet the quantity control objective. Area POST2 and POST3 infiltrate 100% of the runoff capture, and by using a storage volume of 390 m³ and a control orifice in drainage area POST1, the total post-development design flows from the subject site can be reduced to less than or equal to the peak flow rate allowance, as displayed in Table 2. Supporting calculations can be found in Appendix B. During the detailed design stage, further low-impact development infiltration practices will be analyzed to reduce the required storage volume.

100-Year Post-Development Flow Rates Table 2		
AREA	Allowance (cms)	Post (cms)
POST1	0.015	0.012
POST2		0.000
POST3		0.000
TOTAL		0.012

Stormwater quality control for the site will be analyzed during the detailed design stage. At that time, multiple quality control solutions will be investigated, such as low-impact development (LID) treatment and oil grit separators (OGS), and the most practical solution that meets the municipal design criteria will be proposed.

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Water Servicing

As-constructed drawings and the Norfolk County ISMP indicate an existing 200mm diameter watermain along Lam Boulevard. As part of the Yin Subdivision Phase 5 project (Vallee Project No. 10-034), a 150mm diameter water service was installed at the north east corner of the subject site and will be utilized to service the proposed development. An analysis of the hydraulic modelling will be conducted by the County consultants to determine the water servicing capacity and constraints on the existing water system to ensure adequate system flows and pressure for the aforementioned domestic and fire demands. Norfolk County's design criteria stipulates the following requirements for system pressures, and the system shall be designed to meet the greater of either of the following requirements;

- Fire flow conditions– not less than 140 kPa
- Normal operating conditions – not less than 280 kPa

Domestic Water Demand

The following summarizes the domestic water flow information for the proposed development:

- | | |
|---|---------------------------------------|
| • Total Number of Units: | 55 |
| • Population Density: | 2.75 persons per unit |
| • Population: | 152 people |
| • Average Daily Water Demand (per person) | 0.450 m ³ /person/day |
| • Average Daily Water Demand: | 68.4 m ³ /day (0.79 L/s) |
| • Maximum Day Demand Factor: | 2.25 |
| • Maximum Day Demand: | 153.90 m ³ /day (1.78 L/s) |
| • Peak Hourly Demand Factor (Residential) | 4.00 |
| • Peak Hourly Demand | 11.40 m ³ /hour (3.17 L/s) |

Fire Water Service

According to the County GIS online mapping, there is an existing fire hydrant located on the west side of Old Hwy 24, at the intersection of Old Hwy 24 and Lam Boulevard. However, this hydrant is greater than 90 m away from the furthest proposed unit. Consequently, a fire hydrant will be installed on the subject property to service the proposed development.

Typically, available fire flow during the maximum day demand is the critical criteria when evaluating a watermain distribution system's ability to service a residential subdivision. The estimated fire flow requirement for the development has been determined using both the recommendations of the Fire Underwriters Survey – 1999 (FUS) and the Ontario Building Code (OBC) method. Using the FUS recommendations and the OBC fire flow calculation procedure, the minimum required fire flow was determined to be 217 L/s and 150 L/s, respectively. It should be noted that the FUS method is generally conservative. As such, the required flow for proposed development is estimated to be 150 L/s. Supporting calculations for both methods are detailed in Appendix C.

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The Norfolk County ISMP estimates that the available fire flow in the existing watermain on Lam Boulevard ranges from 83 L/s to 159 L/s, as displayed in Appendix C. Therefore, the available municipal watermain is anticipated to provide sufficient flow to service the development. It should be noted that the ISMP modeling was from 2015, consequently, it is recommended that Norfolk County review against their current model and provide more current available demands to confirm that the supply is adequate.

Conclusions and Recommendations

The functional servicing design for the proposed development can be summarized as follows:

- The proposed development will be serviced by a sanitary sewer that connects to the existing 200mm sanitary sewer along Lam Boulevard.
- A peak sanitary design flow of approximately 3.68 L/s is anticipated from the proposed development.
- An analysis of the existing sanitary sewer network on Lam Boulevard and Old Hwy 24 indicates that there is sufficient capacity to support the sanitary flows from the proposed development. However, modelling from the Norfolk County's consultant is recommended to determine the impact of the proposed additional sanitary flows further downstream.
- Two infiltration trench facilities are utilized to collect and detain runoff for infiltration.
- Overland flow (major storm events) storm sewers (minor storm events) will convey stormwater to the proposed SWM storage facility, ultimately releasing to the existing municipal 600mm diameter storm sewer along Old Hwy 24 via a storm sewer.
- Under all storm events, peak flows associated with the post-development site are controlled to less than or equal to the allowable peak flow rate determined as part of the Yin Subdivision Phase 5 - Vallee Project 10-034.
- Quality control will be analyzed during the detailed design stage.
- The existing 200mm watermain on Lam Boulevard shall serve as the water supply for the proposed development.
- An analysis of the hydraulic modelling will be conducted by the County consultants to determine the water servicing capacity and constraints on the existing water system to ensure adequate system flows and pressure for the aforementioned domestic and fire demands.
- The domestic maximum day demand and peak hourly demand were found to be 153.90 m³/day (1.78 L/s) and 11.40 m³/hour (3.17 L/s), respectively.
- The required fire flow demand for the proposed development was found to be 150 L/s, which is within the estimated range of available fire flow (83 L/s to 159 L/s).

It is recommended that this report be provided to the Norfolk County and the Long Point Region Conservation Authority in support of the application for zoning by-law amendment of the proposed development.

We trust that this information is complete and sufficient for submission. Should you have any questions or require further information please do not hesitate to contact us

G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects & Planners

Respectfully submitted,



Natalie Biesinger, B.A.Sc., EIT
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects and Planners



John Iezzi, P.Eng.
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects and Planners

Appendix A

- 10-034 SA1 – Sanitary Sewer Drainage Areas
- 10-034 Sanitary Sewer Design Sheet
- 20-128 Sanitary Sewer Design Sheet
- 20-128 Sanitary Flow Calculation

Appendix B

- 10-034 ST1 – Storm Drainage Areas
- 10-034 Storm Sewer Design Sheet
- 20-128 SWM – Stormwater Management Drainage Areas
- 20-128 SWM Parameters and Calculations

Appendix C

- Domestic Water Demand Calculations
- Fire Flow Calculation Distances
- FUS Calculations
- OBC Calculations
- Norfolk ISMP Map

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APPENDIX A

10-034 SA1 – Sanitary Sewer Drainage Areas
10-034 Sanitary Sewer Design Sheet
20-128 Sanitary Sewer Design Sheet
20-128 Sanitary Flow Calculation

SANITARY SEWER DESIGN SHEET

Pipe Material PVC
N 0.013

Project: Yin's Subdivision Phase 6

Job No. 14123

Date 1-Feb-15

Designed by TGS

Checked by JDV

Sheet of : 1 of 1

Location				Area				Total Pop.	M=Peak Factor	Flow			Sewer Design							
Area	Street	From MH	To MH	Section Ha	Cumul. Ha	Section Units	Cumul. Units			Q(i) L/s	Q(s) L/s	Q(d) L/s	Material	Size mm	Length m	N	Slope %	Cap L/s	Full V m/s	
10-18	Lam Blvd	10	18	0.3	0.30	2	2	6	4.4363	0.084	0.1271	0.2111	PVC	200	42	0.013	0.70%	27.4	0.87	
19-18	Tan Ave	19	18	0.25	0.55	2	4	11	4.4106	0.154	0.2527	0.4067	PVC	200	40	0.013	1.00%	32.8	1.04	
18-17	Tan Ave	18	17	0.93	1.48	10	14	39	4.3363	0.4144	0.8695	1.2839	PVC	200	105.3	0.013	0.50%	23.2	0.74	
17-16	Tan Ave	17	16	1.06	2.54	10	24	66	4.2888	0.7112	1.4743	2.1855	PVC	200	105.3	0.013	0.80%	29.3	0.93	
16-15	Tan Ave	16	15	0.62	3.16	6	30	83	4.2655	0.8848	1.8328	2.7176	PVC	200	61.8	0.013	2.10%	47.5	1.51	
15-14	Tan Ave	15	14	0.51	3.67	5	35	96	4.2481	1.0276	2.1296	3.1572	PVC	200	62.2	0.013	1.00%	32.8	1.04	
14A-14	Block 1 - TWNHSE	14A	14	0.67	0.67	12	12	33	4.348	0.1876	0.7473	0.9349	PVC	200	10	0.013	0.50%	23.2	0.74	
14-4	Yu Blvd	14	4	0.17	4.51	0	47	129	4.2114	1.2628	2.835	4.0978	PVC	200	94	0.013	1.00%	32.8	1.04	
10-9	Lam Blvd	10	9	0.34	0.34	2	2	6	4.4363	0.0952	0.1271	0.2223	PVC	200	46.8	0.013	2.00%	46.4	1.48	
9-8	Lam Blvd	9	8	0.35	0.69	2	4	11	4.4106	0.1932	0.2527	0.4459	PVC	200	11.3	0.013	1.70%	42.8	1.36	
8-7	Lam Blvd	8	7	0.92	1.61	8	12	33	4.348	0.4508	0.7473	1.1981	PVC	200	98.5	0.013	1.40%	38.8	1.24	
13-7	Tai Shan Place	13	7	1.00	1.00	10	10	28	4.3607	0.28	0.6246	0.9046	PVC	200	70	0.013	0.50%	23.2	0.74	
7-6	Lam Blvd	7	6	0.65	3.26	7	29	80	4.2692	0.9128	1.7733	2.6861	PVC	200	84.5	0.013	0.50%	23.2	0.74	
6-5	Lam Blvd	6	5	0.34	3.60	3	32	88	4.2584	1.008	1.9517	2.9597	PVC	200	50.5	0.013	0.50%	23.2	0.74	
12-11	Jong St	12	11	0.48	0.48	5	5	14	4.4003	0.1344	0.3151	0.4495	PVC	200	67.5	0.013	0.70%	27.4	0.87	
11-5	Jong St	11	5	0.39	0.87	4	9	25	4.3676	0.2436	0.563	0.8066	PVC	200	67.3	0.013	0.50%	23.2	0.74	
5-4	Lam Blvd	5	4	0.37	4.84	4	45	124	4.2171	1.3552	2.718	4.0732	PVC	200	54.9	0.013	0.50%	23.2	0.74	
4-3	Lam Blvd	4	3	0.28	9.63	3	95	261	4.1034	2.6964	5.5835	8.2799	PVC	200	48	0.013	0.50%	23.2	0.74	
3A-3	Block 2 Aptmnts.	3A	3	0.73	0.73	60	60	165	4.1773	0.2044	3.5899	3.7943	PVC	200	10	0.013	0.50%	23.2	0.74	
3-2	Lam Blvd	3	2	0.22	10.58	2	157	432	4.0062	2.9624	9.0087	11.971	PVC	200	60	0.013	0.50%	23.2	0.74	
2A-2	Block 3 Commercial	2A	2	0.75	0.75	25	25	67	4.2867	0.21	1.5043	1.7143	PVC	200	10	0.013	0.50%	23.2	0.74	
2B-2	Block 2 Aptmnts.	2B	2	1.4	1.40	46	46	127	4.2142	0.392	2.7765	3.1685	PVC	200	10	0.013	0.50%	23.2	0.74	
2-1	Lam Blvd	2	1	0.09	12.07	0	228	626	3.9222	3.3796	12.78	16.16	PVC	200	99.8	0.013	0.50%	23.2	0.74	

