MHBC | PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

April 17, 2024

Mohammad Alam
Supervisor, Development Planning
Norfolk County
185 Robinson Street
Simcoe, ON
N3Y 5L6

Dear Mr. Alam;

RE: LYNN RIVER HEIGHTS PHASE II
DRAFT PLAN OF SUBDIVISION AND ZONING BY-LAW AMENDMENT
597 HIGHWAY 6, PORT DOVER
OUR FILE: 08103B

On behalf of our client, Democrat Port Dover Limited (the "Owner"), we are pleased to submit revised materials in support of our Draft Plan of Subdivision ("DPOS") and Zoning By-law Amendment ("ZBA") applications, re-submitted on July 13th, 2023, and further communicated via email correspondence November 6th, 7th, & 20th, 2023 (County File Nos. 28TPL2017317 and ZNPL2017318.), in response to the various comments received.

Digital (PDF) copies of the following revised materials are provided in response to comments received by City Staff on June 27, 2023 and comments received from the statutory Public Meeting held on December 5, 2023, and are enclosed with this submission:

- Revised Draft Plan of Subdivision prepared by MHBC, dated March 14, 2024;
- Revised Coloured Draft Plan of Subdivision, dated March 14, 2024 with Zoning Table prepared by MHBC
- Revised Draft Zoning By-law (text and Schedule) prepared by MHBC;
- Comment Response Matrix prepared by MHBC, addressing all comments provided by County Staff and at the Public Meeting;
- Comment Response Matrix prepared by Crozier Consulting Engineering, addressing the previous Ainley comments
- Updated Functional Servicing and Stormwater Management Report (FSR/SWM) prepared by Crozier Consulting Engineers, dated March 2024;
- Updated Traffic Impact Study (TIS) prepared by NexTrans, dated April 16, 2024; and
- Streetscape and Parking Plan Report prepared by MHBC, dated April 12, 2024;

REVISIONS TO THE DRAFT PLAN

Revisions to the DPOS have occurred to address the necessary stormwater management requirements as outlined within Crozier Engineering's updated March 2024 enclosed FSR/SWM Report, as well as the comments received at the Public Meting. Below is a summary of the revisions:

- Increase in the size of Block 451 for the stormwater management pond (1.52 ha)
- Decrease in the size of Block 450 for the park to accommodate the increased stormwater management block (0.58 ha)
- New Block 519 to serve as a drainage block to accommodate the existing drainage from the adjacent property to the west of the development
- Reduction of lot frontages and areas for lots 6-9 to accommodate the new drainage block (Block 519)
- Revisions to the Zoning By-law Amendment (ZBA) Schedule to capture the reduced lot frontages of lots 6-9
- Re-location of Block 455 to provide access to the Hazard Lands

Re-location of Walkway/Access Block

As previously noted, the revised DPOS, dated March 14, 2024, has re-located Block 455, which provided the walkway/access to the "Hazard Lands" (Blocks 457 and 458). During the Public Meeting, connection to the municipal trail system was a desired initiative from members of Council, as they recognized an existing a trail network within the vicinity of the Subject Lands.

It is our understanding that Hazard Lands and walkway/access blocks will be transferred to the municipality as part of the subdivision agreement and registration. The location of the walkway/access block may provide access to the lands to the North, and enable a future connection to the trail network, once it is determined as appropriate by the municipality.

REVISIONS TO THE ZBA SCHEDULE

The revisions to the ZBA Schedule will implement the decreased lot frontages for lots 6-9, as a result of introducing the new drainage block. The size increase of the stormwater management block and decrease of the parkland block do not require revisions to the ZBA Schedule, as the permitted uses remain within the respective Open Space zone proposed in the July, 2023 submission. Furthermore the drainage block and re-located walkway/access block are permitted within their respective zones, and do not require further revisions to the Zoning By-law Amendment (ZBA).

Despite the minor revisions to the ZBA Schedule, the changes do not result in the increase or decrease of the total number of residential dwelling units (449 dwelling units) within the DPOS.

The park block will continue to be of a size (0.58 ha) and configuration (49.2 m in width and 120.3 m in length) to allow for meaningful park use.

UPDATED TECHNICAL STUDIES

As requested by County Staff, the Owner has updated the required supporting technical studies (FSR/SWM and TIS), to reflect the changes to the Phase 2 DPOS and address comments regarding, but not limited to, stormwater management, daily water and sewer flows, traffic signalization, and the internal road network design of the subdivision. Furthermore, an additional report (Streetscape & Parking Plan Report) was prepared to address comments regarding the on-street parking capacity/supply raised at the Public Meeting.

The Commenting Matrices included in this submission addresses all comments provided by County Staff and received at the Public Meeting. In summary the technical studies concluded the following:

Crozier Engineering March 2024 FSR/SWM Report

- Stormwater can be appropriately managed without impacting the surrounding area through the proposed internal storm sewer, the proposed storm water management pond, the existing storm sewer located on Willowdale Crescent, and the existing storm ditch on Highway 6.
- Total peak sanitary flow for the proposed development is 41.14 L/s. (Additional correspondence with the Norfolk County will be required throughout the design process to ensure that sufficient sanitary allocation is provided for the site)
- The domestic maximum day demand and peak hourly water demand for the proposed development are 18.77 L/s and 33.37 L/s, respectively. (The pressure boundary conditions at the site will be confirmed with the County through the use of their existing water modelling)

NexTrans Engineering April 2024 TIS Report

- The intersection of Highway 6 and Street B was modelled as an unsignalized intersection with the southbound approach (Street B) stop-controlled, with no auxiliary turning lanes;
- Based on the forecast traffic volumes, signalization is not warranted in accordance with OTM Book 12 Justification 7 in all future total scenarios, including an assumption of 260 units (based on a density of 80 units / ha) on the future development blocks.
- Based on the MTO Left Turn Lane Warrant, an eastbound left turn lane at the intersection of Highway 6 and Street B is warranted.
- The AutoTURN analysis demonstrates that an emergency vehicle (HSU TAC-2017) can maneuver through the site without conflict.

MHBC’s Streetscape & Parking Plan Report

- The proposed density of 21.55 units per net hectare within the Phase 2 DPOS conforms to the 40 units per net hectare density permitted for low density residential units in the Draft Port Dover Secondary Plan.
- The Phase 2 DPOS will provide for 329 on-street parking spaces, based on the conceptual Streetscape and Parking Plan, which equates to an on-street parking supply ratio of 0.73 additional parking spaces per dwelling unit.

SUMMARY

It remains our opinion that the proposed revisions in the March 14th, 2024 Lynn River Heights Phase 2 DPOS and implementing ZBA remain consistent and conform with Provincial and County planning policies, are appropriate and desirable, and continue to represent good planning.

We trust the above-noted revised materials are satisfactory in addressing the comments received. Please advise if any additional material is required and hopefully this provides the information needed to move forward to a Staff Recommendation Report to Committee and Council.

Yours truly,

MHBC

Debra Walker, BES, MBA, MCIP, RPP
Partner l Planner

Eric Brathwaite, BA, CPT
Intermediate Planner

cc. *Tricia Givens, Director of Planning, Norfolk County*
Democrat Port Dover Limited (Owners)
Mitchinson Planning & Development Consultants
Crozier Consulting Engineering
NexTrans Consulting Engineers

Legal Description

LYNN RIVER HEIGHTS PHASE 2
PART OF LOT 8, CONCESSION 2, GEOGRAPHIC
TOWNSHIP OF WOODHOUSE
NOW IN NORFOLK COUNTY

Owner's Certificate

I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.

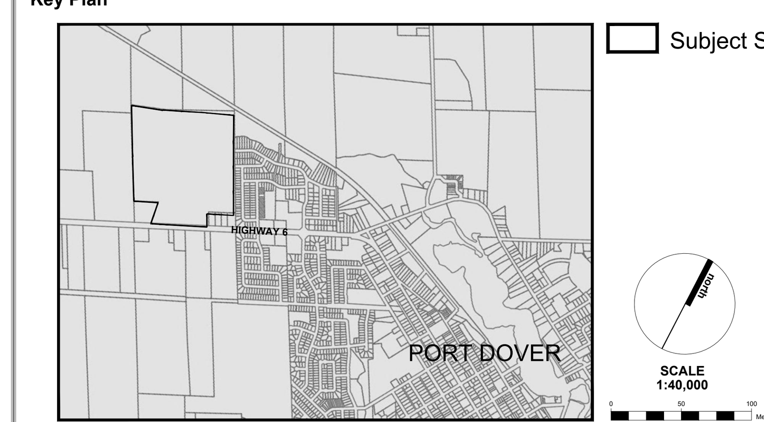
DATE: March 2024 — DEMOCRAT PORT DOVER LIMITED.

Surveyor's Certificate

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

DATE: JUNE 2017 — KIM S. HUSTED, - O.L.S.

Key Plan



Revision No.	**Date**	**Issued / Revision**	**By**

Additional Information Required Under Section 51(17) of the Planning Act R.S.O. 1990, c.P.13 as Amended

A. As Shown
B. As Shown
C. As Shown
D. Residential, Employment, Commercial, Park, Stormwater Management, Open Space
E. As Shown
F. As Shown
G. As Shown
H. Municipal Water Supply
I. Loam
J. As Shown
K. All Services As Required
L. As Shown

Description	Lots/Blocks	Units	Area
9.0m Semi Detached	260-307, 434-441	56	1.69ha/4.18ac
10m Single Detached	227-259,308-319,423-433, 442-449	64	2.17ha/5.38ac
12m Single Detached	1-9, 89-150, 201-214, 320-339,371-378, 393-422	139	5.74ha/14.19ac
15m Single Detached	10-88, 151-200, 215-226, 340-370,379-392	190	11.20ha/27.67ac
Total Residential	1-449	449	**20.83ha/51.45ac**
20m ROW	Street A-J, Cardinal Lane, Willowdale Crescent	N/A	8.78ha/21.69ac
Total Roadways			**8.77ha/21.69ac**
Walkway/Access	455,456	N/A	0.04ha/0.10ac
Parks & Open Space	450	N/A	0.58ha/1.44ac
SWM	451	N/A	1.52ha/3.74ac
6m Buffer	457	N/A	0.44ha/1.09ac
Hazard	458	N/A	4.35ha/10.76ac
Future Development	452, 453	N/A	3.21ha/7.95ac
Future Road Access	454	N/A	0.06ha/0.15ac
0.3 Reserves* (already included in lot area calculations)	459-518	N/A	0.05ha/0.12ac
Drainage	519	N/A	0.03ha/0.07ac
Total Other	69 (Blocks 450 - 519)		**10.28ha/25.42ac**

Total Draft Plan of Subdivision: 39.88ha/98.54ac

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
230-7050 WESTON ROAD WOODBRIDGE, ON, L4L 8G7 | P: 905 761 5588 F: 905 761 5589 | WWW.MHBCPLAN.COM

Stamp

Date April 17, 2024

File No. 08103-B

Plan Scale 1:1500 (Arch D)

Drawn By P.B.

Checked By D.W.

Other

Project

LYNN RIVER HEIGHTS PHASE 2

north

File Name DRAFT PLAN OF SUBDIVISION

Dwg No. 1 of 1

Scale Bar 0 2 4 Meters

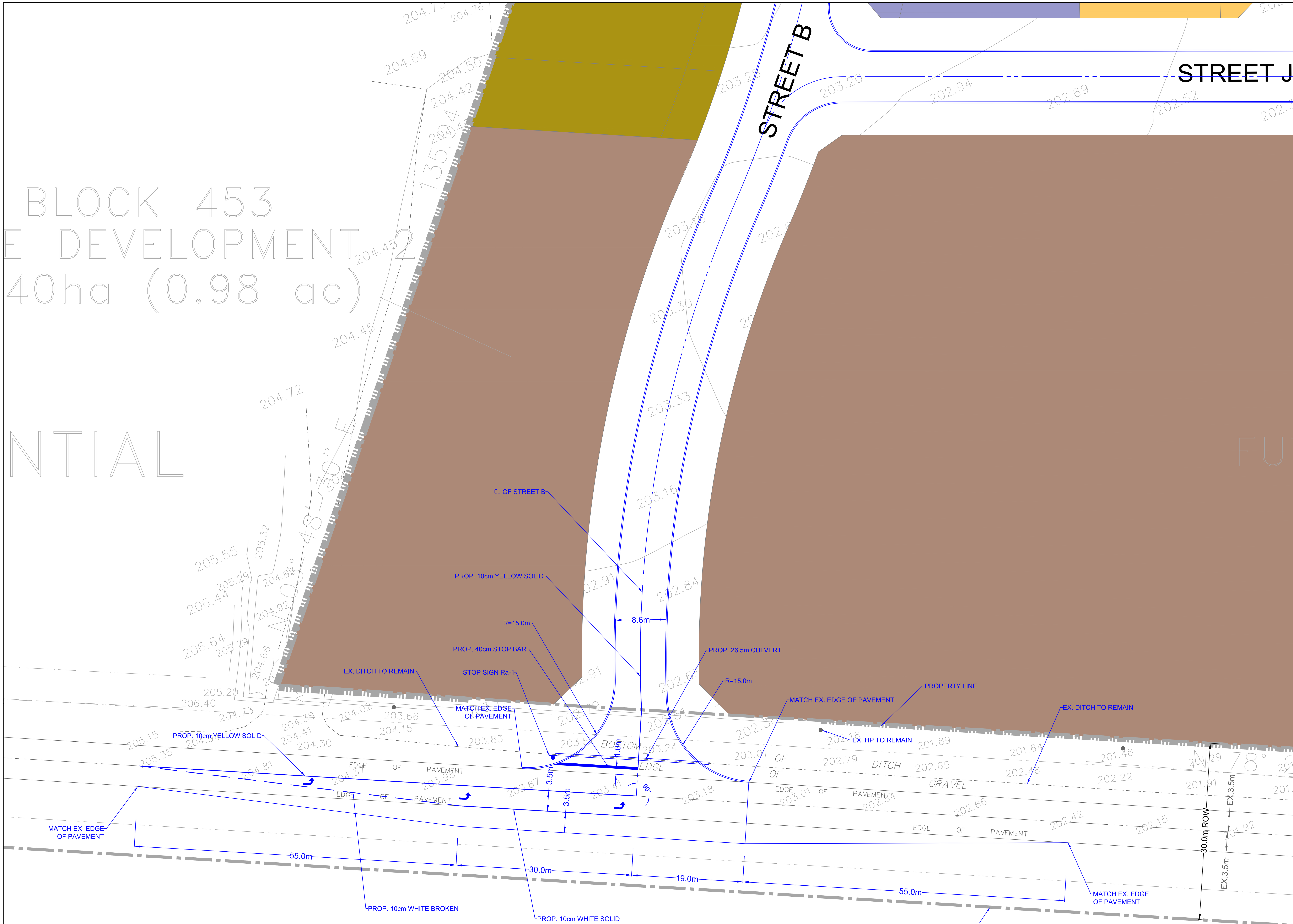
N:\08103\B - Lynn River Heights Phase II, Port Dover\6 - Tech Production\1-Final Figures\DPOS\CAD