Design Information:

Q(s) = Sewage Flow = $P \cdot q \cdot M / 86.4$

Q(i) = Infiltration Flow = $I \cdot A$

Q(d) = Peak Design Flow = $Q(s) + Q(i)$

P = Population in thousands

M = Peaking Factor = $1 + 14 / (4 + P^{0.5})$

A = Tributary Area

q = Per Capita Flow =

450 L/cap d

I = Peak Extraneous Flow =

0.28

L/s/ha

Population Density =

2.75

persons /unit

Existing Sewer

SANITARY SEWER DESIGN SHEET

Pipe Material PVC
N 0.013

Project: Yin's Subdivision Phase 6 - Updated to Include Orchard Square
Job No. 20-128

Date 7-Dec-21
Designed by TGS/NLB
Checked by JI
Sheet of : 1 of 1

Location				Area				Total Pop.	M=Peak Factor	Flow			Sewer Design							
Area	Street	From	To	Section	Cumul.	Section	Cumul.			Q(i)	Q(s)	Q(d)	Material	Size mm	Length m	N	Slope %	Cap L/s	Full V m/s	
		MH	MH	Ha	Ha	Units	Units			L/s	L/s	L/s								
10-18	Lam Blvd	10	18	0.3	0.30	2	2	6	4.43629	0.084	0.12708	0.21108	PVC	200	42	0.013	0.70%	27.4	0.87	✓ 1%
19-18	Tan Ave	19	18	0.25	0.55	2	4	11	4.41057	0.154	0.25269	0.40669	PVC	200	40	0.013	1.00%	32.8	1.04	✓ 1%
18-17	Tan Ave	18	17	0.93	1.48	10	14	39	4.33634	0.4144	0.86953	1.28393	PVC	200	105.3	0.013	0.50%	23.2	0.74	✓ 6%
17-16	Tan Ave	17	16	1.06	2.54	10	24	66	4.28877	0.7112	1.47427	2.18547	PVC	200	105.3	0.013	0.80%	29.3	0.93	✓ 7%
16-15	Tan Ave	16	15	0.62	3.16	6	30	83	4.26551	0.8848	1.83284	2.71764	PVC	200	61.8	0.013	2.10%	47.5	1.51	✓ 6%
15-14	Tan Ave	15	14	0.51	3.67	5	35	96	4.24808	1.0276	2.12957	3.15717	PVC	200	62.2	0.013	1.00%	32.8	1.04	✓ 10%
14A-14	Block 1 - TWNHSE	14A	14	0.67	0.67	12	12	33	4.34795	0.1876	0.7473	0.9349	PVC	200	10	0.013	0.50%	23.2	0.74	✓ 4%
14-4	Yu Blvd	14	4	0.17	4.51	0	47	129	4.21137	1.2628	2.835	4.0978	PVC	200	94	0.013	1.00%	32.8	1.04	✓ 12%
10-9	Lam Blvd	10	9	0.34	0.34	2	2	6	4.43629	0.0952	0.12708	0.22228	PVC	200	46.8	0.013	2.00%	46.4	1.48	✓ 0%
9-8	Lam Blvd	9	8	0.35	0.69	2	4	11	4.41057	0.1932	0.25269	0.44589	PVC	200	11.3	0.013	1.70%	42.8	1.36	✓ 1%
8-7	Lam Blvd	8	7	0.92	1.61	8	12	33	4.34795	0.4508	0.7473	1.1981	PVC	200	98.5	0.013	1.40%	38.8	1.24	✓ 3%
13-7	Tai Shan Place	13	7	1.00	1.00	10	10	28	4.36067	0.28	0.62458	0.90458	PVC	200	70	0.013	0.50%	23.2	0.74	✓ 4%
7-6	Lam Blvd	7	6	0.65	3.26	7	29	80	4.26919	0.9128	1.77327	2.68607	PVC	200	84.5	0.013	0.50%	23.2	0.74	✓ 12%
6-5	Lam Blvd	6	5	0.34	3.60	3	32	88	4.25835	1.008	1.95175	2.95975	PVC	200	50.5	0.013	0.50%	23.2	0.74	✓ 13%
12-11	Jong St	12	11	0.48	0.48	5	5	14	4.40032	0.1344	0.31513	0.44953	PVC	200	67.5	0.013	0.70%	27.4	0.87	✓ 2%
11-5	Jong St	11	5	0.39	0.87	4	9	25	4.36755	0.2436	0.563	0.8066	PVC	200	67.3	0.013	0.50%	23.2	0.74	✓ 3%
5-4	Lam Blvd	5	4	0.37	4.84	4	45	124	4.21707	1.3552	2.71804	4.07324	PVC	200	54.9	0.013	0.50%	23.2	0.74	✓ 18%
4-3	Lam Blvd	4	3	0.28	9.63	3	95	261	4.10344	2.6964	5.58345	8.27985	PVC	200	48	0.013	0.50%	23.2	0.74	✓ 36%
3A-3	Block 2 Aptmnts.	3A	3	0.73	0.73	60	60	165	4.17734	0.2044	3.5899	3.7943	PVC	200	10	0.013	0.50%	23.2	0.74	✓ 16%
3-2	Lam Blvd	3	2	0.22	10.58	2	157	432	4.00618	2.9624	9.00868	11.9711	PVC	200	60	0.013	0.50%	23.2	0.74	✓ 52%
2A-2	Block 3 Commercial	2A	2	0.75	0.75	25	25	67	4.28672	0.21	1.50426	1.71426	PVC	200	10	0.013	0.50%	23.2	0.74	✓ 7%
2B-2	Block 2 Aptmnts.	2B	2	1.4	1.40	55	55	151	4.18986	0.392	3.30061	3.69261	PVC	200	10	0.013	0.50%	23.2	0.74	✓ 16%
2-1	Lam Blvd	2	1	0.09	12.07	0	237	650	3.91275	3.3796	13.2539	16.6335	PVC	200	99.8	0.013	0.50%	23.2	0.74	✓ 72%

Design Information:

Q(s) = Sewage Flow = $P \cdot q \cdot M / 86.4$

Q(i) = Infiltration Flow = $I \cdot A$

Q(d) = Peak Design Flow = $Q(s) + Q(i)$

P = Population in thousands

M = Peaking Factor = $1 + 14 / (4 + P^{0.5})$

A = Tributary Area

q = Per Capita Flow=

I = Peak Extraneous Flow =

Population Density

450

L/cap d

0.28

L/s/ha

2.75

persons /unit

Existing Sewer

Notes:

1) Number of units for drainage area 2B-2 modified to 55 from 46.



Norfolk County Design Criteria Section 9.2 - Sanitary Sewage Flow

9.2.01 Tributary Population

Residential Development:	2.75 persons/unit
Units:	55 Units
Number of Persons:	152 persons
Site Area	1.31 ha

9.2.02 Sewage Flow

Residential Development:	0.45 m ³ /person/day
Average Sewage Flow:	0.792 L/s

9.2.03 Peak Sanitary Flow Factor

Commercial Peaking Factor Formula:

$$M = 1 + (14 / (4 + [14 / \{4 + P^{(0.5)}\}]))$$

P = 0.152

M = 4.189

9.2.04 Infiltration Allowance

Infiltration Allowance:	0.28 L/s/ha
Infiltration Allowance:	0.367 L/s

9.2.05 Design Flow

Design Flow:

Design Flow = (Average Sewage Flow * Peak Sanitary Flow Factor) + Infil. Allowance

Design Flow =	3.684 L/s
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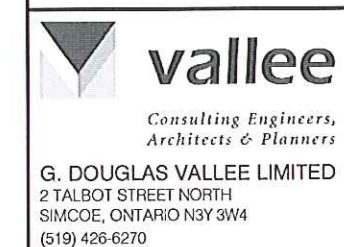
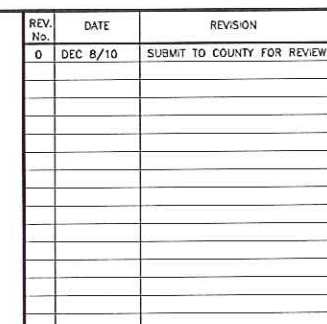
APPENDIX B

10-034 ST1 – Storm Drainage Areas

10-034 Storm Sewer Design Sheet

20-128 SWM – Stormwater Management Drainage Areas

20-128 SWM Parameters and Calculations



PRELIMINARY
NOT TO BE USED
FOR CONSTRUCTION

Project Title

YIN PHASE 5

NORFOLK COUNTY - WATERFORD

Drawing Title	
STORM DRAINAGE AREAS	
Designed by :	DJB
Drawn By :	TJG
Checked by :	TGS
Date Started :	SEPTEMBER 2016
Drawing Scale :	1:100
Project No.	10-034