Lynn River Phase 2 - Zoning Conformity Table

Zoning	R1-A Special provision 14.1044	R1-B Special provision 14.1040	R1(H) Special Provision 14.1041	R2 Special Provision 14.1042	CN Special Provision 14.1043
Building Type	Single Detached Dwelling Unit	Single Detached Dwelling Unit	Single Detached Dwelling Unit	Semi Detaced Dwelling Unit	Non-Residential or Combination of Non-Residential and Residential Use
Minimum Lot Area					
i) Interior Lot	450 square metres	360 metres	272 square metres	267 square metres	450 square metres
ii) Corner Lot	560 square metres	450 square metres	360 square metres	352 square metres	495 square metres
Minimum Lot Frontage					
i) Interior Lot	15 metres	12 metres	10 metres	8.5 metres	15 metres
ii) Corner Lot	18 metres	15 metres	13 metres	11.5 metres for the corner unit	16.5 metres
Minimum Front Yard	6 metres				N/A
i) Detached garage with Rear lane	3 metres				
i) To residential dwelling unit	N/A	3 metres	3 metres	3 metres	
ii) To attached garage	N/A	6 metres	6 metres	6 metres	
Minimum Exterior Side yard	6 metres	3 metres	3 metres	3 metres	
Minimum Interior side yard	N/A	1.2 metres	1.2 metres	separating two (2) attached semi-detached dwelling units, no interior side yard is required where the walls are joined; where the walls are not joined, a 1.2 metre side yard shall be required.	N/A
i) Detached Garage	3 metres & 1.2 metres	N/A	N/A	N/A	N/A
ii) Detached garage with rear lane; attached garage	1.2 metres each side	N/A	N/A	N/A	N/A
Minimum rear yard	7.5 metres	6.5 metres	6.5 metres	6.5 metres	N/A
Maximum building height	11 metres	11 metres	11 metres	11 metres	6 storeys
Maximum driveway width along street line	3 metres	3 metres	3 metres	N/A	N/A
Minimum length of landscape area along street	6 metres	6 metres	6 metres	N/A	N/A
Minimum Building Height	N/A	N/A	N/A	N/A	3 storeys
Minimum useable floor area for a dwelling unit in a non-residential building	N/A	N/A	N/A	N/A	40 square metres
Maximum lot coverage	N/A	N/A	N/A	N/A	50 percent
Maximum useable floor area of a fruit and vegetable stand	N/A	N/A	N/A	N/A	200 square metres
Maximum useable floor area of a convenience store	N/A	N/A	N/A	N/A	280 square metres
Outdoor Storage	N/A	N/A	N/A	N/A	prohibited in a yard adjoining a residential Zone

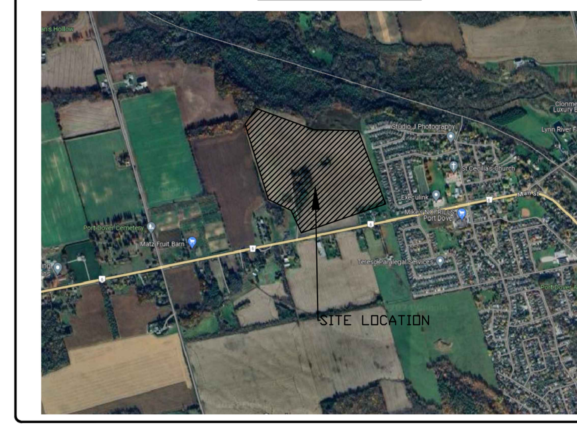
Note:
Notwithstanding Section 3.20.1, where in any Zone a 0.30 metre reserve separates a side yard from a street, the exterior side yard requirement and the minimum lot area requirement shall be provided and measured as though the reserve is non-existent.

Note:
Development of the Future Development blocks solely for residential uses shall comply with the provisions of the R(4) and R(6) zones



NOTES:
1. THIS PLAN IS ONLY FOR DISCUSSION PURPOSE.
2. ALL EXISTING PAVEMENT MARKING LINES, EDGE OF PAVEMENT, STREET LINE, LANE WIDTH, EXISTING UTILITIES ARE TO BE CONFIRMED IN DETAILED STAGE AND PROVIDED BY UPDATED LEGAL TOPO GRAPHIC SURVEY.

KEY PLAN



DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWING, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

LEGEND

PROPERTY LINE

No.	Revision	Date	By	App'd
6				
5				
4				
3				
2				
1	SUBMISSION FOR REVIEW	APR 04 2024	W.L.	R.P.

ELEVATION NOTE

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO TABLET (No. 724316) IN EAST SIDE OF CONCRETE FOUNDATION 30 CENTIMETERS BELOW BRICK WORK AND 24 CENTIMETERS NORTH OF SOUTH EAST CORNER OF BUILDING ELEVATION = 208.596

CONSULTANT

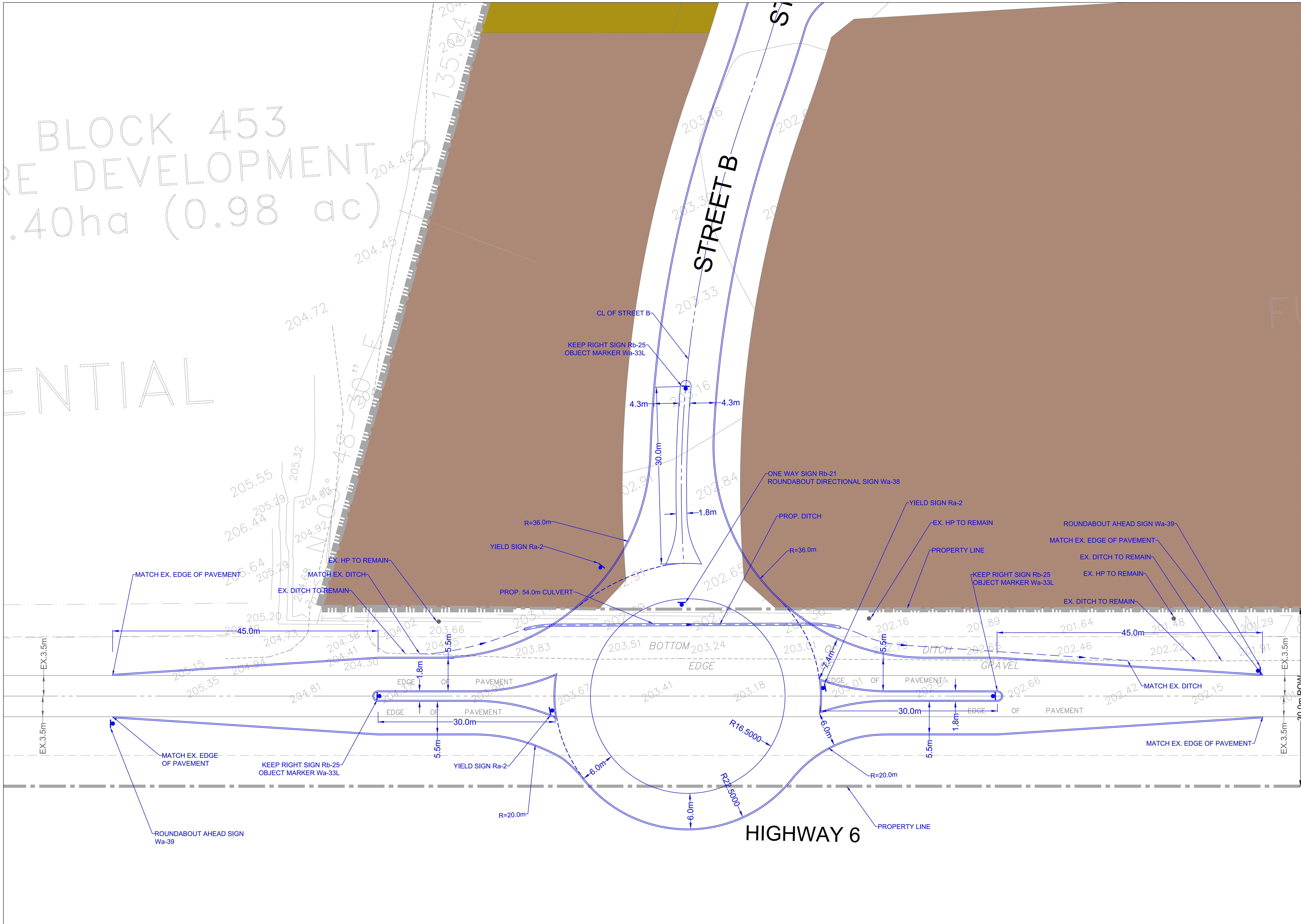
DIRECTOR OF DEVELOPMENT ENGINEERING

nexTrans
CONSULTING ENGINEERS
Suite 201, 520 Industrial Parkway South
Aurora ON L4G 6W8
Tel: 905-503-2563
Web: www.nextrans.ca

LYNN RIVER HEIGHTS PHASE 2
PORT DOVER
NORFOLK COUNTY

FUNCTION PLAN - 1

Surveyed by: KIM HUSTED SURVEYING LTD.	Checked by: R.P.	Project No. NT-23-233
Drawn by: W.L.	Approved by: R.P.	
Designed by: W.L.	Date: April/02/2024	Drawing No. FP-1
Scale 1:300		Sheet No.



NOTES:
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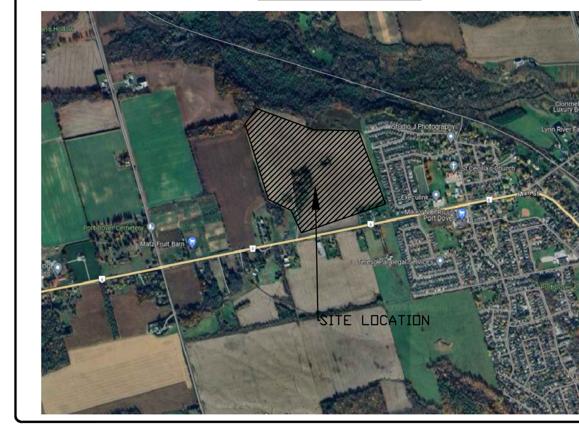
KEY PLAN



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LEGEND

PROPERTY LINE
EXISTING DITCH
PROPOSED DITCH

No.	Revision	Date	By	Appr'd
6				
5				
4				
3				
2				
1	SUBMISSION FOR REVIEW	APR 04 2024	W.L.	R.P.

ELEVATION NOTE

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LYNN RIVER HEIGHTS PHASE 2
PORT DOVER
NORFOLK COUNTY

FUNCTION PLAN - 2

Surveyed by: KIM HUSTED SURVEYING LTD.	Checked by: R.P.	Project No. NT-23-233
Drawn by: W.L.	Approved by: R.P.	
Designed by: W.L.	Date: April/02/2024	Drawing No. FP-2
Scale 1:300		Sheet No.

The Corporation of Norfolk County
By-Law __-Z-2023

Being a By-Law to Amend Zoning By-Law 1-Z-2014, as amended, for property described as Part of Lot 8, Concession 2, Geographic Township of Woodhouse, County of Norfolk, municipally addressed as 597 Highway 6, Port Dover.

WHEREAS Norfolk Council is empowered to enact this By-Law, by virtue of the provisions of Section 34 and 36(1) (Holding) of the *Planning Act, R.S.O. 1990, CHAPTER P.13*, as amended;

AND WHEREAS this By-Law conforms to the Norfolk County Official Plan.

NOW THEREFORE the Council of The Corporation of Norfolk County hereby enacts as follows:

1. That Schedule A of By-Law 1-Z-2014, as amended, is hereby further amended by changing the zoning of a portion of the subject lands described as Part 1, Part 2, Part 3, Part 4, Part 5 and Part 6 identified on Map A (attached to and forming part of this By-Law) as follows:

   Part 1: From Urban Residential Type 1 Zone (R1-A) with a Holding (H) Provision to Urban Residential Type 1 Zone (R1-B) with Holding (H) and a Special Provision **14.1040**:

   Part 2: From Urban Residential Type 1 Zone (R1-A) with a Holding (H) Provision and Urban Residential Type 2 Zone (R2) with a Holding (H) Provision to Urban Residential Type 1 Zone (R1) with Holding (H) and a Special Provision **14.1041**;

   Part 3: From Urban Residential Type 1 Zone (R1-A) with a Holding (H) Provision to Urban Residential Type 2 Zone (R2) with a Holding (H) and a Special Provision **14.1042**;

   Part 4: From Urban Residential Type 1 Zone (R1-A) with a Holding (H) Provision and Urban Residential Type 2 Zone (R2) with a Holding (H) Provision to Neighbourhood Commercial (CN) Zone with a Holding (H) and a Special Provision **14.1043**;

   Part 5: From Urban Residential Type 1 Zone (R1-A) with a Holding (H) Provision to Open Space Zone (OS);

Part 6: From Urban Residential Type 1 Zone (R1-A) with a Holding (H) Provision to Urban Residential Type 1 Zone (R1-A) with Holding (H) and a Special Provision **14.1044**

2. That Subsection 14 Special Provisions is hereby further amended by adding a new **Subsection 14.1040** as follows:

   Part 1, identified on Map A (attached to and forming part of this By-Law)

   i) In lieu of the corresponding provisions in the R1-B Zone, the following provisions shall apply to lands zoned Urban Residential Type 1 Zone (R1-B) with a Special Provision **14.1040**:

a) Minimum *lot area*:	
i) *Interior lot*	360 square metres
ii) *Corner lot*	450 square metres
b) Minimum *lot frontage*:	
i) *Interior lot*	12 metres
ii) *Corner lot*	15 metres
c) Minimum *front yard*:	
i) To residential dwelling unit	3 metres
ii) To attached garage	6 metres
d) Minimum *exterior side yard*:	3 metres
e) Minimum *interior side yard*:	1.2 metres
f) Minimum *rear yard*:	6.5 metres
g) Maximum *driveway* width along *street line*:	3 metres
h) Minimum length of landscape area along *street line*:	6 metres

   ii) Notwithstanding Section 3.20.1, where in any Zone a 0.30 metre reserve separates a side yard from a street, the exterior side yard requirement and the minimum lot area requirement shall be provided and measured as though the reserve is non-existent.

3. That Subsection 14 Special Provisions is hereby further amended by adding a new **Subsection 14.1041** as follows:

   Part 2, identified on Map A (attached to and forming part of this By-Law)

   i) In lieu of the corresponding provisions in the R1 Zone, the following provisions shall apply to lands zoned Urban Residential Type 1 Zone (R1) with a Special Provision **14.1041**:

a) Minimum *lot area*:	
i. *Interior lot*	272 square metres
ii. *Corner lot*	360 square metres
b) Minimum *lot frontage*:	
i. *Interior lot*	10 metres
ii. *Corner lot*	13 metres
c) Minimum *front yard*:	
i. To residential dwelling unit	3 metres
ii. To attached garage	6 metres
d) Minimum *exterior side yard*:	3 metres
e) Minimum *interior side yard*:	1.2 metres
f) Minimum *rear yard*:	6.5 metres
g) Maximum *driveway* width along *street line*:	3 metres
h) Minimum length of landscape area along *street line*:	6 metres

ii) Notwithstanding Section 3.20.1, where in any Zone a 0.30 metre reserve separates a side yard from a street, the exterior side yard requirement and the minimum lot area requirement shall be provided and measured as though the reserve is non-existent.

4. That Subsection 14 Special Provisions is hereby further amended by adding a new Subsection **14.1042** as follows:

Part 3, identified on Map A (attached to and forming part of this By-Law)

i) In lieu of the provisions in the corresponding R2 Zone, the following provisions shall apply to lands zoned Urban Residential Type 2 Zone (R2) with a Special Provision **14.1042**:

Provision	*Semi-detached* (per unit)
a) Minimum *lot area*:	
i) *Interior lot*	267 square metres
ii) *Corner lot*	352 square metres
b) Minimum *front yard*:	

iii) To residential dwelling unit 3 metres

iv) To attached garage 6 metres

c) Minimum *exterior side yard*: 3 metres

d) Minimum *rear yard*: 6.5 metres

ii) Notwithstanding Section 3.20.1, where in any *Zone* a *0.30 metre reserve* separates a *side yard* from a *street,* the *exterior side yard* requirement and the minimum lot area requirement shall be provided and measured as though the reserve is non-existent.

5. That Subsection 14 Special Provisions is hereby further amended by adding **14.1043** as follows:

Part 4, identified on Map A (attached to and forming part of this By-Law)

i) In addition to the "Permitted Uses" provisions in the CN Zone, the following provision shall apply to lands zoned Neighbourhood Commercial (CN) Zone with Special Provision **14.1043**:

a) a dwelling apartment use shall also be a permitted use.

ii) In lieu of the corresponding "Zone Provisions for any Sole Residential Use" in the CN Zone, the following provisions shall apply to lands zoned Neighbourhood Commercial (CN) Zone with Special Provision **14.1043**:

a) Notwithstanding the provisions in Subsection 6.5.3, any sole residential use and *home occupations* shall conform to the provisions in the Urban Residential Type 4 Zone (R4) and the Urban Residential Type 6 Zone (R6) as the respective provisions apply to the type of sole residential use.

iii) In lieu of or in addition to the corresponding "Zone Provisions for Non-Residential Uses or Non-Residential Uses in Combination with Residential Uses" in the CN Zone, the following provisions shall apply to lands zoned Neighbourhood Commercial (CN) Zone with Special Provision **14.1043**:

a) Minimum *front yard, exterior side yard, interior side yard* and *rear yard* Requirements shall not apply.

b) Minimum setback from a *street line* 3 metres

c) Minimum setback from an adjoining Residential *Zone* 7.5 metres

d) Minimum *building height* 3 storeys

e) Maximum *building height* 6 storeys

f) Maximum *lot coverage*	50 percent
g) *Outdoor storage*:	prohibited in a yard adjoining a residential *Zone*

iv) Notwithstanding Section 3.20.1, where in any Zone a 0.30 metre reserve separates a side yard from a street, the exterior side yard requirement and the minimum lot area requirement shall be provided and measured as though the reserve is non-existent.

6. That Subsection 14 Special Provisions is hereby further amended by adding a new **Subsection 14.1044** as follows:

   Part 6, identified on Map A (attached to and forming part of this By-Law)

   i) In lieu of the corresponding provisions in the R1-A Zone, the following provisions shall apply to lands zoned Urban Residential Type 1 Zone (R1-A) with a Special Provision **14.1044**:

a) Maximum *driveway* width along *street line*:	3 metres
b) Minimum length of landscape area along *street line*:	6 metres

   ii) Notwithstanding Section 3.20.1, where in any Zone a 0.30 metre reserve separates a side yard from a street, the exterior side yard requirement and the minimum lot area requirement shall be provided and measured as though the reserve is non-existent.

7. That the holding (H) provision of this By-Law identified on Part 1, Part 2, Part 3, Part 4 and Part 6 on Map A (attached to and forming part of this By-Law) be removed upon a successful development agreement to the satisfaction of the General Manager of the Community Development Division.

8. That the effective date of this By-Law shall be the date of passage thereof.

ENACTED AND PASSED this date day _ of month _, 2023

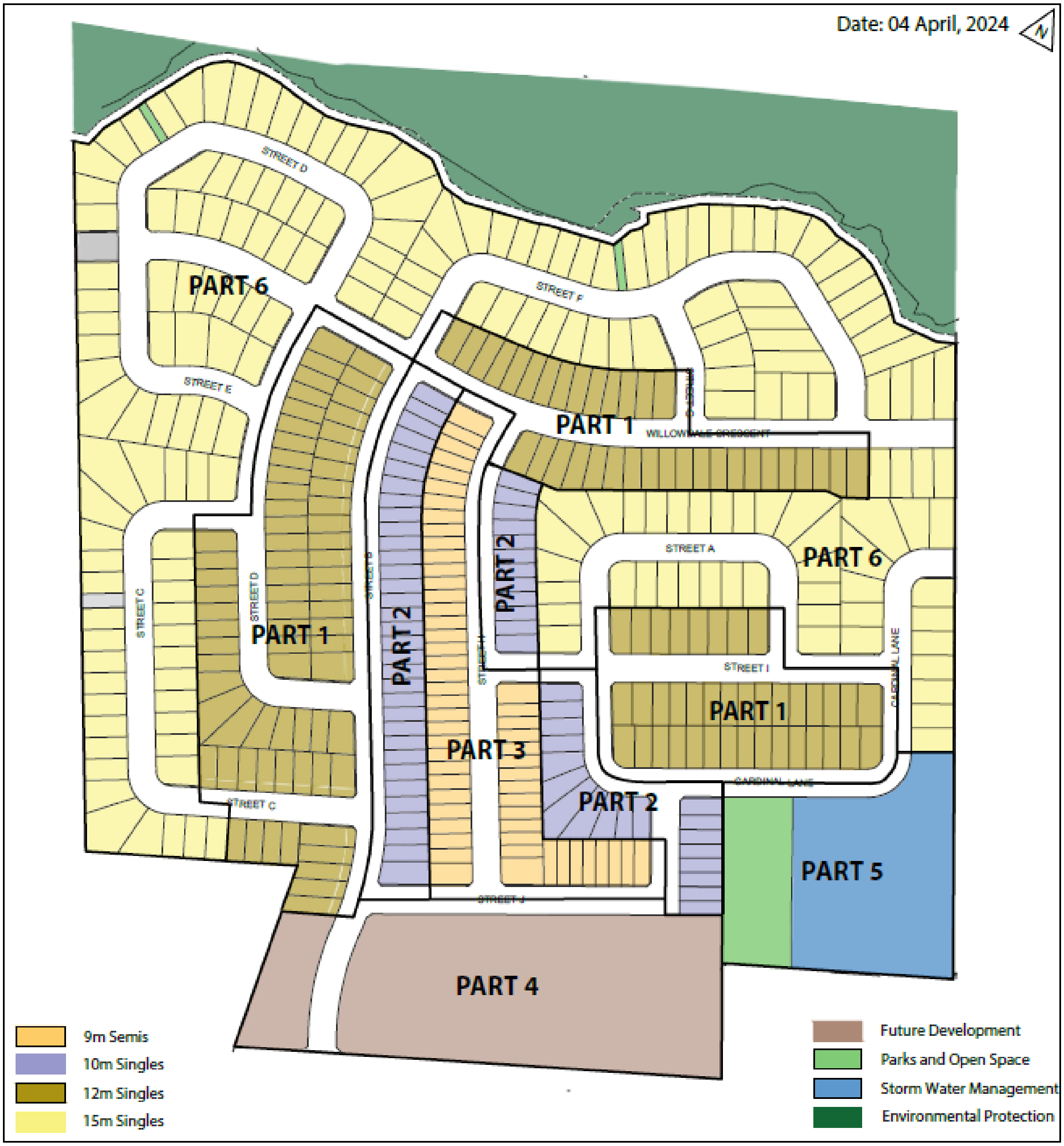
Mayor

County Clerk

Zoning By-law Amendment

Norfolk County - Map A

In the Geographic Township of Woodhouse (Port Dover)



Part 1:
From R1-A(H)
To: R1-B (H) Special Provision 14.1040

Part 2:
From R1-A(H) & R2(H)
To: R1(H) Special Provision 14.1041

Part 3:
From R1-A(H) & R2(H)
To: R2 (H) Special Provision 14.1042

Part 4:
From R1-A(H) & R2(H)
To: CN (H) with Special Provision 14.1043

Part 5:
From R1-A(H)
To: OS

Part 6:
From R1-A(H)
To: R1-A (H) Special Provision 14.1044

Explanation of the Purpose and Effect
of By-Law __-Z-2023

This By-Law affects a parcel of land described as Part of Lot 8, Concession 2, Geographic Township of Woodhouse, Norfolk County, municipally addressed as 597 Highway 6, Port Dover.

The subject lands were originally zoned in 2006 for residential uses in accordance with the Lynn River Heights Phase 2 Plan of Subdivision. However, the original Draft Plan of Subdivision Approval lapsed in 2015 and a revised June 2023 Draft Plan of Subdivision has now been approved with this Zoning By-law Amendment.