STORM SEWER DESIGN SHEET

Storm 2-year Simcoe

A= 529.71

Pipe Material PVC<=450, Concrete >450

n 0.013

B= 4.501

C= 0.745

Project 10034 Yin's Phase 5 - Main Street Storm

Town/County Waterford - Norfolk County

Date Nov 24/10

Designed by TGS

Checked by JDV

Sheet of : 1 of

Location			Area			Cumulative	Time	Rainfall	Flow	Sewer Design					
Area	From	To			TOTAL	R*A	of		2.78*I*A*R	Size	Slope	Cap	Vel	Length	Time
			Ha	Ha	Ha		Concentration	mm/hr							
			0.45	0.9			min		L/s	mm	%	L/s	m/s	m	min
Pond	Pond	7	0		0.00	0	0.00	N/A	30.0	450	0.30%	156.2	0.982	59.2	1
7-6	7	6	0.37		0.17	0.17	15.00	57.94	56.8	450	0.40%	180.3	1.134	104.5	1.54
6-5	6	5	0		0.00	0.17	16.54	54.75	85.3	600	0.20%	274.6	0.971	114	1.96
5-4	5	4		1.34	1.21	1.37	18.49	51.24	255.5	600	0.20%	274.6	0.971	119	2.04
4-3	4	3		2.09	1.88	3.25	20.53	48.10	495.0	750	0.25%	556.6	1.26	119.4	1.58
3-2	3	2		1.81	1.63	4.88	22.11	45.95	683.7	825	0.25%	717.7	1.343	84	1.04
2-1	2	1	1.71		0.77	5.65	23.16	44.66	761.7	825	0.30%	786.2	1.471	29.9	0.34
1-EX	1	EX	1.26		0.57	6.22	23.50	44.25	825.1	825	0.35%	849.2	1.589	107	1.12

Note:
Peak Discharge from Pond (100-yr storm)
Peak Discharge from Block 3
Peak Discharge from Block 4

0.03 Applied at Area POND
0.015 Applied at Area 6-5
0.015 Applied at Area 6-6

Post-Development Catchment Parameters

Drainage Area	Area Description	Area (ha)	Imperv. Area (ha)	Directly Connected Imperv. (ha)	TIMP (%)	XIMP (%)
		(1)	(2)	(3)	(2)/(1)	(3)/(1)
TOTAL	-	1.312	0.886	0.455	68%	35%
POST1	Underground Storage	0.759	0.591	0.455	78%	60%
POST2	Perm. Pavers with Storage	0.331	0.173	0.000	52%	0%
POST3	Infiltration Trench	0.222	0.122	0.000	55%	0%

Allowable Release Rate (m3/s)	0.015	*obtained from 10-034 Yin Phase5 Subdivision SWM Report
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Soil Parameters

Soil Type	A - gravelly sandy till, sandy textures over gravelly sandy till
CN (-)	58
Ia Developed (mm)	16.5
Infiltration Rate (i) (m/hr)	0.0114
Void Ratio (Vr)	0.4
Drainage Time (ts) (hr)	48
Max allowable stone depth (drmax) (m)	1.37

Pond Parameters

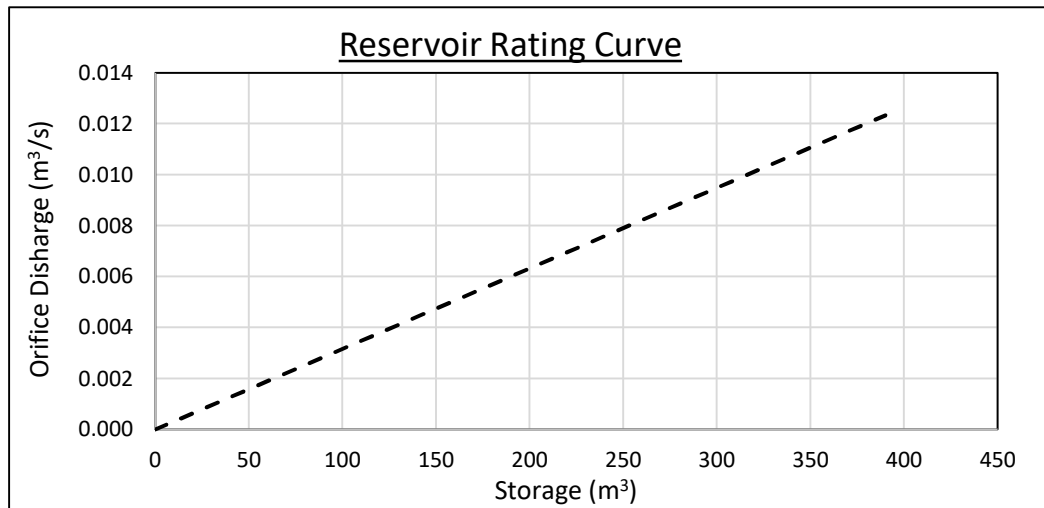
Target Flow Rate (m3/s)	0.015
Active Storage Depth (m)	1.0
Required Volume (m3)	390
Required Footprint (m2)	390

Orifice Parameters

	Diameter	0.075	m
Orifice #1	Area	0.0044	m2
	Elevation	0.00	m

Stage-Storage-Discharge

Description	Ponding Depth (m)	Pond Volume (m3)	Total Volume (ha.m)	Total Q (m3/s)
Bottom of Pond/Orifice #1	0.0	0.00	0.0000	0.000
Top of Active Storage	1.0	390.00	0.0390	0.012



100-YR Flow Rate (m3/s)

Target	0.015	
Actual Provided	0.012	✓

Required Storage (m3)

Provided	390	
Utilized	385	✓

NOTE:

Storm MH at Lam Blvd/Old Hwy 24 inv	242.01
STMH T/G	243.00
Site Ground Elevation	~242.5 - 244.5

APPENDIX C

Domestic Water Demand Calculations

Fire Flow Calculation Distances

FUS Calculations

OBC Calculations

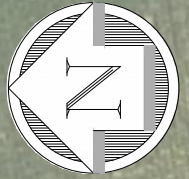
Norfolk ISMP Map

Maximum Daily Demand

Total Number of Units	55 units
Zoning of Land	Residential
Equiv. Population Density	2.75 ppl/unit
Equiv. Population	152
Av. Daily Demand Per Capita	0.45 m ³ /capita/day
Maximum Daily Demand Peaking Factor	2.25
Maximum Daily Demand	153.90 m ³ /day
	1.78 l/s

Maximum Hourly Demand

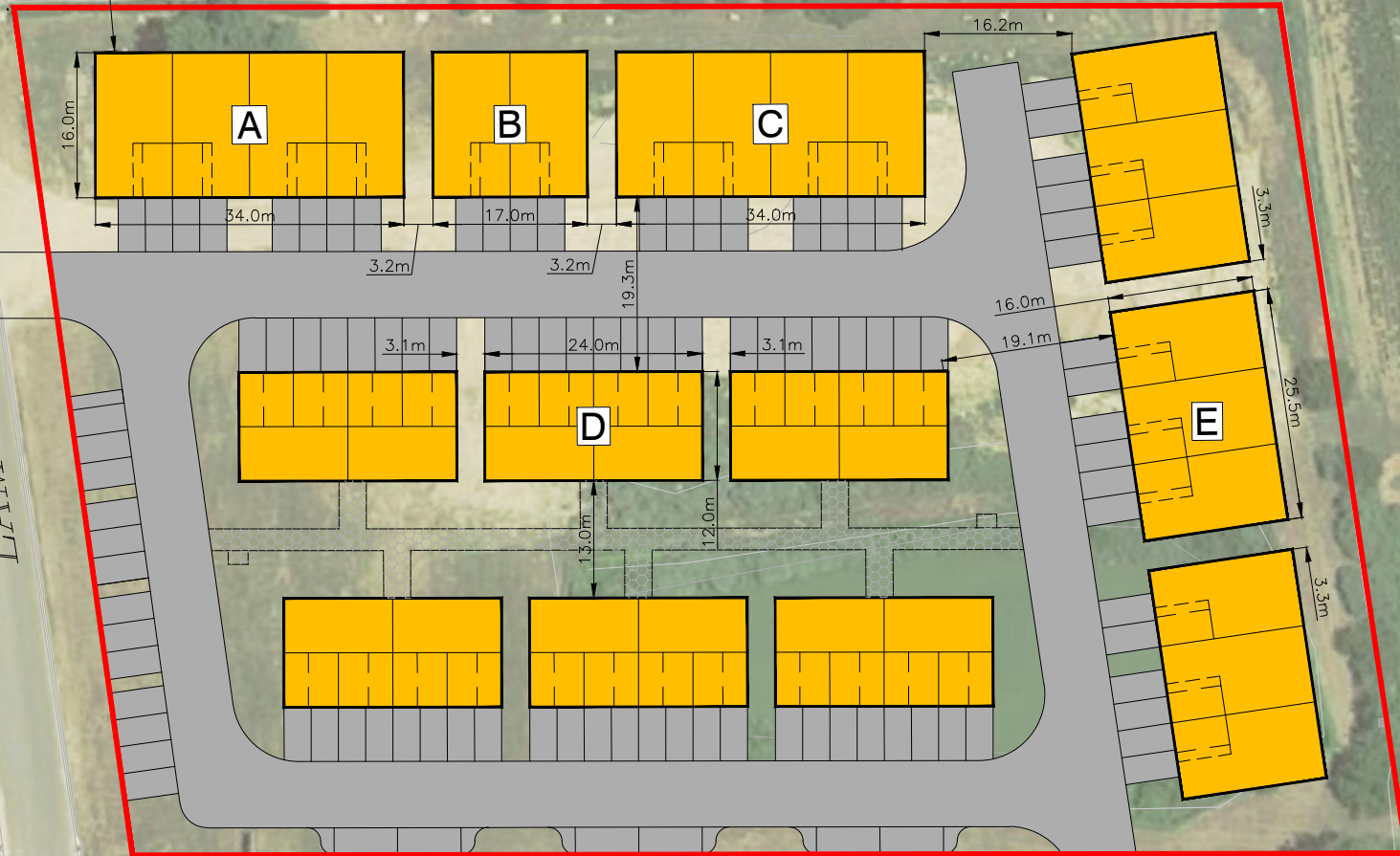
Total Number of Units	55 units
Zoning of Land	Residential
Equiv. Population Density	2.75 ppl/ha
Equiv. Population	152
Av. Daily Demand Per Capita	0.45 m ³ /capita/day
Maximum Hourly Demand Peaking Factor	4
Maximum Hourly Demand	11.40 m ³ /hour
	3.17 l/s



N.T.S.