The purpose of this By-Law is to:

- to change the zoning of lands shown as Part 1 from R1-A with a Holding (H) to R1-B with a special provision 14.1040;
- to change the zoning of lands shown as Part 2 from R1-A and R2 with a Holding (H) to R1 with a special provision 14.1041 and a Holding (H),
- to change the zoning of lands shown as Part 3 from R1-A to R2 with a special provision 14.1042 and a Holding (H),
- to change the zoning of lands shown as Part 4 from R1-A and R2 with a Holding (H) to CN with a special provision 14.1043 and a Holding (H);
- to change the zoning of lands shown as Part 5 from R1-A with a Holding (H) to OS;
- to change the zoning of lands shown as Part 6 from R1-A with a Holding (H) to R1-A with a special provision 14.1044 and a Holding (H).

The changes to the zoning as set out in this By-law will implement a proposed draft plan of subdivision that includes a total of 455 single detached and semi-detached units, a future mixed use block, a stormwater management facility and a public park use. The special provisions to the Residential Zones will allow relief of minimum lot areas, minimum lot frontages, various setbacks, will add maximum driveway widths and minimum landscape widths along the street line to promote on-street parking, and will clarify setbacks relative to 0.3 m reserves. The special provisions to the Neighbourhood Commercial zone will allow a dwelling apartment use, reduce setbacks overall except when adjacent to a Residential Zone, prohibit outdoor storage adjacent to a Residential Zone, set out minimum and maximum building heights, and maximum lot coverage on the subject lands.

The existing Holding provision is updated to ensure a development agreement is executed on Part 1, Part 2, Part 3, Part 4 and Part 6 of Map A to the satisfaction of the General Manager of the Community Development Division.

April 10, 2024

LYNN RIVER HEIGHTS PHASE II | COMMENTS & RESPONSE MATRIX FINAL

NORFOLK COUNTY

COMMENTS RECEIVED FROM THE FOLLOWING DEPARTMENTS/ AGENCIES:

NO.	NORFOLK COUNTY DEPARTMENTS	NO.	EXTERNAL AGENCIES	CONSULTANT	REFERENCE CODE
1.0	PLANNING	8.0	GMBP ENGINEERING REVIEW		
2.0	AGREEMENTS COORDINATOR	9.0	LONG POINT REGION CONSERVATION AUTHORITY		
3.0	DEVELOPMENT ENGINEERING	10.0	CANADA POST		
4.0	BUILDING DEPARTMENT	11.0	HALDIMAND NORFOLK SOCIAL SERVICES AND HOUSING		
5.0	ZONING	12.0	BELL CANADA		
6.0	FIRE	13.0	GRAND ERIE DISTRICT SCHOOL BOARD		
7.0	PARAMEDIC SERVICES	14.0	PUBLIC MEETING		

NO.	COMMENTS	RESPONSE	ADDRESSED	CONSULTANT RESPONSIBLE
1.0	**PLANNING**			
	Zoning			
1.1	Staff have concerns about the proposed reduction of the required 9m sight triangle. Please provide greater justification to support the reduced sight triangle requirements.	The proposed Zoning By-law Amendment was revised to remove any change to Section 3.31 of the Zoning By-law relative to the required 9 m sight triangle.	**YES**	**MHBC**
	Subdivision Design			
1.2	Thank you for the submission of the streetscape design drawing. Please be advised that in accordance with Section 8,2, subsection (d), of Parking bylaw 2011-189 (on-street parking), 'No person shall park a vehicle less than 1.2 meters of a driveway, measured from the curb cut, or where there is no curb cut from the intersection of the prolonged edge of the travelled portion of the driveway and the edge of the roadway'. As a result of this requirement, on-street parking may not be able to be accommodated with the proposed 10 m frontages for the single-detached dwellings.	Noted. MHBC has prepared a Streetscape and Parking Plan, which demonstrates various potential streetscape profiles that can be implemented through detailed design to accommodate landscaping, sidewalks, driveways, and adequate on street parking conditions.	**YES**	**MHBC**
2.0	**AGREEMENTS COORDINATOR**			
2.1	Draft plan of subdivision conditions will be included as part of the planning report. One of these conditions will be the requirement to enter into a subdivision agreement, and any subsequent amending or supplementary agreements thereto, and that the agreements shall be registered on title to the subject lands, all at the Owner's expense. Your conditions of draft approval will need to be fulfilled or satisfied prior to registration of your subdivision agreement. In order to streamline the agreement process and reduce review times, please provide a complete submission package along with any fees required when you are ready to start.	Noted.	**YES**	**MHBC**
3.0	**DEVELOPMENT ENGINEERING**			
3.1	Revised Draft Plan of Subdivision (DPOS) and Zoning By-law Amendment (ZBA) for Norfolk County Application File: 28TPPL2017317 28TPL2017317 and ZNPL2017318 for the Lynn River Heights Phase 2	Noted. An updated Functional Servicing and Stormwater Management Report (FSR/SWM) dated March 2024 prepared by Crozier Consulting Engineers and an		**MHBC**

NO.	COMMENTS	RESPONSE	ADDRESSED	CONSULTANT RESPONSIBLE
	Residential Development in Port Dover is not recommended for Engineering Approval, based on the following: 1. An updated Functional Servicing Report is required to address recent water and sanitary upgrades in Port Dover, as well as incorporate updated hydraulic model analysis (to be completed by R. V. Anderson Associates Limited) as well as any potential for servicing upgrades external to the development; and, 2. An updated Traffic Impact Study is required to address works completed and confirm updated area conditions (the submitted Traffic Impact Study is dated December 2006).	updated Traffic Impact Study (TIS) prepared by NexTrans Consulting Engineers dated April 2024 is included in the submission material. It is our understanding that water and wastewater flows will be provided to the County's consultant R.V. Anderson to complete a capacity assessment of the surrounding municipal infrastructure and confirm if external upgrades are required.		
3.2	At minimum, design briefs stamped by a qualified professional Engineer referencing the previous completed servicing and traffic studies are required. The design briefs are to include description of how the previous technical studies apply to the current 2023 Development Application with reference to current and planned conditions within the area of the proposed development, including updated water and wastewater system analysis modelling completed by the County's consultant.	See above response to 3.1.	**YES**	**NEXTRANS/ CROZIER**
3.3	It is important that updated engineering studies are completed to current County standards and requirements and updated studies / design briefs are required to confirm that no additional external water and wastewater servicing and transportation works are required to support this development. Reference to previous approval of submitted reports by Development Engineering is not sufficient as significant work has been completed by the County since the previous submission to understand the water and wastewater system within Port Dover. TIS are to always reference current conditions and proposed road layouts and traffic controls.	See above response to 3.1.	**YES**	**NEXTRANS/ CROZIER**
4.0	**BUILDING DEPARTMENT**			
	All general permitting inquires: by email: permits@norfolkcounty.ca or by phone: 226-NORFOLK (226-667-3655) Ext 6016			
4.1	The building department has reviewed the proposal and has NO comments or conditions. No Ontario Building Code review has been completed at this time and will be done at permit application stage. Please reach out to the building department as you get closer to having the planning and applicable approvals in place and staff will be happy to assist you with information on preparing for the building and septic permit stage of the project.	Noted.	**YES**	**N/A**
5.0	**ZONING**			
5.1	A Zoning table should be on draft plan of subdivision for each phase stating the zone and the zone provisions. There are zoning comments on the conceptual streetscape plan, but it doesn't state if it's R1 or R2, and this is not put in a zoning table format.	A Zoning Table has been added to the coloured version of the Draft Plan of Subdivision, dated March 14, 2024, as requested.	**YES**	**MHBC**
5.2	This is a large document to decipher, it would be good if a site plan sketch for each phase can be sent separately for zoning to review with zoning tables.	Please see Streetscape and Parking Plan Analysis for typical lot layouts based on the proposed zoning standards (Figure 1).	**YES**	**MHBC**
5.3	Additionally, the submitted conceptual plan contains no decks, decks pose many issues in the future if a basic concept deck is not on the site plan sketch.	Decks are shown on typical lot layouts within Streetscape and Parking Plan Report, and adhere to Section 3.6 of the Norfolk County Zoning By-law (Figure 1).	**YES**	**MHBC**
6.0	**FIRE**			

NO.	COMMENTS	RESPONSE	ADDRESSED	CONSULTANT RESPONSIBLE
6.1	Norfolk Fire has the following comments for this proposal: • Ensure there is adequate access for fire department apparatus through the site and that road widths take into consideration street parking. • Particular attention should be paid to curves/corners and parking proximity to these areas- please keep the turn radius in mind. • Ensure there is an adequate number of hydrants spaced appropriately.	The Draft Plan of Subdivision, dated arch 14, 2024, includes 20 metre street widths with turning radii at 90 metres, which is consistent with the County's Residential & Local Roads and Minor Collector Road Standards. NexTrans has also reviewed the proposed street network and confirmed that emergency vehicles can manoeuver through the site without conflict. (Section 7.0 of TIS) Fire hydrant locations have been proposed to ensure adequate fire suppression for the proposed development per County design standards.	**YES**	**MHBC / NEXTRANS**
7.0	**PARAMEDIC SERVICES**			
7.1	No comments from Paramedic Services.	Noted.		**N/A**
8.0	**GMBP ENGINEERING REVIEW COMMENTS**			
	Lynn River Heights, Port Dover, Traffic Impact Study by F.R. Berry & Associates, December 2006 / Lynn River Heights Residential Subdivision, Phase 2, Port Dover Traffic Impact Assessment, by F.R. Berry & Associates, December 2016			
8.1	The submitted Traffic Impact Studies (TIS) are from December 2006 and December 2016. An updated TIS is required, or at minimum a brief stamped by a qualified professional Engineer, identifying how the previously completed TIS remains consistent under current conditions – including reference to studies, plans and works undertaken since completion of the previously completed TIS as well as review of the original traffic count data and modelling.	NexTrans has prepared an updated 2024 TIS based on the revised Draft Plan of Subdivision, dated March 14, 24 updated traffic data, appropriate design horizons, and applicable buildout assumptions.	**YES**	**NEXTRANS**
8.2	The July 13, 2023 Cover Letter Re: Lynn River Heights Phase 2, Port Dover, Revised Draft Plan of Subdivision…" notes that "the proposed round-about entrance at Highway 6 and Street B has been replaced with a traditional intersection (including 5 m x 5 m daylight triangles) due to jurisdictional issues (MTO ownership of Highway 6) and design/construction/land ownership/cost share challenges associated with the round-about." The updated TIS is to include detail on the rationale for traffic control at Highway 6 and Street B.	Rationale for both a signalized intersection and round-about is provided within Section 6 – Highway 6 and Street B Intersection Control Alternatives. The TIS recommends improvement to Highway 6 by providing an eastbound left turning lane onto Street B. Furthermore, it has been determined that despite the intersection not warranting signalization or a round-about, the intersection should be protected for future signalization, and does not require a land dedication as signalization has been determined to fit within the 30 metre right of way.	**YES**	**NEXTRANS**
8.3	The July 13, 2023 Cover Letter Re: Lynn River Heights Phase 2, Port Dover, Revised Draft Plan of Subdivision…" notes that "There has been a slight adjustment to Streets H and J due to the park relocation and to provide a more direct internal access to the future development blocks. Street J, as proposed, will help minimize any potential traffic conflicts between residential uses within the subdivision and the future mixed-use development." The updated TIS is to address any changes and impacts of changes to the proposed road layout.	The TIS (Section 7) reviewed the internal road network of the draft plan of subdivision, dated March 14, 2024. It determined that the intersection spacing, angle, curb radius, and sight triangles were satisfactory and met the appropriate design criteria of the Transportation Association of Canada ("TAC") and Norfolk County.	**YES**	**NEXTRANS**
8.4	The July 13, 2023 Cover Letter Re: Lynn River Heights Phase 2, Port Dover, Revised Draft Plan of Subdivision…" notes that "The Highway 6 / Street B intersection is consistent with the findings of the Traffic Impact Study." This is to be confirmed by a qualified professional Engineer as part of the application.	Noted. See response to 8.2 and 8.3 above.	**YES**	**NEXTRANS**

NO.	COMMENTS	RESPONSE	ADDRESSED	CONSULTANT RESPONSIBLE
	Lynn River Heights Subdivision Phase 2 Port Dover Democrat Port Dover Limited Functional Servicing Report, by Girard Engineering Ltd.			
	An updated Functional Servicing Report (FSR) is required to addresses recent water and sanitary upgrades completed within Port Dover (including work completed after 2019), as well as updated hydraulic analysis of the proposed development on the Port Dover water and wastewater systems to be completed by the County's consultant (R. V. Anderson Associates Limited). A design brief stamped by a qualified Professional Engineer, identifying how the previously completed FSR remains consistent under current conditions (with reference to updated hydraulic analysis work to be completed by the County's Consultant) is also acceptable; but, as the submitted FSR is very brief (1 page), it is anticipated that a fully updated FSR will be required to fully address the proposed servicing under current conditions.	Crozier has prepared an updated 2024 Functional Servicing Report for review and consideration by Norfolk County and their consultants. Design flows and proposed servicing alignment will be provided to the County's consultant to complete the external capacity assessment.		**CROZIER**
	Lynn River Heights Subdivision (Port Dover, ON) Preliminary Stormwater Management Report, by Girard Engineering Ltd., November 2017, Updated March 2019			
8.5	The report has been updated to address comments prepared by Ainley & Associates Limited (April 12, 2018) relating to Draft Plan of Subdivision (DPOS). The Phase 1 Development Stormwater Management Report is to be provided to confirm that the preliminary stormwater management report is sufficient for DPOS Approval.	Crozier has prepared an updated 2024 FSR/SWM Report for review and consideration of Norfolk County and their consultants. Furthermore, Crozier has prepared a Commenting Matrix in response to the Ainley & Associate comments.	**YES**	**CROZIER**
8.6	For the Detailed Engineering Submission, all April 12, 2018 comments prepared by Ainley are to be addressed. Upon receiving the updated SWM Report in support of the Detailed Engineering submission, there may be additional new comments based on review of the more detailed submission.	Noted. Same response as provided in 8.5.	**YES**	**CROZIER**
9.0	**LONG POINT REGION CONSERVATION AUTHORITY**			
	Lynn River Heights, Port Dover, Traffic Impact Study by F.R. Berry & Associates, December 2006 / Lynn River Heights Residential Subdivision, Phase 2, Port Dover Traffic Impact Assessment, by F.R. Berry & Associates, December 2016			
9.1	Long Point Region Conservation Authority (LPRCA) staff have had an opportunity to review the application 28TPL2017317, ZNPL2017318 and can provide the following comments based on LPRCA's various plan review responsibilities. Delegated Responsibility from the Ministry of Natural Resources and Forestry, Section 3.1 of the Provincial Policy Statement, 2020 Conservation Authorities have been delegated responsibilities from the Minister of Natural Resources and Forestry to represent the provincial interests regarding natural hazards encompassed by Section 3.1 of the Provincial Policy Statement, 2020 (PPS). The overall intent of Section 3.0 - Protecting Public Health and Safety of the PPS is to reduce the potential public cost or risk to Ontario's residents from natural or human-made hazards. As such, "development shall be directed away from areas of natural or human-made hazards where there is an unacceptable risk to public health or safety or of property damage, and not create new or aggravate existing hazards." The application is subject to the following subsections of section 3.1 of the Provincial Policy Statement: 3.1.1 Development shall generally be directed, in accordance with guidance developed by the Province (as amended from time to time), to areas outside of:	Noted.	**YES**	**N/A**

NO.	COMMENTS	RESPONSE	ADDRESSED	CONSULTANT RESPONSIBLE
	b) hazardous lands adjacent to river, stream and small inland lake systems which are impacted by flooding hazards and/or erosion hazards. As the proposed lots are setback a minimum of 6m from the top of bank, the proposed application is consistent with section 3.1 of the Provincial Policy Statement, 2020. LPRCA has no objection to the concept of this application at this time			
9.2	*Ontario Regulation 178/06* For the applicant's information, a portion of the subject property is regulated under Ontario Regulation 178/06. A permit is required for any development within the regulation limit. Development includes: • the construction, reconstruction, erection or placing of a building or structure of any kind, • any change to a building or structure that would have the effect of altering the use or potential use of the building or structure, increasing the size of the building or structure or increasing the number of dwelling units in the building or structure, • site grading, or • the temporary or permanent placing, dumping or removal of any material, originating on the site or elsewhere (Conservation Authorities Act, R.S.O. 1990, c. 27, s. 28 (25)).	Noted.	**YES**	**OWNER**
	LPRCA has reviewed stormwater management design using the 2003 MECP Stormwater Management Planning and Design Manual, MTO Drainage Manual, LID Stormwater Management Manual, the sustainable technologies STEP website https://sustainabletechnologies.ca/, and the Municipal SWM guidelines. Staff have the following comments with regards to stormwater management (SWM):			
9.3	The SWM report states "Infiltration measures shall be distributed around the site rater than at a single 'end of pipe' location. Please provide a concept with proposed locations for infiltration. Staff recommend the utilization of a treatment train to capture the first flush of rainfall (1in);	The updated 2024 Functional Servicing and Stormwater Management Report by Crozier Engineering indicates that the existing soils are not conducive to infiltration and the implementation of LID's. Due to the existing site constraints, no LID's have been proposed at this time to meet the water balance objectives for the proposed development.	**YES**	**CROZIER**
9.4	Please provide justification on why 'Partly Asphalt' is set at C = 0.8 and not a minimum 0.9;	Runoff coefficients for the proposed development were established using Section 7.8.04 of the Norfolk County Design Criteria 2019. The updated stormwater management modelling uses 0.9 for asphalt surfaces and 'partly asphalt' is no longer considered.	**YES**	**CROZIER**
9.5	A pre and post development drainage area illustration is requested and should include the designated area associated along with the impervious percentage or run off coefficient,	Pre and Post Development Drainage Plans are provided in the 2024 Functional Servicing and Storm Water Management Plan prepared by Crozier Engineering, as figures 5 and 6 respectfully.	**YES**	**CROZIER**
9.6	The emergency overflow easements should be on private property;	Block 519 was introduced as drainage easement to address overflow of storm water from the adjacent lands to the west. Overland flow from the proposed stormwater management facility will outlet to the existing Lynn River Heights Phase 1 750mm sewer block.	**YES**	**CROZIER**
9.7	Erosion and Sediment Control plan needs to be provided;	An Erosion and Sediment Control Plan (Figure 10) has been prepared and details of the Erosion Controls has been provided in the Function Servicing and Stormwater Management Report (Crozier, 2024).	**YES**	**CROZIER**

NO.	COMMENTS	RESPONSE	ADDRESSED	CONSULTANT RESPONSIBLE
9.8	All setbacks should be clearly labeled on the engineered drawings. The 6m setback should be applied along the top of the slope on the north end and all lots should remain 6m back from the top of slope. A scale bar should be provided on all drawings	Block 457 provides a 6 m buffer from the Hazard Lands within Block 458 and the residential lots at the north of the DPOS, dated March 14, 2024.	**YES**	**MHBC**
9.9	Please provide details about the major overland flow route within the report at the detailed design stage	Noted.		**CROZIER**
10.0	**CANADA POST**			
10.1	Please be advised that Canada Post does not have any further comments on this application. This development will be serviced by Community mailboxes and Canada Post will work with the developer on site locations and requirements for concrete pads.	Noted.	**YES**	**MHBC**
11.0	**HALDIMAND NORFOLK SOCIAL SERVICES AND HOUSING**			
11.1	Social Services and Housing is supportive of additional housing options for members of our community, particularly more affordable options.	Noted.	**YES**	**MHBC**
12.0	**BELL CANADA**			
	We have reviewed the circulation regarding the above noted application. The following paragraphs are to be included as a condition of approval:			
12.1	The Owner acknowledges and agrees to convey any easement(s) as deemed necessary by Bell Canada to service this new development. The Owner further agrees and acknowledges to convey such easements at no cost to Bell Canada.	Noted.	**YES**	**OWNER**
12.2	The Owner agrees that should any conflict arise with existing Bell Canada facilities where a current and valid easement exists within the subject area, the Owner shall be responsible for the relocation of any such facilities or easements at their own cost.	Noted.	**YES**	**OWNER**
12.3	Upon receipt of this comment letter, the Owner is to provide Bell Canada with servicing plans/CUP at their earliest convenience to planninganddevelopment@bell.ca to confirm the provision of communication/telecommunication infrastructure needed to service the development.	Once the draft plan of subdivision has been accepted by the County, the Owner (through Crozier) will circulate the accepted plan to Bell Canada.		**CROZIER**
12.4	It shall be noted that it is the responsibility of the Owner to provide entrance/service duct(s) from Bell Canada's existing network infrastructure to service this development. In the event that no such network infrastructure exists, in accordance with the Bell Canada Act, the Owner may be required to pay for the extension of such network infrastructure.	Noted.	**YES**	**OWNER**
12.5	If the Owner elects not to pay for the above noted connection, Bell Canada may decide not to provide service to this development.	Noted.	**YES**	**OWNER**
13.0	**GRAND ERIE DISTRICT SCHOOL BOARD**			
13.1	The proposed development is located within the attendance boundary for Lakewood Elementary School (JK-8) and Simcoe Composite School (9-12).	To date comments from the Catholic District Schoolboard have not been received regarding the recent re-submission. Staff to provide comments as they become available.		

NO.	COMMENTS	RESPONSE	ADDRESSED	CONSULTANT RESPONSIBLE
	Lakewood Elementary is currently at 88% utilization and Simcoe Composite is at 68% utilization. With the proposed plan to develop 455 residential lots, enrolment projections suggest the utilizations could increase to 112% and 72%, respectively. Lakewood Elementary may not have the space to accommodate all the students generated from this development.			
13.2	We request that the following be included in the conditions of draft approval; That the Owner/Developer must agree in the Subdivision Agreement and/or Site Plan Agreement to notify all purchasers of residential units and/or renters of same, by inserting the following clause in all offers of Purchase and Sale/Lease: *"Despite the best efforts of the Grand Erie District School Board (GEDSB), accommodation in nearby facilities may not be available for all anticipated students. You are hereby notified that students may be accommodated in temporary facilities and/or bussed to a school outside the area, and further, that students may, in future, be transferred to another school.*	Noted.	**YES**	**OWNER**
14.0	**PUBLIC MEETING**			
14.1	From Mr. and Mrs. Wilkinson, property owners to the south east of the Subject Lands: • Retaining wall of Lynn River Heights Phase-I caused water inundation in neighboring property to the west. • The proposed stormwater pond of phase-II would further worsen the current situation • A solution such as a catch basin can be installed to divert the water into the storm sewer system • This is a decade old problem that needs to be addressed.	The updated FSR/SWM Report does not depict any additional stormwater draining onto adjacent residential properties from the Phase II lands. The existing 450mm storm sewer within Lynn River Heights Phase 1 will be extended and terminate at a proposed headwall to receive external drainage from the existing residential lots along Highway 6. Preliminary grading promotes positive drainage away from the neighboring properties and directs drainage towards the existing drainage block adjacent the SWM pond block. With that said, the updated FSR/SWM Report has considered this issue and has made recommendations on best efforts that may be possible through the pond design (on the Phase II lands) to help accommodate a portion of stormwater from the adjacent property. Additional recommendations have been put forward in the updated FSR but will require appropriate agreements between the adjacent property owner and the County to implement.	**YES**	**CROZIER**
14.2	On-Street Parking was a concern with the proposed idea of providing overflow parking for visitors	MHBC has prepared a Streetscape and Parking Plan, which demonstrates various potential streetscape profiles to accommodate landscaping, sidewalks, driveways, and on street parking conditions for accommodating overflow parking for visitors based on what has been observed in similar developments in the community.	**YES**	**MHBC**
14.3	Concerns with density however acknowledged that the Draft Secondary Plan is pushing for the increased density	Noted. Increased density aligns with provincial policy objectives, the Official Plan, the draft Secondary Plan, and promotes development within the existing urban boundary.	**YES**	**MHBC**
14.4	Concerns regarding "big box" retail in the Future Development Blocks	The Future Development Blocks are proposed to be zoned Neighbourhood Commercial (CN) which is intended to permit smaller scale commercial uses in a mixed use setting and are more compatible with low density residential development. This zoning and mixed use was requested by County Staff and aligns with the draft Secondary Plan. "Big box" stores would note be permitted in the CN zone and would be encouraged within Norfolk County's Central Business District (CBD) and Shopping Centre Commercial (CSC) Zones.	**YES**	**MHBC**
14.5	Request for contributions to a walkway along Highway 6 frontage to ensure connection to other community facilities based on the number of units being proposed	A portion of the required Norfolk County Development Charges contributes to roads and related services. Each proposed dwelling will be required to pay development charges, which will be reflected in a subdivision agreement.	**YES**	**MHBC**

NO.	COMMENTS	RESPONSE	ADDRESSED	CONSULTANT RESPONSIBLE
14.6	Concerns regarding the capacity of the existing Catholic School and inquired if the Catholic District School Board provided comments	Comments were only received from the Grand Erie District School Board, which requested a warning clause be included within the subdivision agreement. Will address any future comments from the Catholic District School Board as they become readily available.	**YES**	**MHBC**
14.7	Requested more detail regarding proposed sidewalks	MHBC has prepared a Streetscape and Parking Plan, which demonstrates various potential streetscape profiles including sidewalk locations.	**YES**	**MHBC**
14.8	Concerns regarding the order of construction and the use of existing local roads as means for construction access	Construction of the road will be part of the initial stages of construction. Access will occur via Highway 6 and is not intended to utilize existing local roads.	**YES**	**MHBC**
14.9	Questions regarding the target market for the development	The proposed applications will provide for a mix and range of housing options in order to cater to various demographics, including more attainable housing options.	**YES**	**MHBC**
14.10	Questions regarding the interconnectivity of the Stormwater Management Ponds for Phase 1 and 2. Specifically wanted to know if the pond in Phase 1 had sufficient capacity for the storm water in the proposed development.	The proposed stormwater management pond is intended to be interconnected with the existing infrastructure within the Phase 1 development. The proposed swm facility overcontrols the post-development flow rates to the capacity of the existing Phase 1 storm sewers. As such, flows being conveyed to the existing phase 1 facility will be less than pre-development conditions.	**YES**	**CROZIER**
14.11	Concerns regarding the connectivity of the proposed easement to the trail system to the north	Block 455 has been re-located to provide a future walkway and access to the adjacent lands to the northwest that provide potential for a future connection. It should be noted that any future connection or access to the lands to the north will be subject to additional approvals required by the County through a separate planning process put forward by the landowner to the north.	**YES**	**MHBC**