LAM BLVD

OLD HWY 24



UNIT BLOCK A

1) Fire Flow Requirement

$$F_1 = 220C(A^{1/2}) \quad (\text{L/min})$$

C= 1.5 Construction coefficient for wood frame construction

A= 544.0 Floor Area m² = main floor area
= 1088.0 Fire Area m² = main floor area + second floor area

$$F_1 = 10885 \text{ L/min}$$

$$F_1 = \mathbf{11000 \text{ L/min}} \quad (\text{Round to the nearest 1,000 l/min})$$

2) Occupancy

Occupancy Type: Residential Non-Combustible

Reduction: 25%

Surcharge: 0%

$$F_2 = F_1 + (F_1 * \text{Reduction} / \text{Surcharge}) \quad (\text{L/min})$$

$$F_2 = \mathbf{8250 \text{ L/min}}$$

3) Sprinkler System

Sprinkler System: Not Applicable (assumed no sprinkler system in service)

Reduction: 0%

$$F_3 = F_2 * \text{Reduction} \quad (\text{L/min})$$

$$F_3 = \mathbf{0 \text{ L/min}}$$

4) Seperation

<u>Location</u>	<u>Direction</u>	<u>Distance (m)</u>	<u>Surcharge</u>	<u>Separation Surcharges</u>	
Front	West	19.3	15%	0 to 3m	25%
Side	North	9999.0	0%	3.1m to 10m	20%
Side	South	3.2	20%	10.1m to 20m	15%
Rear	East	11.7	15%	20.1 to 30m	10%
Total:			50%	30.1 to 45m	5%

$$F_4 = (\text{TOTAL}) * F_2 \quad (\text{L/min})$$

$$F_4 = \mathbf{4125 \text{ L/min}}$$

Total Fire Flow

$$F = F_2 - F_3 + F_4 = 12375 \text{ L/min}$$

$$= \mathbf{12000 \text{ L/min}} \quad (\text{Round to the nearest 1,000 l/min})$$

$$= \mathbf{200.0 \text{ L/s}}$$

Notes: 1) All calculations and factors from Part 2 "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 1999
2) 9999 denotes either the nearest building > 45m away or a fire wall is provided

UNIT BLOCK B

1) Fire Flow Requirement

$$F_1 = 220C(A^{1/2}) \quad (\text{L/min})$$

C= 1.5 Construction coefficient for wood frame construction

A= 272.0 Floor Area m² = main floor area
= 544.0 Fire Area m² = main floor area + second floor area

$$F_1 = 7697 \text{ L/min}$$

$$F_1 = \mathbf{8000 \text{ L/min}} \quad (\text{Round to the nearest 1,000 l/min})$$

2) Occupancy

Occupancy Type: Residential Non-Combustible

Reduction: 25%

Surcharge: 0%

$$F_2 = F_1 + (F_1 * \text{Reduction} / \text{Surcharge}) \quad (\text{L/min})$$

$$F_2 = \mathbf{6000 \text{ L/min}}$$

3) Sprinkler System

Sprinkler System: Not Applicable (assumed no sprinkler system in service)

Reduction: 0%

$$F_3 = F_2 * \text{Reduction} \quad (\text{L/min})$$

$$F_3 = \mathbf{0 \text{ L/min}}$$

4) Seperation

<u>Location</u>	<u>Direction</u>	<u>Distance (m)</u>	<u>Surcharge</u>	<u>Separation Surcharges</u>	
Front	West	19.3	15%	0 to 3m	25%
Side	North	3.2	20%	3.1m to 10m	20%
Side	South	3.2	20%	10.1m to 20m	15%
Rear	East	9999.0	0%	20.1 to 30m	10%
Total:			55%	30.1 to 45m	5%

$$F_4 = (\text{TOTAL}) * F_2 \quad (\text{L/min})$$

$$F_4 = \mathbf{3300 \text{ L/min}}$$

Total Fire Flow

$$F = F_2 - F_3 + F_4 = 9300 \text{ L/min}$$

$$= \mathbf{9000 \text{ L/min}} \quad (\text{Round to the nearest 1,000 l/min})$$

$$= \mathbf{150.0 \text{ L/s}}$$

Notes: 1) All calculations and factors from Part 2 "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 1999
2) 9999 denotes either the nearest building > 45m away or a fire wall is provided

UNIT BLOCK C

1) Fire Flow Requirement

$$F_1 = 220C(A^{1/2}) \quad (\text{L/min})$$

C= 1.5 Construction coefficient for wood frame construction

A= 544.0 Floor Area m² = main floor area
= 1088.0 Fire Area m² = main floor area + second floor area

$$F_1 = 10885 \text{ L/min}$$

$$F_1 = \mathbf{11000 \text{ L/min}} \quad (\text{Round to the nearest 1,000 l/min})$$

2) Occupancy

Occupancy Type: Residential Non-Combustible

Reduction: 25%

Surcharge: 0%

$$F_2 = F_1 + (F_1 * \text{Reduction/Surcharge}) \quad (\text{L/min})$$

$$F_2 = \mathbf{8250 \text{ L/min}}$$

3) Sprinkler System

Sprinkler System: Not Applicable (assumed no sprinkler system in service)

Reduction: 0%

$$F_3 = F_2 * \text{Reduction} \quad (\text{L/min})$$

$$F_3 = \mathbf{0 \text{ L/min}}$$

4) Seperation

<u>Location</u>	<u>Direction</u>	<u>Distance (m)</u>	<u>Surcharge</u>	<u>Separation Surcharges</u>	
Front	West	19.3	15%	0 to 3m	25%
Side	North	3.2	20%	3.1m to 10m	20%
Side	South	16.2	15%	10.1m to 20m	15%
Rear	East	9999.0	0%	20.1 to 30m	10%
Total:			50%	30.1 to 45m	5%

$$F_4 = (\text{TOTAL}) * F_2 \quad (\text{L/min})$$

$$F_4 = \mathbf{4125 \text{ L/min}}$$

Total Fire Flow

$$F = F_2 - F_3 + F_4 = 12375 \text{ L/min}$$

$$= \mathbf{12000 \text{ L/min}} \quad (\text{Round to the nearest 1,000 l/min})$$

$$= \mathbf{200.0 \text{ L/s}}$$

Notes: 1) All calculations and factors from Part 2 "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 1999
2) 9999 denotes either the nearest building > 45m away or a fire wall is provided

UNIT BLOCK D

1) Fire Flow Requirement

$$F_1 = 220C(A^{1/2}) \quad (\text{L/min})$$

C= 1.5 Construction coefficient for wood frame construction

A= 288.0 Floor Area m² = main floor area
= 864.0 Fire Area m² = main floor area + 2nd floor area + 3rd floor area

$$F_1 = 9700 \text{ L/min}$$

$$F_1 = \mathbf{10000 \text{ L/min}} \quad (\text{Round to the nearest 1,000 l/min})$$

2) Occupancy

Occupancy Type: Residential Non-Combustible

Reduction: 25%

Surcharge: 0%

$$F_2 = F_1 + (F_1 * \text{Reduction/Surcharge}) \quad (\text{L/min})$$

$$F_2 = \mathbf{7500 \text{ L/min}}$$

3) Sprinkler System

Sprinkler System: Not Applicable (assumed no sprinkler system in service)

Reduction: 0%

$$F_3 = F_2 * \text{Reduction} \quad (\text{L/min})$$

$$F_3 = \mathbf{0 \text{ L/min}}$$

4) Seperation

<u>Location</u>	<u>Direction</u>	<u>Distance (m)</u>	<u>Surcharge</u>	<u>Separation Surcharges</u>	
Front	East	19.3	15%	0 to 3m	25%
Side	North	3.1	20%	3.1m to 10m	20%
Side	South	3.1	20%	10.1m to 20m	15%
Rear	West	13.0	15%	20.1 to 30m	10%
Total:			70%	30.1 to 45m	5%

$$F_4 = (\text{TOTAL}) * F_2 \quad (\text{L/min})$$

$$F_4 = \mathbf{5250 \text{ L/min}}$$

Total Fire Flow

$$F = F_2 - F_3 + F_4 = 12750 \text{ L/min}$$

$$= \mathbf{13000 \text{ L/min}} \quad (\text{Round to the nearest 1,000 l/min})$$

$$= \mathbf{216.7 \text{ L/s}}$$

Notes: 1) All calculations and factors from Part 2 "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 1999
2) 9999 denotes either the nearest building > 45m away or a fire wall is provided

UNIT BLOCK E

1) Fire Flow Requirement

$$F_1 = 220C(A^{1/2}) \quad (\text{L/min})$$

C= 1.5 Construction coefficient for wood frame construction

A= 408.0 Floor Area m² = main floor area
= 816.0 Fire Area m² = main floor area + second floor area

$$F_1 = 9427 \text{ L/min}$$

$$F_1 = \mathbf{9000 \text{ L/min}} \quad (\text{Round to the nearest 1,000 l/min})$$

2) Occupancy

Occupancy Type: Residential Non-Combustible

Reduction: 25%

Surcharge: 0%

$$F_2 = F_1 + (F_1 * \text{Reduction} / \text{Surcharge}) \quad (\text{L/min})$$

$$F_2 = \mathbf{6750 \text{ L/min}}$$

3) Sprinkler System

Sprinkler System: Not Applicable (assumed no sprinkler system in service)

Reduction: 0%

$$F_3 = F_2 * \text{Reduction} \quad (\text{L/min})$$

$$F_3 = \mathbf{0 \text{ L/min}}$$

4) Seperation

<u>Location</u>	<u>Direction</u>	<u>Distance (m)</u>	<u>Surcharge</u>	<u>Separation Surcharges</u>	
Front	North	19.1	15%	0 to 3m	25%
Side	East	3.3	20%	3.1m to 10m	20%
Side	West	3.3	20%	10.1m to 20m	15%
Rear	South	9999.0	0%	20.1 to 30m	10%
Total:			55%	30.1 to 45m	5%

$$F_4 = (\text{TOTAL}) * F_2 \quad (\text{L/min})$$

$$F_4 = \mathbf{3713 \text{ L/min}}$$

Total Fire Flow

$$F = F_2 - F_3 + F_4 = 10463 \text{ L/min}$$

$$= \mathbf{10000 \text{ L/min}} \quad (\text{Round to the nearest 1,000 l/min})$$

$$= \mathbf{166.7 \text{ L/s}}$$

Notes: 1) All calculations and factors from Part 2 "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 1999
2) 9999 denotes either the nearest building > 45m away or a fire wall is provided