LYNN RIVER HEIGHTS PHASE II | COMMENTS & RESPONSE MATRIX FINAL
NORFOLK COUNTY

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NO.	COMMENTS	RESPONSE	ADDRESSED	CONSULTANT RESPONSIBLE
1.0	**PLANNING**			
	Zoning			
1.1	Staff have concerns about the proposed reduction of the required 9m sight triangle. Please provide greater justification to support the reduced sight triangle requirements.	The proposed Zoning By-law Amendment was revised to remove any change to Section 3.31 of the Zoning By-law relative to the required 9 m sight triangle.	**YES**	**MHBC**
	Subdivision Design			
1.2	Thank you for the submission of the streetscape design drawing. Please be advised that in accordance with Section 8,2, subsection (d), of Parking bylaw 2011-189 (on-street parking), 'No person shall park a vehicle less than 1.2 meters of a driveway, measured from the curb cut, or where there is no curb cut from the intersection of the prolonged edge of the travelled portion of the driveway and the edge of the roadway'. As a result of this requirement, on-street parking may not be able to be accommodated with the proposed 10 m frontages for the single-detached dwellings.	Noted. MHBC has prepared a Streetscape and Parking Plan, which demonstrates various potential streetscape profiles that can be implemented through detailed design to accommodate landscaping, sidewalks, driveways, and adequate on street parking conditions.	**YES**	**MHBC**
2.0	**AGREEMENTS COORDINATOR**			
2.1	Draft plan of subdivision conditions will be included as part of the planning report. One of these conditions will be the requirement to enter into a subdivision agreement, and any subsequent amending or supplementary agreements thereto, and that the agreements shall be registered on title to the subject lands, all at the Owner's expense. Your conditions of draft approval will need to be fulfilled or satisfied prior to registration of your subdivision agreement. In order to streamline the agreement process and reduce review times, please provide a complete submission package along with any fees required when you are ready to start.	Noted.	**YES**	**MHBC**
3.0	**DEVELOPMENT ENGINEERING**			
3.1	Revised Draft Plan of Subdivision (DPOS) and Zoning By-law Amendment (ZBA) for Norfolk County Application File: 28TPPL2017317 28TPL2017317 and ZNPL2017318 for the Lynn River Heights Phase 2	Noted. An updated Functional Servicing and Stormwater Management Report (FSR/SWM) dated March 2024 prepared by Crozier Consulting Engineers and an		**MHBC**

NO.	COMMENTS	RESPONSE	ADDRESSED	CONSULTANT RESPONSIBLE
	Residential Development in Port Dover is not recommended for Engineering Approval, based on the following: 1. An updated Functional Servicing Report is required to address recent water and sanitary upgrades in Port Dover, as well as incorporate updated hydraulic model analysis (to be completed by R. V. Anderson Associates Limited) as well as any potential for servicing upgrades external to the development; and, 2. An updated Traffic Impact Study is required to address works completed and confirm updated area conditions (the submitted Traffic Impact Study is dated December 2006).	updated Traffic Impact Study (TIS) prepared by NexTrans Consulting Engineers dated April 2024 is included in the submission material. It is our understanding that water and wastewater flows will be provided to the County's consultant R.V. Anderson to complete a capacity assessment of the surrounding municipal infrastructure and confirm if external upgrades are required.		
3.2	At minimum, design briefs stamped by a qualified professional Engineer referencing the previous completed servicing and traffic studies are required. The design briefs are to include description of how the previous technical studies apply to the current 2023 Development Application with reference to current and planned conditions within the area of the proposed development, including updated water and wastewater system analysis modelling completed by the County's consultant.	See above response to 3.1.	**YES**	**NEXTRANS/ CROZIER**
3.3	It is important that updated engineering studies are completed to current County standards and requirements and updated studies / design briefs are required to confirm that no additional external water and wastewater servicing and transportation works are required to support this development. Reference to previous approval of submitted reports by Development Engineering is not sufficient as significant work has been completed by the County since the previous submission to understand the water and wastewater system within Port Dover. TIS are to always reference current conditions and proposed road layouts and traffic controls.	See above response to 3.1.	**YES**	**NEXTRANS/ CROZIER**
4.0	**BUILDING DEPARTMENT**			
	All general permitting inquires: by email: permits@norfolkcounty.ca or by phone: 226-NORFOLK (226-667-3655) Ext 6016			
4.1	The building department has reviewed the proposal and has NO comments or conditions. No Ontario Building Code review has been completed at this time and will be done at permit application stage. Please reach out to the building department as you get closer to having the planning and applicable approvals in place and staff will be happy to assist you with information on preparing for the building and septic permit stage of the project.	Noted.	**YES**	**N/A**
5.0	**ZONING**			
5.1	A Zoning table should be on draft plan of subdivision for each phase stating the zone and the zone provisions. There are zoning comments on the conceptual streetscape plan, but it doesn't state if it's R1 or R2, and this is not put in a zoning table format.	A Zoning Table has been added to the coloured version of the Draft Plan of Subdivision as requested.	**YES**	**MHBC**
5.2	This is a large document to decipher, it would be good if a site plan sketch for each phase can be sent separately for zoning to review with zoning tables.	Please see Streetscape and Parking Plan Analysis for typical lot layouts based on the proposed zoning standards (Figure 1).	**YES**	**MHBC**
5.3	Additionally, the submitted conceptual plan contains no decks, decks pose many issues in the future if a basic concept deck is not on the site plan sketch.	Decks are shown on typical lot layouts within Streetscape and Parking Plan Report, and adhere to Section 3.6 of the Norfolk County Zoning By-law (Figure 1).	**YES**	**MHBC**
6.0	**FIRE**			

NO.	COMMENTS	RESPONSE	ADDRESSED	CONSULTANT RESPONSIBLE
6.1	Norfolk Fire has the following comments for this proposal: • Ensure there is adequate access for fire department apparatus through the site and that road widths take into consideration street parking. • Particular attention should be paid to curves/corners and parking proximity to these areas- please keep the turn radius in mind. • Ensure there is an adequate number of hydrants spaced appropriately.	The Draft Plan of Subdivision includes 20 metre street widths with turning radii at 90 metres, which is consistent with the County's Residential & Local Roads and Minor Collector Road Standards. NexTrans has also reviewed the proposed street network and confirmed that emergency vehicles can manoeuver through the site without conflict. (Section 7.0 of TIS) Fire hydrant locations have been proposed to ensure adequate fire suppression for the proposed development per County design standards.	**YES**	**MHBC / NEXTRANS**
7.0	**PARAMEDIC SERVICES**			
7.1	No comments from Paramedic Services.	Noted.		**N/A**
8.0	**GMBP ENGINEERING REVIEW COMMENTS**			
	Lynn River Heights, Port Dover, Traffic Impact Study by F.R. Berry & Associates, December 2006 / Lynn River Heights Residential Subdivision, Phase 2, Port Dover Traffic Impact Assessment, by F.R. Berry & Associates, December 2016			
8.1	The submitted Traffic Impact Studies (TIS) are from December 2006 and December 2016. An updated TIS is required, or at minimum a brief stamped by a qualified professional Engineer, identifying how the previously completed TIS remains consistent under current conditions – including reference to studies, plans and works undertaken since completion of the previously completed TIS as well as review of the original traffic count data and modelling.	NexTrans has prepared an updated 2024 TIS based on the 2023 revised Draft Plan of Subdivision, updated traffic data, appropriate design horizons, and applicable buildout assumptions.	**YES**	**NEXTRANS**
8.2	The July 13, 2023 Cover Letter Re: Lynn River Heights Phase 2, Port Dover, Revised Draft Plan of Subdivision…" notes that "the proposed round-about entrance at Highway 6 and Street B has been replaced with a traditional intersection (including 5 m x 5 m daylight triangles) due to jurisdictional issues (MTO ownership of Highway 6) and design/construction/land ownership/cost share challenges associated with the round-about." The updated TIS is to include detail on the rationale for traffic control at Highway 6 and Street B.	Rationale for both a signalized intersection and round-about is provided within Section 6 – Highway 6 and Street B Intersection Control Alternatives. The TIS recommends improvement to Highway 6 by providing an eastbound left turning lane onto Street B. Furthermore, it has been determined that despite the intersection not warranting signalization or a round-about, the intersection should be protected for future signalization, and does not require a land dedication as signalization has been determined to fit within the 30 metre right of way.	**YES**	**NEXTRANS**
8.3	The July 13, 2023 Cover Letter Re: Lynn River Heights Phase 2, Port Dover, Revised Draft Plan of Subdivision…" notes that "There has been a slight adjustment to Streets H and J due to the park relocation and to provide a more direct internal access to the future development blocks. Street J, as proposed, will help minimize any potential traffic conflicts between residential uses within the subdivision and the future mixed-use development." The updated TIS is to address any changes and impacts of changes to the proposed road layout.	The TIS (Section 7) reviewed the internal road network of the draft plan of subdivision dated March 14, 2024. It determined that the intersection spacing, angle, curb radius, and sight triangles were satisfactory and met the appropriate design criteria of the Transportation Association of Canada ("TAC") and Norfolk County.	**YES**	**NEXTRANS**
8.4	The July 13, 2023 Cover Letter Re: Lynn River Heights Phase 2, Port Dover, Revised Draft Plan of Subdivision…" notes that "The Highway 6 / Street B intersection is consistent with the findings of the Traffic Impact Study." This is to be confirmed by a qualified professional Engineer as part of the application.	Noted. See response to 8.2 and 8.3 above.	**YES**	**NEXTRANS**

NO.	COMMENTS	RESPONSE	ADDRESSED	CONSULTANT RESPONSIBLE
	Lynn River Heights Subdivision Phase 2 Port Dover Democrat Port Dover Limited Functional Servicing Report, by Girard Engineering Ltd.			
	An updated Functional Servicing Report (FSR) is required to addresses recent water and sanitary upgrades completed within Port Dover (including work completed after 2019), as well as updated hydraulic analysis of the proposed development on the Port Dover water and wastewater systems to be completed by the County's consultant (R. V. Anderson Associates Limited). A design brief stamped by a qualified Professional Engineer, identifying how the previously completed FSR remains consistent under current conditions (with reference to updated hydraulic analysis work to be completed by the County's Consultant) is also acceptable; but, as the submitted FSR is very brief (1 page), it is anticipated that a fully updated FSR will be required to fully address the proposed servicing under current conditions.	Crozier has prepared an updated 2024 Functional Servicing Report for review and consideration by Norfolk County and their consultants. Design flows and proposed servicing alignment will be provided to the County's consultant to complete the external capacity assessment.		**CROZIER**
	Lynn River Heights Subdivision (Port Dover, ON) Preliminary Stormwater Management Report, by Girard Engineering Ltd., November 2017, Updated March 2019			
8.5	The report has been updated to address comments prepared by Ainley & Associates Limited (April 12, 2018) relating to Draft Plan of Subdivision (DPOS). The Phase 1 Development Stormwater Management Report is to be provided to confirm that the preliminary stormwater management report is sufficient for DPOS Approval.	Crozier has prepared an updated 2024 FSR/SWM Report for review and consideration of Norfolk County and their consultants. Furthermore, Crozier has prepared a Commenting Matrix in response to the Ainley & Associate comments.	**YES**	**CROZIER**
8.6	For the Detailed Engineering Submission, all April 12, 2018 comments prepared by Ainley are to be addressed. Upon receiving the updated SWM Report in support of the Detailed Engineering submission, there may be additional new comments based on review of the more detailed submission.	Noted. Same response as provided in 8.5.	**YES**	**CROZIER**
9.0	**LONG POINT REGION CONSERVATION AUTHORITY**			
	Lynn River Heights, Port Dover, Traffic Impact Study by F.R. Berry & Associates, December 2006 / Lynn River Heights Residential Subdivision, Phase 2, Port Dover Traffic Impact Assessment, by F.R. Berry & Associates, December 2016			
9.1	Long Point Region Conservation Authority (LPRCA) staff have had an opportunity to review the application 28TPL2017317, ZNPL2017318 and can provide the following comments based on LPRCA's various plan review responsibilities. Delegated Responsibility from the Ministry of Natural Resources and Forestry, Section 3.1 of the Provincial Policy Statement, 2020 Conservation Authorities have been delegated responsibilities from the Minister of Natural Resources and Forestry to represent the provincial interests regarding natural hazards encompassed by Section 3.1 of the Provincial Policy Statement, 2020 (PPS). The overall intent of Section 3.0 - Protecting Public Health and Safety of the PPS is to reduce the potential public cost or risk to Ontario's residents from natural or human-made hazards. As such, "development shall be directed away from areas of natural or human-made hazards where there is an unacceptable risk to public health or safety or of property damage, and not create new or aggravate existing hazards." The application is subject to the following subsections of section 3.1 of the Provincial Policy Statement: 3.1.1 Development shall generally be directed, in accordance with guidance developed by the Province (as amended from time to time), to areas outside of:	Noted.	**YES**	**N/A**