ON-SITE FIRE PROTECTION SUPPLY CALCULATION

Per Fire Protection Water Supply Guideline, Ontario Building Code Division 3, Part B, 3.2.5.7

Project:	20-128 Orchard Square	Building/Block #:	Unit Block A
Project Location:	Waterford, ON	Firewalls/Sprinkler:	

Conditions not requiring On-Site Fire Protection:

Building area is Less than 200 m ² or Less	<input type="checkbox"/>
Building height is 2 Storeys or Less	<input checked="" type="checkbox"/>
Building does not have a Group B Occupancy (Care or Detention)	<input checked="" type="checkbox"/>
Building does not require a sprinkler system or standpipe and hose system	<input checked="" type="checkbox"/>
Limiting distance from the property line is at least 13 m if the building has an F-1 (high hazard industrial) occupancy	<input checked="" type="checkbox"/>
Building constitutes no significant environmental contamination potential under fire conditions	<input checked="" type="checkbox"/>
On-Site Supply Required?	YES

Calculation Information:

$$Q = K * V * S_{Tot}$$

where: Q = Minimum supply of water in litres (L)
V = Total Building Volume in cubic metres
K = Water supply coefficient from Table 1
S_{Tot} = total of spatial coefficient values from property line exposures on all sides, as obtained from the formula:

$$S_{Tot} = 1.0 + [(S_{Side1}) + (S_{Side2}) + (S_{Side3}) + ... etc.]$$

where: S_{Side} = values are obtained from Figure 1, as modified by Sections 6.3 (e) and 6.3 (f) of the OBC Guideline
S_{Tot} = need not exceed 2.0 (see Section 7.0 of the OBC Guideline)

Determining K Value:

Major Occupancy Classification	Residential Occupancies	
Group	C	
Division	-	
Building is of combustible construction. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire resistance rating.		
	K Factor	23

Determining Building Volume:

Average Length (m)	34.0	
Average Width (m)	16	
Height, including basements (m)	11.0	
	Building Volume (m³)	5984

Total Spatial Coefficient:

	Exposure Distance (m)	Factor	
North Side	>10	0	
East Side	>10	0	
South Side	3.2	1	
West Side	>10	0	
		S_{Tot} Factor	2

Minimum Water Supply Flow:

	Q (L)	275,264
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Minimum Water Supply Flow Rate OBC:

9000	L/min
150.0	L/sec

Table 2: Minimum Water Supply Flow Rates	
Building Code, Part 3 Buildings	Required Minimum Water Supply Flow Rate (L/min.)
One-storey building with building area not exceeding 600m ² (excluding F-1 occupancies)	1800
All other buildings	2700 (If Q ≤ 108,000L) ⁽¹⁾ 3600 (If Q > 108,000L and ≤ 135,000L) ⁽¹⁾ 4500 (If Q > 135,000L and ≤ 162,000L) ⁽¹⁾ 5400 (If Q > 162,000L and ≤ 190,000L) ⁽¹⁾ 6300 (If Q > 190,000L and ≤ 270,000L) ⁽¹⁾ 9000 (If Q > 270,000L) ⁽¹⁾

Note: ⁽¹⁾ Q=KVS_{Tot} as referenced in Section 3(a)

ON-SITE FIRE PROTECTION SUPPLY CALCULATION

Per Fire Protection Water Supply Guideline, Ontario Building Code Division 3, Part B, 3.2.5.7

Project:	20-128 Orchard Square	Building/Block #:	Unit Block B
Project Location:	Waterford, ON	Firewalls/Sprinkler:	

Conditions not requiring On-Site Fire Protection:

Building area is Less than 200 m ² or Less	<input type="checkbox"/>
Building height is 2 Storeys or Less	<input checked="" type="checkbox"/>
Building does not have a Group B Occupancy (Care or Detention)	<input checked="" type="checkbox"/>
Building does not require a sprinkler system or standpipe and hose system	<input checked="" type="checkbox"/>
Limiting distance from the property line is at least 13 m if the building has an F-1 (high hazard industrial) occupancy	<input checked="" type="checkbox"/>
Building constitutes no significant environmental contamination potential under fire conditions	<input checked="" type="checkbox"/>
On-Site Supply Required?	YES

Calculation Information:

$$Q = K * V * S_{Tot}$$

where: Q = Minimum supply of water in litres (L)
V = Total Building Volume in cubic metres
K = Water supply coefficient from Table 1
S_{Tot} = total of spatial coefficient values from property line exposures on all sides, as obtained from the formula:

$$S_{Tot} = 1.0 + [(S_{Side1}) + (S_{Side2}) + (S_{Side3}) + ... etc.]$$

where: S_{Side} = values are obtained from Figure 1, as modified by Sections 6.3 (e) and 6.3 (f) of the OBC Guideline
S_{Tot} = need not exceed 2.0 (see Section 7.0 of the OBC Guideline)

Determining K Value:

Major Occupancy Classification	Residential Occupancies	
Group	C	
Division	-	
Building is of combustible construction. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire resistance rating.		
	K Factor	23

Determining Building Volume:

Average Length (m)	17.0	
Average Width (m)	16	
Height, including basements (m)	11.0	
	Building Volume (m³)	2992

Total Spatial Coefficient:

	Exposure Distance (m)	Factor	
North Side	3.2	1	
East Side	>10	0	
South Side	3.2	1	
West Side	>10	0	
			S_{Tot} Factor
			3

Minimum Water Supply Flow:

	Q (L)	206,448
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Minimum Water Supply Flow Rate OBC:

6300	L/min
105.0	L/sec

Table 2: Minimum Water Supply Flow Rates	
Building Code, Part 3 Buildings	Required Minimum Water Supply Flow Rate (L/min.)
One-storey building with building area not exceeding 600m ² (excluding F-1 occupancies)	1800
All other buildings	2700 (If Q ≤ 108,000L) ⁽¹⁾ 3600 (If Q > 108,000L and ≤ 135,000L) ⁽¹⁾ 4500 (If Q > 135,000L and ≤ 162,000L) ⁽¹⁾ 5400 (If Q > 162,000L and ≤ 190,000L) ⁽¹⁾ 6300 (If Q > 190,000L and ≤ 270,000L) ⁽¹⁾ 9000 (If Q > 270,000L) ⁽¹⁾

Note: ⁽¹⁾ Q=KVS_{Tot} as referenced in Section 3(a)

ON-SITE FIRE PROTECTION SUPPLY CALCULATION

Per Fire Protection Water Supply Guideline, Ontario Building Code Division 3, Part B, 3.2.5.7

Project:	20-128 Orchard Square	Building/Block #:	Unit Block C
Project Location:	Waterford, ON	Firewalls/Sprinkler:	

Conditions not requiring On-Site Fire Protection:

- | | |
|---|-------------------------------------|
| Building area is Less than 200 m ² or Less | <input type="checkbox"/> |
| Building height is 2 Storeys or Less | <input checked="" type="checkbox"/> |
| Building does not have a Group B Occupancy (Care or Detention) | <input checked="" type="checkbox"/> |
| Building does not require a sprinkler system or standpipe and hose system | <input checked="" type="checkbox"/> |
| Limiting distance from the property line is at least 13 m if the building has an F-1 (high hazard industrial) occupancy | <input checked="" type="checkbox"/> |
| Building constitutes no significant environmental contamination potential under fire conditions | <input checked="" type="checkbox"/> |

On-Site Supply Required? **YES**

Calculation Information:

$$Q = K * V * S_{Tot}$$

where: Q = Minimum supply of water in litres (L)
V = Total Building Volume in cubic metres
K = Water supply coefficient from Table 1
S_{Tot} = total of spatial coefficient values from property line exposures on all sides, as obtained from the formula:

$$S_{Tot} = 1.0 + [(S_{Side1}) + (S_{Side2}) + (S_{Side3}) + ... etc.]$$

where: S_{Side} = values are obtained from Figure 1, as modified by Sections 6.3 (e) and 6.3 (f) of the OBC Guideline
S_{Tot} = need not exceed 2.0 (see Section 7.0 of the OBC Guideline)

Determining K Value:

Major Occupancy Classification	Residential Occupancies	
Group	C	
Division	-	
Building is of combustible construction. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire resistance rating.		
K Factor		23

Determining Building Volume:

Average Length (m)	34.0	
Average Width (m)	16	
Height, including basements (m)	11.0	
Building Volume (m³)		5984

Total Spatial Coefficient:

	Exposure Distance (m)	Factor	
North Side	3.2	1	
East Side	>10	0	
South Side	>10	1	
West Side	>10	0	
S_{Tot} Factor			3

Minimum Water Supply Flow:

	Q (L)	412,896
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Minimum Water Supply Flow Rate OBC:

9000	L/min
150.0	L/sec

Table 2: Minimum Water Supply Flow Rates	
Building Code, Part 3 Buildings	Required Minimum Water Supply Flow Rate (L/min.)
One-storey building with building area not exceeding 600m ² (excluding F-1 occupancies)	1800
All other buildings	2700 (If Q ≤ 108,000L) ⁽¹⁾ 3600 (If Q > 108,000L and ≤ 135,000L) ⁽¹⁾ 4500 (If Q > 135,000L and ≤ 162,000L) ⁽¹⁾ 5400 (If Q > 162,000L and ≤ 190,000L) ⁽¹⁾ 6300 (If Q > 190,000L and ≤ 270,000L) ⁽¹⁾ 9000 (If Q > 270,000L) ⁽¹⁾

Note: ⁽¹⁾ Q=KVS_{Tot} as referenced in Section 3(a)

ON-SITE FIRE PROTECTION SUPPLY CALCULATION

Per Fire Protection Water Supply Guideline, Ontario Building Code Division 3, Part B, 3.2.5.7

Project:	20-128 Orchard Square	Building/Block #:	Unit Block D
Project Location:	Waterford, ON	Firewalls/Sprinkler:	

Conditions not requiring On-Site Fire Protection:

Building area is Less than 200 m ² or Less	<input type="checkbox"/>
Building height is 2 Storeys or Less	<input type="checkbox"/>
Building does not have a Group B Occupancy (Care or Detention)	<input checked="" type="checkbox"/>
Building does not require a sprinkler system or standpipe and hose system	<input checked="" type="checkbox"/>
Limiting distance from the property line is at least 13 m if the building has an F-1 (high hazard industrial) occupancy	<input checked="" type="checkbox"/>
Building constitutes no significant environmental contamination potential under fire conditions	<input checked="" type="checkbox"/>
On-Site Supply Required?	YES

Calculation Information:

$$Q = K * V * S_{Tot}$$

where: Q = Minimum supply of water in litres (L)
V = Total Building Volume in cubic metres
K = Water supply coefficient from Table 1
S_{Tot} = total of spatial coefficient values from property line exposures on all sides, as obtained from the formula:

$$S_{Tot} = 1.0 + [(S_{Side1}) + (S_{Side2}) + (S_{Side3}) + ... etc.]$$

where: S_{Side} = values are obtained from Figure 1, as modified by Sections 6.3 (e) and 6.3 (f) of the OBC Guideline
S_{Tot} = need not exceed 2.0 (see Section 7.0 of the OBC Guideline)

Determining K Value:

Major Occupancy Classification	Residential Occupancies	
Group	C	
Division	-	
Building is of combustible construction. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire resistance rating.		
K Factor		23

Determining Building Volume:

Average Length (m)	24.0	
Average Width (m)	12	
Height, including basements (m)	11.0	
Building Volume (m³)		3168

Total Spatial Coefficient:

	Exposure Distance (m)	Factor	
North Side	3.1	1	
East Side	>10	0	
South Side	3.1	1	
West Side	>10	0	
S_{Tot} Factor			3

Minimum Water Supply Flow:

	Q (L)	218,592
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Minimum Water Supply Flow Rate OBC:

6300	L/min
105.0	L/sec

Table 2: Minimum Water Supply Flow Rates	
Building Code, Part 3 Buildings	Required Minimum Water Supply Flow Rate (L/min.)
One-storey building with building area not exceeding 600m ² (excluding F-1 occupancies)	1800
All other buildings	2700 (If Q ≤ 108,000L) ⁽¹⁾ 3600 (If Q > 108,000L and ≤ 135,000L) ⁽¹⁾ 4500 (If Q > 135,000L and ≤ 162,000L) ⁽¹⁾ 5400 (If Q > 162,000L and ≤ 190,000L) ⁽¹⁾ 6300 (If Q > 190,000L and ≤ 270,000L) ⁽¹⁾ 9000 (If Q > 270,000L) ⁽¹⁾

Note: ⁽¹⁾ Q=KVS_{Tot} as referenced in Section 3(a)

ON-SITE FIRE PROTECTION SUPPLY CALCULATION

Per Fire Protection Water Supply Guideline, Ontario Building Code Division 3, Part B, 3.2.5.7

Project:	20-128 Orchard Square	Building/Block #:	Unit Block E
Project Location:	Waterford, ON	Firewalls/Sprinkler:	

Conditions not requiring On-Site Fire Protection:

Building area is Less than 200 m ² or Less	<input type="checkbox"/>
Building height is 2 Storeys or Less	<input checked="" type="checkbox"/>
Building does not have a Group B Occupancy (Care or Detention)	<input checked="" type="checkbox"/>
Building does not require a sprinkler system or standpipe and hose system	<input checked="" type="checkbox"/>
Limiting distance from the property line is at least 13 m if the building has an F-1 (high hazard industrial) occupancy	<input checked="" type="checkbox"/>
Building constitutes no significant environmental contamination potential under fire conditions	<input checked="" type="checkbox"/>
On-Site Supply Required?	YES

Calculation Information:

$$Q = K * V * S_{Tot}$$

where: Q = Minimum supply of water in litres (L)
V = Total Building Volume in cubic metres
K = Water supply coefficient from Table 1
S_{Tot} = total of spatial coefficient values from property line exposures on all sides, as obtained from the formula:

$$S_{Tot} = 1.0 + [(S_{Side1}) + (S_{Side2}) + (S_{Side3}) + ... etc.]$$

where: S_{Side} = values are obtained from Figure 1, as modified by Sections 6.3 (e) and 6.3 (f) of the OBC Guideline
S_{Tot} = need not exceed 2.0 (see Section 7.0 of the OBC Guideline)

Determining K Value:

Major Occupancy Classification	Residential Occupancies	
Group	C	
Division	-	
Building is of combustible construction. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire resistance rating.		
K Factor		23

Determining Building Volume:

Average Length (m)	25.5	
Average Width (m)	16	
Height, including basements (m)	11.0	
Building Volume (m³)		4488

Total Spatial Coefficient:

	Exposure Distance (m)	Factor	
North Side	>10	0	
East Side	3.3	1	
South Side	3.3	1	
West Side	>10	0	
S_{Tot} Factor			3

Minimum Water Supply Flow:

	Q (L)	309,672
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Minimum Water Supply Flow Rate OBC:

9000	L/min
150.0	L/sec

Table 2: Minimum Water Supply Flow Rates	
Building Code, Part 3 Buildings	Required Minimum Water Supply Flow Rate (L/min.)
One-storey building with building area not exceeding 600m ² (excluding F-1 occupancies)	1800
All other buildings	2700 (If Q ≤ 108,000L) ⁽¹⁾ 3600 (If Q > 108,000L and ≤ 135,000L) ⁽¹⁾ 4500 (If Q > 135,000L and ≤ 162,000L) ⁽¹⁾ 5400 (If Q > 162,000L and ≤ 190,000L) ⁽¹⁾ 6300 (If Q > 190,000L and ≤ 270,000L) ⁽¹⁾ 9000 (If Q > 270,000L) ⁽¹⁾

Note: ⁽¹⁾ Q=KVS_{Tot} as referenced in Section 3(a)

Ontario Building Code Tables and Figures

XX

Table 3.1.2.1.
Major Occupancy Classification

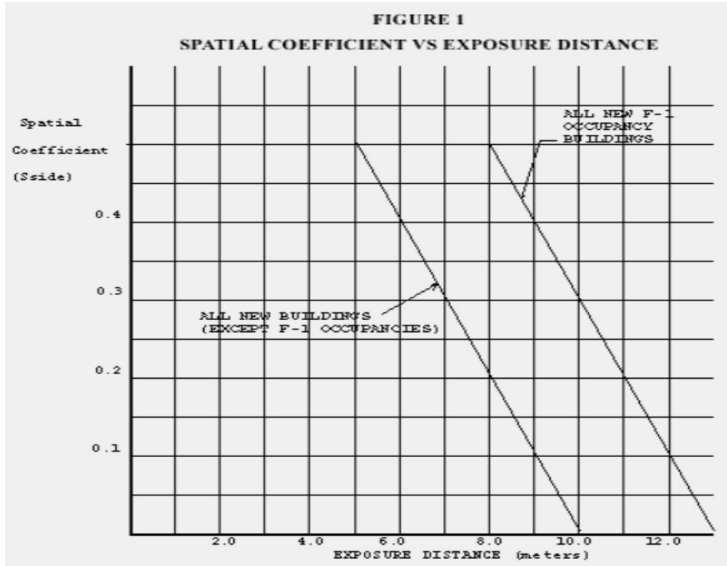
Forming Part of Sentences 3.1.2.1.(1), 3.1.2.2.(1) and 3.11.2.1.(3)

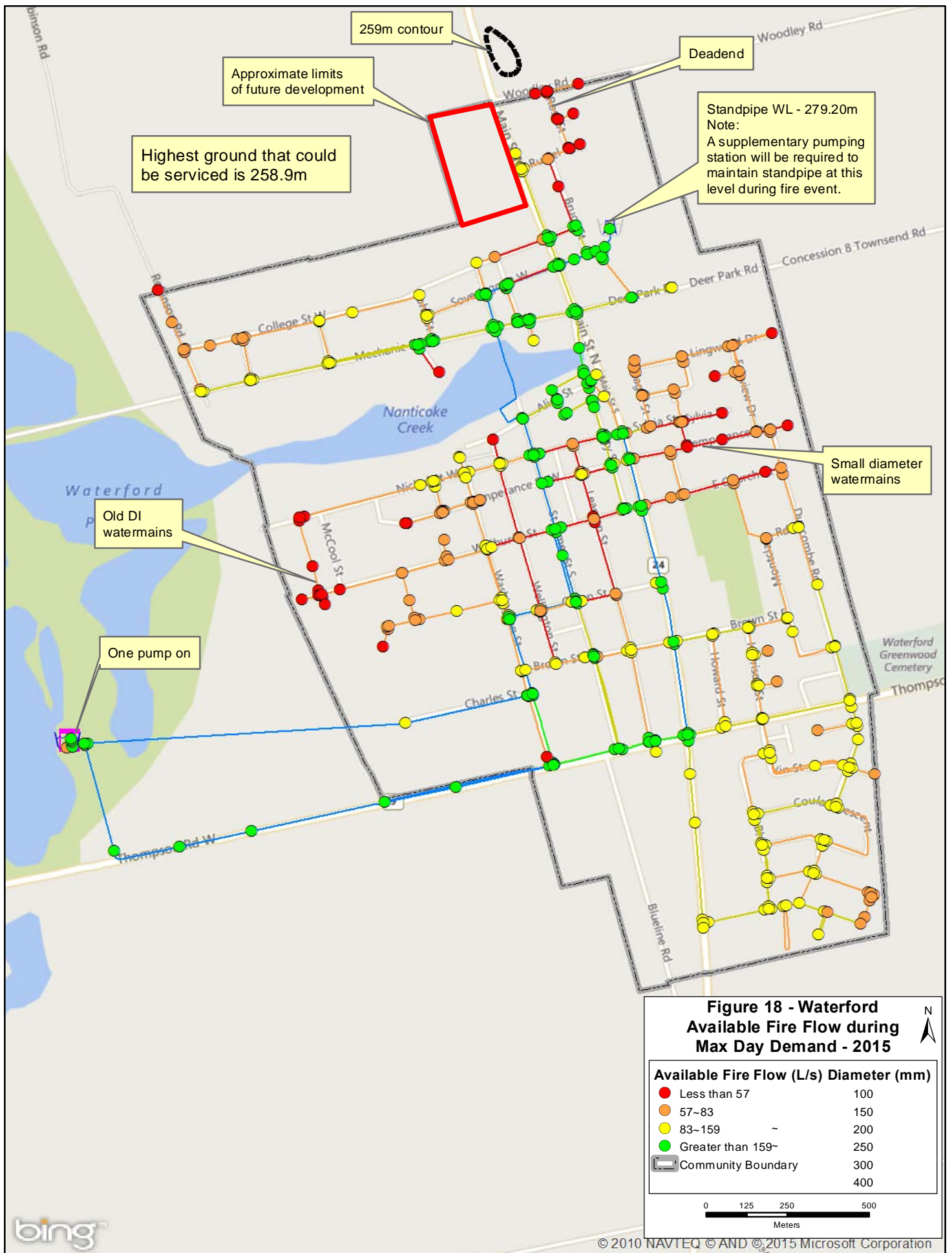
Item	Column 1 Group	Column 2 Division	Column 3 Description of Major Occupancies
1.	A	1	Assembly occupancies intended for the production and viewing of the performing arts
2.	A	2	Assembly occupancies not elsewhere classified in Group A
3.	A	3	Assembly occupancies of the arena type
4.	A	4	Assembly occupancies in which occupants are gathered in the open air
5.	B	1	Detention occupancies
6.	B	2	Care and treatment occupancies
7.	B	3	Care occupancies
8.	C	---	Residential occupancies
9.	D	---	Business and personal services occupancies
10.	E	---	Mercantile occupancies
11.	F	1	High hazard industrial occupancies
12.	F	2	Medium hazard industrial occupancies
13.	F	3	Low hazard industrial occupancies

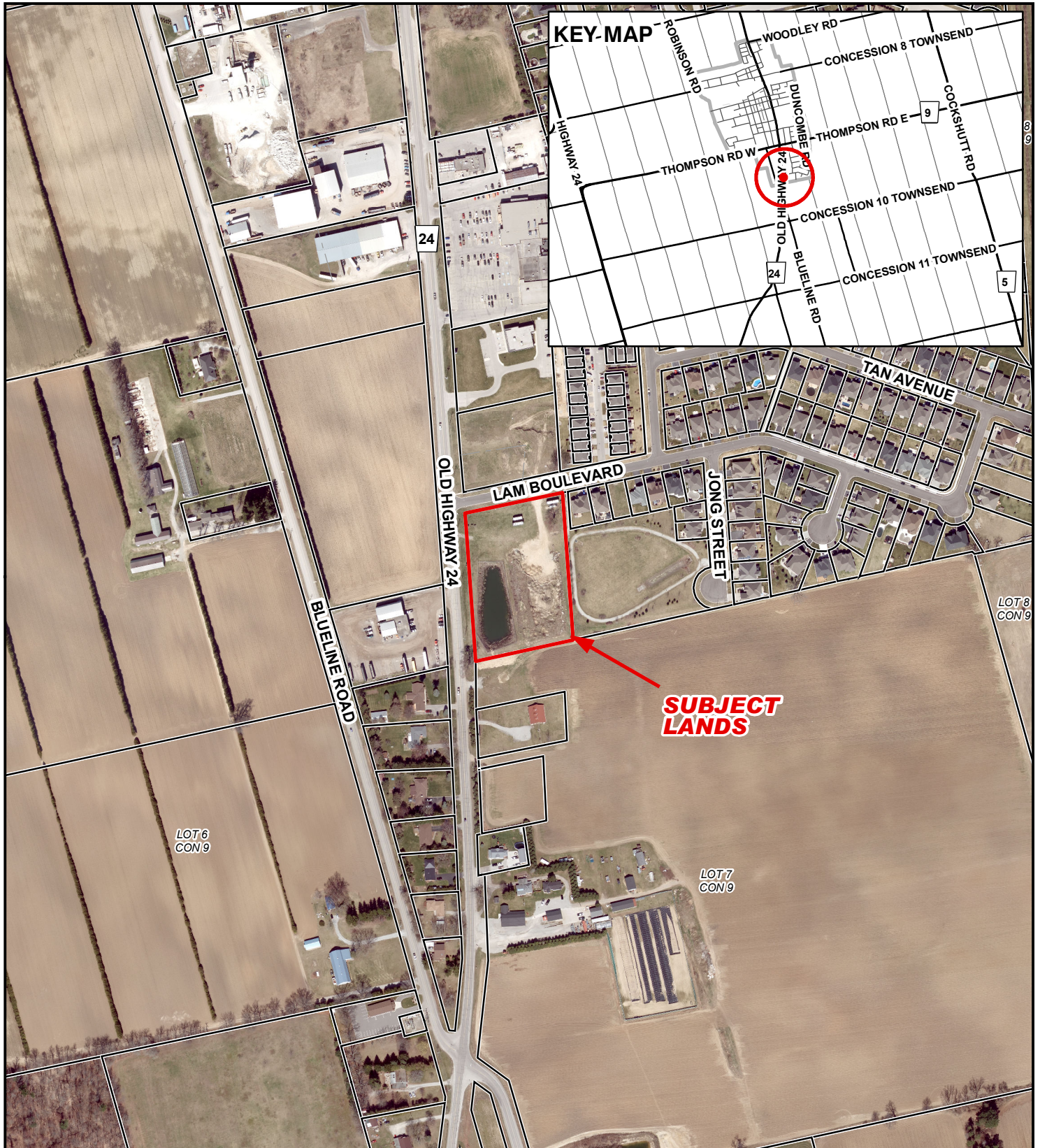
Table 2: Minimum Water Supply Flow Rates	
Building Code, Part 3 Buildings	Required Minimum Water Supply Flow Rate (L/min.)
One-storey building with building area not exceeding 600m² (excluding F-1 occupancies)	1800
All other buildings	2700 (If $Q \leq 108,000L^{(1)}$ 3600 (If $Q > 108,000L$ and $\leq 135,000L^{(1)}$ 4500 (If $Q > 135,000L$ and $\leq 162,000L^{(1)}$ 5400 (If $Q > 162,000L$ and $\leq 190,000L^{(1)}$ 6300 (If $Q > 190,000L$ and $\leq 270,000L^{(1)}$ 9000 (If $Q > 270,000L^{(1)}$

Note: ⁽¹⁾ $Q=KVS_{Tot}$ as referenced in Section 3(a)


Table 1: Water Supply Coefficient - K	
TYPE OF CONSTRUCTION	Classification by Group or Division in Accordance with Table 3.1.2.1 of the Ontario Building Code
	A-2 B-1 B-2 B-3 C D
	A-4 F-3
	A-1 A-3<
	E-2
	F-1
Building is of noncombustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2. of the OBC, including loadbearing walls, columns and arches.	10 12 14 17 23
Building is of noncombustible construction or of heavy timber construction conforming to Article 3.1.4.6. of the OBC. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.	16 19 22 27 37
Building is of combustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2. of the OBC, including loadbearing walls, columns and arches. Noncombustible construction may be used in lieu of fire-resistance rating where permitted in Subsection 3.2.2. of the OBC.	18 22 25 31 41
Building is of combustible construction. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.	23 28 32 39 53
Column 1	2 3 4 5 6







Legend

 Subject Lands

2020 Air Photo

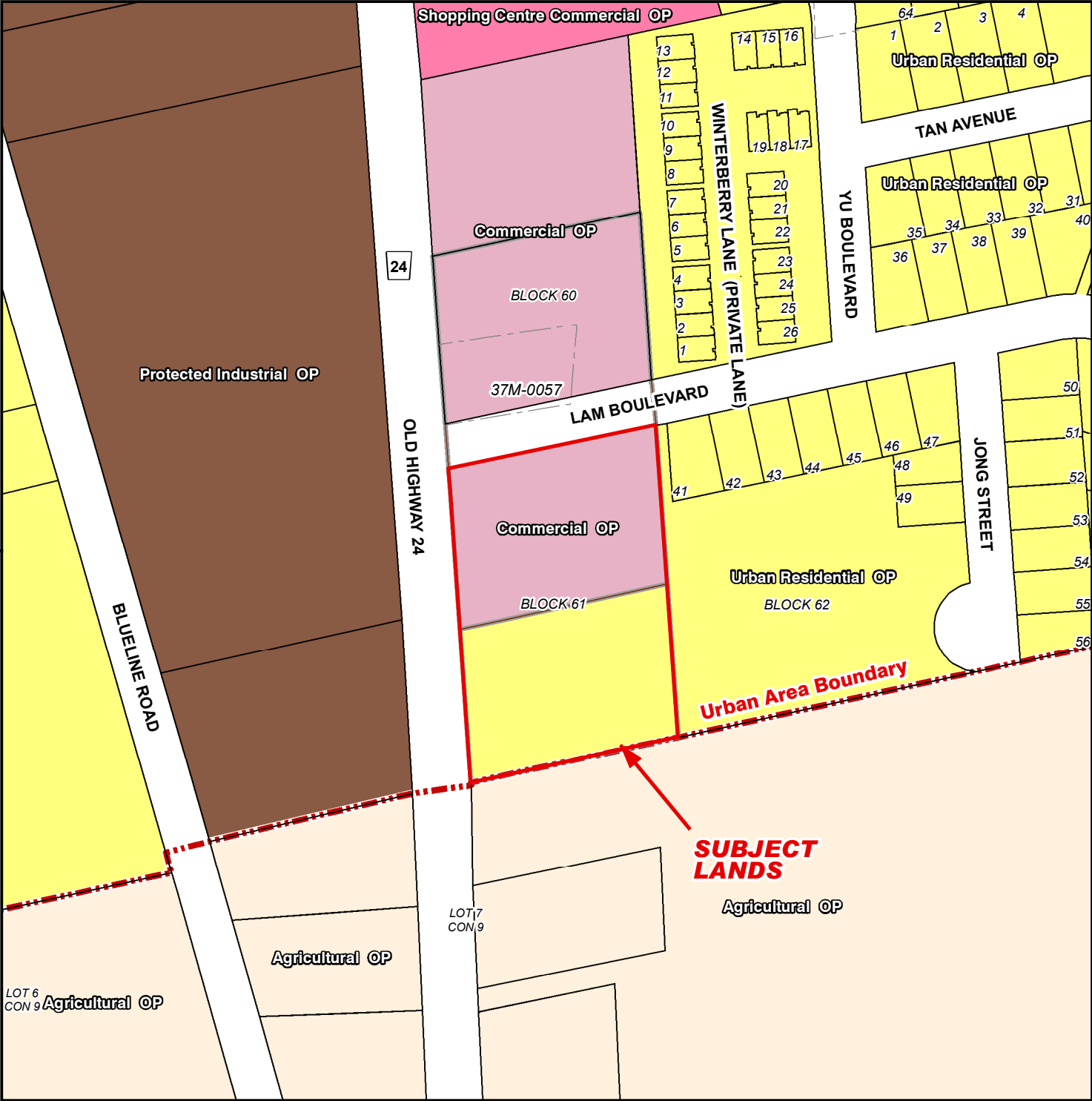
2/7/2022



40 20 0 40 80 120 160 Meters

MAP B
PROPOSED OFFICIAL PLAN AMENDMENT MAP
Geographic Township of TOWNSEND

OPNPL2022039
ZNPL2022040



Legend

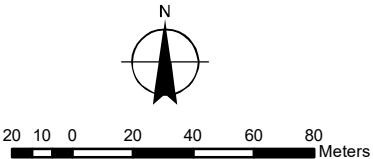
Subject Lands

Official Plan Designations

- Agricultural
- Urban Residential
- Shopping Centre Commercial
- Commercial
- Protected Industrial
- Urban Area Boundary