NO.	COMMENTS	RESPONSE	ADDRESSED	CONSULTANT RESPONSIBLE
	b) hazardous lands adjacent to river, stream and small inland lake systems which are impacted by flooding hazards and/or erosion hazards. As the proposed lots are setback a minimum of 6m from the top of bank, the proposed application is consistent with section 3.1 of the Provincial Policy Statement, 2020. LPRCA has no objection to the concept of this application at this time			
9.2	*Ontario Regulation 178/06* For the applicant's information, a portion of the subject property is regulated under Ontario Regulation 178/06. A permit is required for any development within the regulation limit. Development includes: • the construction, reconstruction, erection or placing of a building or structure of any kind, • any change to a building or structure that would have the effect of altering the use or potential use of the building or structure, increasing the size of the building or structure or increasing the number of dwelling units in the building or structure, • site grading, or • the temporary or permanent placing, dumping or removal of any material, originating on the site or elsewhere (Conservation Authorities Act, R.S.O. 1990, c. 27, s. 28 (25)).	Noted.	**YES**	**OWNER**
	LPRCA has reviewed stormwater management design using the 2003 MECP Stormwater Management Planning and Design Manual, MTO Drainage Manual, LID Stormwater Management Manual, the sustainable technologies STEP website https://sustainabletechnologies.ca/, and the Municipal SWM guidelines. Staff have the following comments with regards to stormwater management (SWM):			
9.3	The SWM report states "Infiltration measures shall be distributed around the site rater than at a single 'end of pipe' location. Please provide a concept with proposed locations for infiltration. Staff recommend the utilization of a treatment train to capture the first flush of rainfall (1in);	The updated 2024 Functional Servicing and Stormwater Management Report by Crozier Engineering indicates that the existing soils are not conducive to infiltration and the implementation of LID's. Due to the existing site constraints, no LID's have been proposed at this time to meet the water balance objectives for the proposed development.	**YES**	**CROZIER**
9.4	Please provide justification on why 'Partly Asphalt' is set at C = 0.8 and not a minimum 0.9;	Runoff coefficients for the proposed development were established using Section 7.8.04 of the Norfolk County Design Criteria 2019. The updated stormwater management modelling uses 0.9 for asphalt surfaces and 'partly asphalt' is no longer considered.	**YES**	**CROZIER**
9.5	A pre and post development drainage area illustration is requested and should include the designated area associated along with the impervious percentage or run off coefficient,	Pre and Post Development Drainage Plans are provided in the 2024 Functional Servicing and Storm Water Management Plan prepared by Crozier Engineering, as figures 5 and 6 respectfully.	**YES**	**CROZIER**
9.6	The emergency overflow easements should be on private property;	Block 519 was introduced as drainage easement to address overflow of storm water from the adjacent lands to the west. Overland flow from the proposed stormwater management facility will outlet to the existing Lynn River Heights Phase 1 750mm sewer block.	**YES**	**CROZIER**
9.7	Erosion and Sediment Control plan needs to be provided;	An Erosion and Sediment Control Plan (Figure 10) has been prepared and details of the Erosion Controls has been provided in the Function Servicing and Stormwater Management Report (Crozier, 2024).	**YES**	**CROZIER**

NO.	COMMENTS	RESPONSE	ADDRESSED	CONSULTANT RESPONSIBLE
9.8	All setbacks should be clearly labeled on the engineered drawings. The 6m setback should be applied along the top of the slope on the north end and all lots should remain 6m back from the top of slope. A scale bar should be provided on all drawings	Block 457 provides a 6 m buffer from the Hazard Lands within Block 458 and the residential lots at the north of the DPOS.	**YES**	**MHBC**
9.9	Please provide details about the major overland flow route within the report at the detailed design stage	Noted.		**CROZIER**
10.0	**CANADA POST**			
10.1	Please be advised that Canada Post does not have any further comments on this application. This development will be serviced by Community mailboxes and Canada Post will work with the developer on site locations and requirements for concrete pads.	Noted.	**YES**	**MHBC**
11.0	**HALDIMAND NORFOLK SOCIAL SERVICES AND HOUSING**			
11.1	Social Services and Housing is supportive of additional housing options for members of our community, particularly more affordable options.	Noted.	**YES**	**MHBC**
12.0	**BELL CANADA**			
	We have reviewed the circulation regarding the above noted application. The following paragraphs are to be included as a condition of approval:			
12.1	The Owner acknowledges and agrees to convey any easement(s) as deemed necessary by Bell Canada to service this new development. The Owner further agrees and acknowledges to convey such easements at no cost to Bell Canada.	Noted.	**YES**	**OWNER**
12.2	The Owner agrees that should any conflict arise with existing Bell Canada facilities where a current and valid easement exists within the subject area, the Owner shall be responsible for the relocation of any such facilities or easements at their own cost.	Noted.	**YES**	**OWNER**
12.3	Upon receipt of this comment letter, the Owner is to provide Bell Canada with servicing plans/CUP at their earliest convenience to planninganddevelopment@bell.ca to confirm the provision of communication/telecommunication infrastructure needed to service the development.	Once the draft plan of subdivision has been accepted by the County, the Owner (through Crozier) will circulate the accepted plan to Bell Canada.		**CROZIER**
12.4	It shall be noted that it is the responsibility of the Owner to provide entrance/service duct(s) from Bell Canada's existing network infrastructure to service this development. In the event that no such network infrastructure exists, in accordance with the Bell Canada Act, the Owner may be required to pay for the extension of such network infrastructure.	Noted.	**YES**	**OWNER**
12.5	If the Owner elects not to pay for the above noted connection, Bell Canada may decide not to provide service to this development.	Noted.	**YES**	**OWNER**
13.0	**GRAND ERIE DISTRICT SCHOOL BOARD**			
13.1	The proposed development is located within the attendance boundary for Lakewood Elementary School (JK-8) and Simcoe Composite School (9-12).	To date comments from the Catholic District Schoolboard have not been received regarding the recent re-submission. Staff to provide comments as they become available.		

NO.	COMMENTS	RESPONSE	ADDRESSED	CONSULTANT RESPONSIBLE
	Lakewood Elementary is currently at 88% utilization and Simcoe Composite is at 68% utilization. With the proposed plan to develop 455 residential lots, enrolment projections suggest the utilizations could increase to 112% and 72%, respectively. Lakewood Elementary may not have the space to accommodate all the students generated from this development.			
13.2	We request that the following be included in the conditions of draft approval; That the Owner/Developer must agree in the Subdivision Agreement and/or Site Plan Agreement to notify all purchasers of residential units and/or renters of same, by inserting the following clause in all offers of Purchase and Sale/Lease: *"Despite the best efforts of the Grand Erie District School Board (GEDSB), accommodation in nearby facilities may not be available for all anticipated students. You are hereby notified that students may be accommodated in temporary facilities and/or bussed to a school outside the area, and further, that students may, in future, be transferred to another school.*	Noted.	**YES**	**OWNER**
14.0	**PUBLIC MEETING**			
14.1	From Mr. and Mrs. Wilkinson, property owners to the south east of the Subject Lands: • Retaining wall of Lynn River Heights Phase-I caused water inundation in neighboring property to the west. • The proposed stormwater pond of phase-II would further worsen the current situation • A solution such as a catch basin can be installed to divert the water into the storm sewer system • This is a decade old problem that needs to be addressed.	The updated FSR/SWM Report does not depict any additional stormwater draining onto adjacent residential properties from the Phase II lands. The existing 450mm storm sewer within Lynn River Heights Phase 1 will be extended and terminate at a proposed headwall to receive external drainage from the existing residential lots along Highway 6. Preliminary grading promotes positive drainage away from the neighboring properties and directs drainage towards the existing drainage block adjacent the SWM pond block. With that said, the updated FSR/SWM Report has considered this issue and has made recommendations on best efforts that may be possible through the pond design (on the Phase II lands) to help accommodate a portion of stormwater from the adjacent property. Additional recommendations have been put forward in the updated FSR but will require appropriate agreements between the adjacent property owner and the County to implement.	**YES**	**CROZIER**
14.2	On-Street Parking was a concern with the proposed idea of providing overflow parking for visitors	MHBC has prepared a Streetscape and Parking Plan, which demonstrates various potential streetscape profiles to accommodate landscaping, sidewalks, driveways, and on street parking conditions for accommodating overflow parking for visitors based on what has been observed in similar developments in the community.	**YES**	**MHBC**
14.3	Concerns with density however acknowledged that the Draft Secondary Plan is pushing for the increased density	Noted. Increased density aligns with provincial policy objectives, the Official Plan, the draft Secondary Plan, and promotes development within the existing urban boundary.	**YES**	**MHBC**
14.4	Concerns regarding "big box" retail in the Future Development Blocks	The Future Development Blocks are proposed to be zoned Neighbourhood Commercial (CN) which is intended to permit smaller scale commercial uses in a mixed use setting and are more compatible with low density residential development. This zoning and mixed use was requested by County Staff and aligns with the draft Secondary Plan. "Big box" stores would note be permitted in the CN zone and would be encouraged within Norfolk County's Central Business District (CBD) and Shopping Centre Commercial (CSC) Zones.	**YES**	**MHBC**
14.5	Request for contributions to a walkway along Highway 6 frontage to ensure connection to other community facilities based on the number of units being proposed	A portion of the required Norfolk County Development Charges contributes to roads and related services. Each proposed dwelling will be required to pay development charges, which will be reflected in a subdivision agreement.	**YES**	**MHBC**

NO.	COMMENTS	RESPONSE	ADDRESSED	CONSULTANT RESPONSIBLE
14.6	Concerns regarding the capacity of the existing Catholic School and inquired if the Catholic District School Board provided comments	Comments were only received from the Grand Erie District School Board, which requested a warning clause be included within the subdivision agreement. Will address any future comments from the Catholic District School Board as they become readily available.	**YES**	**MHBC**
14.7	Requested more detail regarding proposed sidewalks	MHBC has prepared a Streetscape and Parking Plan, which demonstrates various potential streetscape profiles including sidewalk locations.	**YES**	**MHBC**
14.8	Concerns regarding the order of construction and the use of existing local roads as means for construction access	Construction of the road will be part of the initial stages of construction. Access will occur via Highway 6 and is not intended to utilize existing local roads.	**YES**	**MHBC**
14.9	Questions regarding the target market for the development	The proposed applications will provide for a mix and range of housing options in order to cater to various demographics, including more attainable housing options.	**YES**	**MHBC**
14.10	Questions regarding the interconnectivity of the Stormwater Management Ponds for Phase 1 and 2. Specifically wanted to know if the pond in Phase 1 had sufficient capacity for the storm water in the proposed development.	The proposed stormwater management pond is intended to be interconnected with the existing infrastructure within the Phase 1 development. The proposed swm facility overcontrols the post-development flow rates to the capacity of the existing Phase 1 storm sewers. As such, flows being conveyed to the existing phase 1 facility will be less than pre-development conditions.	**YES**	**CROZIER**
14.11	Concerns regarding the connectivity of the proposed easement to the trail system to the north	Block 455 has been re-located to provide a future walkway and access to the adjacent lands to the northwest that provide potential for a future connection. It should be noted that any future connection or access to the lands to the north will be subject to additional approvals required by the County through a separate planning process put forward by the landowner to the north.	**YES**	**MHBC**

CROZIER
CONSULTING ENGINEERS

Project Name: Lynn River Heights Phase 2
Project Number: 2604-6978
Date Created: 1/31/24

Lynn River Heights Phase 2 - File No. 2604-6978
Zoning By-Law Amendment Application - First Submission Comments