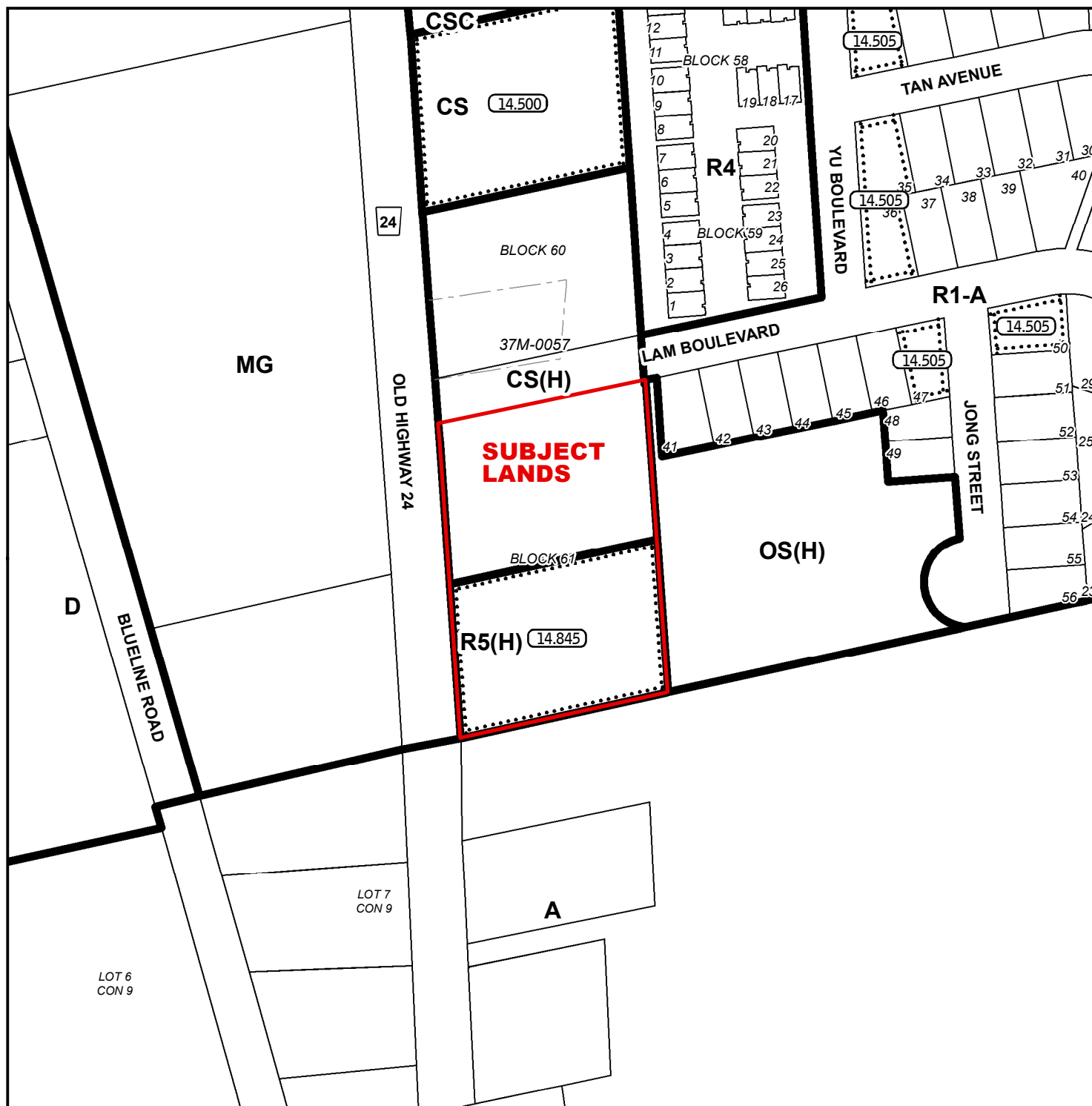
From: Commercial
To: Urban Residential

2/7/2022



MAP C
PROPOSED ZONING BY-LAW AMENDMENT MAP
 Geographic Township of TOWNSEND

OPNPL2022039
 ZNPL2022040



ZONING BY-LAW 1-Z-2014

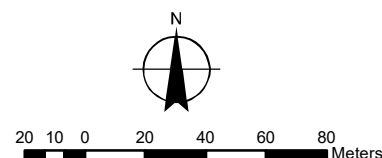
2/7/2022

LEGEND

Subject Lands

- (H) - Holding
- A - Agricultural Zone
- CS - Service Commercial Zone
- CSC - Shopping Centre Commercial Zone
- D - Development Zone
- MG - General Industrial Zone
- OS - Open Space Zone
- R1-A - Residential R1-A Zone
- R4 - Residential R4 Zone
- R5 - Residential R5 Zone

From: CS(H) & R5(H) with 14.845
To: R4(H) with Special Provisions



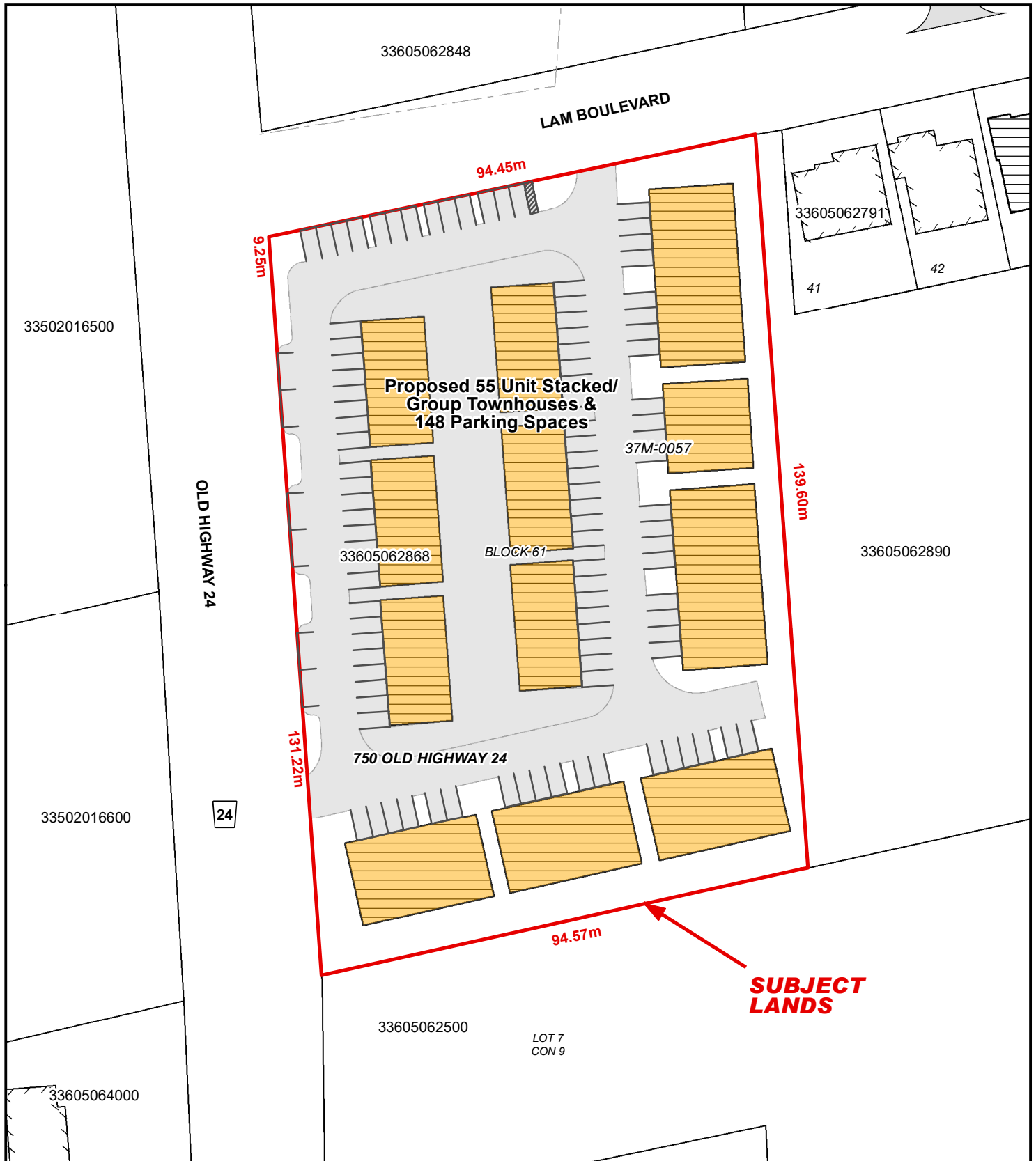
MAP D

CONCEPTUAL PLAN


Geographic Township of TOWNSEND

OPNPL2022039

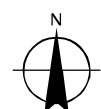
ZNPL2022040



Legend

 Subject Lands

2/7/2022



8 4 0 8 16 24 32 Meters