No.	Agency Comment	Respondee	Response
	Ainley & Associates Limited Peer Review Comments - April 12, 2018		
1.0	Proposed Draft Plan of Subdivision (Dec 15, 2017) — MacKinnon & Associates		
1.1	Show the proposed phasing of the development on all plans as illustrated on the hand drawn sketch provided with this application.	CFC	Phasing to be determined during detailed design.
1.2	0.3 metre reserves are required along all flankages and daylight triangles of corner lots and site entrances.	MHBC	Added 0.3 m reserve blocks to Draft Plan of Subdivision enclosed.
1.3	Private utilities should be circulated on the proposed development plans prior to draft plan approval. Please provide letters of understanding from private utility companies including Hydro One, Bell Telephone and Enbridge natural gas and include as an appendix in the Functional Servicing Report.	CFC	Acknowledged. This will be completed during detailed design.
1.4	The proposed round-about at the intersection of Highway 6 and Street B appears to encroach upon the lands to the south. Clarify if the proponent owns this property or if appropriate agreements are in place to allow this work to be completed.	MHBC	Draft Plan of Subdivision revised to remove roundabout as it is not warranted as per NextTrans Traffic Impact Study, dated April 2024 (enclosed).
1.5	Lot widths for the semi-detached units are as low as 9.0m. We question whether such narrow lots provide adequate frontage to accommodate street features (driveway width, light standards, utility structures, hydrants, etc.) and still provide a streetscape acceptable to the County.	MHBC	The County's Zoning By-law (in the R2 Zone being applied for) requires a minimum lot frontage of 8.5 metres for semi-detached unit. Therefore, the proposed 9 metre semi-detached unit exceeds this zoning standard already set by the County. With that said, MHBC has prepared a Streetscape and Parking Plan, dated April 2024, which demonstrates various potential streetscape profiles to accommodate landscaping, sidewalks, driveways, and on street parking conditions.
1.6	Confirm that the County standard runoff coefficient of 0.6 for semi-detached lots is appropriate for the proposed semi-detached lots with 9.5m frontages.	CFC	The stormwater management modelling, within the Crozier Engineering updated FSR/SWM, dated March 2024, for the proposed development was complete with reference to Section 7.8.04 of the Norfolk County Design Criteria (February 2019).
1.7	Please confirm if a second connection to western developed lands is desired by the County similar to how Phase 2 is connected to Phase 1 by two roads. If this were the case it would seem logical to add another link for example at Street C.	MHBC	In our view, the one access provided to allow for the continuation of the collector road is adequate given that there is no planned intent to develop the lands west of the proposed development. Lands to the west are outside of the Port Dover Urban Boundary Area, and would therefore require a comprehensive review in accordance with 6.4.f of the Norfolk County Official Plan, and all other associated policies.
1.8	The Erosion Hazard Limit and Erosion Access Allowance are to be clearly identified on the Draft Plan. The Lots are to lie outside of that limit.		All lands with hazardous environmental features, have been zoned as Environmental Protection, and have been placed within a block number on the Draft Plan, dated March 14, 2024. Surveyed environmental feature limits are included on the Draft Plan of Subdivision. Further to this, the Draft Plan also provides a buffer block which separates the environmental hazard from the residential lots.
2.0	*Sanitary Servicing*		
2.1	In future submissions, provide details of the available sanitary capacity in the existing sewers downstream of the development on Highway 6.	CFC	Acknowledged. We understand the County's third party consultant will confirm downstream capacity of the sanitary sewer based on design flows provided within Crozier Engineering's March 2024 updated FSR/SWM.
2.2	The County's comments on the proposed staging and the current sanitary treatment plant capacity need to be confirmed.		Acknowledged. A background review of the Port Dover Wastewater Treatment Plant was complete and provided in Section 5.2 of Crozier Engineering's updated March 2024 FSR/SWM. Phasing will be confirmed during detailed design.
3.0	*Water Servicing*		
3.1	The County's Water System Hydraulic Model will need to be updated now, at the Developer's expense, to confirm watermain sizing for the proposed development layout and show adequate water supply, fire flows and pressures can be achieved for the final and interim (Stage 1) condition.	CFC	Acknowledged. The water demand calculations have been provided in the Crozier Engineering's March 2024 updated FSR/SWM to be provided to the County consultant.
3.2	During detailed design we suggest that the watermain extending into Block 490. The watermain should be capped at the tee intersection of Street D and Willowdale Crescent. Alternatively, terminate this watermain line with a hydrant.		Acknowledged. The watermain extension in Block 490 has been removed as the lands to the west are outside of the Port Dover Urban Boundary Area.
3.3	During detailed design the layout of valves within the watermain network shown on Drawing 304 are to be revised. As per County of Norfolk standards, 3 valves are required on all tee intersections and 4 valves are required at all cross intersections. Valves are to be located in line with the property line of the intersection street. In addition, no more than 20 water services shall be located between any 2 valves.		Acknowledged. The number of valves and their locations will be confirmed during detailed design.
3.4	During detailed design, revise the spacing of hydrants as shown on drawing 304A. There is a gap in hydrant coverage at Lot 186.		Acknowledged. All hydrant locations have been revised to ensure sufficient fire suppression coverage.
4.0	*Stormwater Management*		
4.1	Please provide a plan showing the external drainage areas and drainage routes including existing contours surrounding the development site for both the pre- and post-development conditions. Please extend existing contours beyond the subdivision limits to ensure that additional external areas do not drain into the proposed subdivision limits. Confirm no additional corridors between lots are required to accommodate an overland flow route into the subdivision.		Acknowledged. External drainage areas are identified on the updated Post-Development Drainage Plan (Figure 6) of Crozier Engineering's March 2024 updated FSR/SWM. Designated drainage blocks are provided between lots to provide conveyance of external drainage.
4.2	Proposed grading details have not been provided. Provide adequate preliminary grading design to show that the proposed draft plan can be integrated with the abutting lands and drainage can be captured and conveyed to the appropriate outlets.		Acknowledged. Please refer to the Grading Plan (Figure 6) within Crozier Engineering's March 2024 updated FSR/SWM for the preliminary grading of the site.

4.3	During detailed design the FSR and SWM Reports are to be updated and provide supporting calculations that ensure an overland flow route is accommodated in blocks of land or road right of ways as per the Norfolk County Design Criteria Section 7.8.03. Please ensure maximum depths of flow are not exceeded and the flows are contained within the municipal right-of- way.		Acknowledged. These calculations will be provided during detailed design. Preliminary weir sizing calculations were complete within the Visual Otthymo model.
4.4	The Phase 1 stormwater management report was not enclosed in the submitted materials. Please provide the report so that the anticipated capacity can be verified with the Phase 2 development and servicing sizes can be confirmed.		Acknowledged. The Phase 1 report has been included in this submission.
4.5	Please detail in the preliminary stormwater management report how the flows from the development will be controlled post-development to pre-development and conveyed to a legal outlet on municipal property.		Please refer to Crozier Engineering's March 2024 updated FSR/SWM for details on the pre-development and post-development flows from the proposed development. Pot-development flows are being overcontrolled in cimparison to pre-development flows to meet the capacity of the receiving Phase 1storm sewers.
4.6	Further information is necessary to confirm that the Stormwater Management Pond Block is sized correctly so that it can function as intended and as required by MOECC and Norfolk County Design criteria. In particular, the following are necessary: •Twenty four hour detention for the water quality (25mm) storm event (MOECC Stormwater Management Planning and Design Guidelines, 2003); •A Forebay — as per MOECC criteria; •Side slopes as per Norfolk County Design Criteria Section 7.4.01; •Permanent Pool depth of 1.0-1.5m as per Norfolk County Design Criteria 7.4.01. (The permanent pool depth does not match the depth of the drawings (0.Zm vs. 0.8m). Both of these depths do not meet the Norfolk County Design Criteria Section 7.4.01 requiring a permanent pool depth between 1.0 and 1.5m.) •Outlet configuration; •Post-pre flow controls. (The preliminary stormwater management report does not show how the development will restrict flows to pre- development limits. The outlet configuration has not been specified in the report. There is no post-pre flow comparison to show that the facility is meeting post-pre controls as no outflows are shown. Please provide confirmation that post-pre flow controls are maintained for the 2-100 year storm events.)	CFC	Please refer to Crozier Engineering's March 2024 updated FSR/SWM and Preliminary Stormwater Management Facility Plan (Figure 9) for details on the proposed stormwater management facility. The SWM facility has been designed with reference to the appropriate guidelines.
4.7	In detailed design, as the SWM Report is updated it is to acknowledge the presence of the floodplain to the north of the proposed development in Section 1.3 "Existing Drainage Conditions".		The northern extents of the proposed development are regulated by the LPRCA; however, it is anticipated the proposed development will be significantly higher than the Regional Floodplain limit.
4.8	Please ensure during detailed design that infiltration galleries have a four-day maximum drawdown time. It is acknowledged that 15% extra capacity will be accounted for as per the standards. A discussion of where infiltration galleries may exist above measured groundwater levels should be forthcoming as a part of the water balance.		The existing soils are not conducive to infiltration facilities; therefore, infiltration has not been proposed within the development.
4.9	During detailed design, please confirm that storm sewer pipes do not exceed the maximum manhole distances as per Section 7.10.01 (Specifically, A26, A21, Ex. A17 exceed maximums).		Acknowledged.
4.10	As the design progresses, please continue headers on subsequent pages for the stormwater design sheet.		Acknowledged. Storm sewer design sheets will be prepared at the detailed design phase.
4.11	During detailed design describe how proposed LID measures are compatible with existing groundwater levels.		Acknowledged.
4.12	Please demonstrate how existing groundwater quality and quantity will be maintained as per the EIS.		The existing soils are not conducive to infiltration facilities; therefore, infiltration has not been proposed within the development.
4.13	Please provide a summary of any discussions with the LPRCA that have taken place regarding the current stage of the development as an appendix in the stormwater management report.	MHBC	Noted. Norfolk County Response Matrix includes the most recent comments from LPRCA
4.14	Stormwater infrastructure capturing external flows should be located within property limits. Specifically, CBMH59A should be within plan of subdivision boundaries.		Acknowledged. External drainage areas are identified on the updated Post-Development Drainage Plan (Figure 6) within Crozier Engineering's March 2024 updated FSR/SWM. Designated drainage blocks are provided between lots to provide conveyance of external drainage. The Phase 2 SWM facility is designed to convey external drainage areas from the west lands. Any future development within the west lands would be required to control post-development flows to pre-development flow rates.
4.15	Please also confirm if additional infrastructure is needed to capture other external flows.		
4.16	Please confirm if the Phase II SWM facility and storm sewers will be servicing any portion of future development to the west. (We note that there is the provision for Willowdale crescent to continue into a future development.)	CFC	
5.0	*Traffic Impact Study (Dec 2006) - F.R. Berry & Associates*		
5.1	5.1Since the completion of the Traffic Impact Study in 2006, the Phase 1 lands have been constructed and occupied. The report needs to be updated with recent traffic data which incorporates this development. An updated 10-year design horizon of 2032 should be utilized assuming full buildout completion by 2022.		NexTrans April 2024 updated TIS based on the Draft Plan of Subdivision, dated March 14, 2024, has updated the traffic data, appropriate design horizons, and applicable buildout assumptions.
5.2	Report recommends a left turn lane and no signalization at the intersection of Highway 6 and Street A. The draft plan proposes a round-about at this intersection. Justify this change in design. The report has analyzed this intersection as a stop condition on Street A, the operation analysis of this intersection should be updated to reflect the proposed round-about. If a round-about is selected as the solution the Draft Plan is to provide sufficient ROW.	Nextrans	The applicant shares Ainley's concerns regarding the justification for, and construction challenges associated with a round-about, including the fact that it does not own the land to the south which is required for the infrastructure. NextTran's updated April 2024 TIS has evaluated the most appropriate and warranted traffic control requirements for the Highway intersection and concludes that a roundabout is not warranted. Therefore, the roundabout is not shown within the Draft Plan of Subdivision, dated March 14, 2024.
5.3	It appears that the proponent does not own the required lands along the south side of Highway 6 to allow for the construction of the proposed roundabout at the intersection of Highway 6 and Street A.		
6.0	*Geotechnical Investigation Report (April 24, 2006) - Chung & Vander Doelen Engineering Ltd.*		
6.1	Discuss the implications of the groundwater fed pond located in the center of the site. What measures will be required to manage the groundwater table and saturated soils in this area to allow for basement construction.		The Draft Plan, dated March 14, 2024, does not locate the stormwater management pond in the center of the proposed development and the stormwater management pond is located in the southeast corner of the Subject Lands.
6.2	The Geotechnical Report should be revised to include recommendations or constraints related to the construction of house foundations and/or foundation drains as a result of the shallow depth to groundwater table present on this site.	MHBC	Noted. Additional geotechnical review can be completed as part of detailed engineering design which will be conditional and required prior to final registration of the subdivision.
7.0	*Geotechnical Investigation Report (April 24, 2006) - Chung & Vander Doelen Engineering Ltd.*		

7.1	During detailed design provide a water balance comparing post development to predevelopment conditions. Please discuss the existing groundwater conditions on the site. The geotechnical report (2006) discusses a pond fed by groundwater on the site as well as groundwater existing between 0.6 and 1.0m below surface. Please discuss the implications of this high groundwater table on the proposed servicing, infiltration gallery locations, and water balance. Please confirm the groundwater table in the proposed limits and compare to the measurements provided in the geotechnical report from 2006.	MHBC	Noted. Crozier Engineering's March 2024 updated FSR/SWM reflects the most recent Draft Plan of Subdivision, dated March 14, 2024, which includes the re-location of stormwater management pond and addition of a drainage block.

FUNCTIONAL SERVICING & PRELIMINARY STORMWATER MANAGEMENT REPORT

LYNN RIVER HEIGHTS – PHASE 2 RESIDENTIAL DEVELOPMENT

TOWN OF PORT DOVER NORFOLK COUNTY

PREPARED FOR:

DEMOCRAT HOMES PORT DOVER LIMITED

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
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MARCH 2024

CFCA FILE NO. 2604-6978

Revision Number	Date	Comments
Rev.0	March 2024	Issued for 1st Submission (ZBA and DPA)

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1.0 INTRODUCTION

C.F. Crozier & Associates Inc. (Crozier) has been retained by Democrat Homes Port Dover Limited to prepare a Functional Servicing & Preliminary Stormwater Management Report in support of the Lynn River Heights Phase 2 residential Draft Plan of Subdivision and associated site-specific Zoning By-law Amendment. The subject site is located within Part of Lot 8, Concession 2 in the Town of Port Dover, Norfolk County. The location of the site is reflected on the Site Location Plan included as **Figure 1.**

This Functional Servicing & Stormwater Management Report provides information to demonstrate the proposed development is feasible from a water servicing, sanitary servicing, and stormwater management perspective and conforms with the requirements of Norfolk County and the Long Point Region Conservation Authority.

External documents/plans were reviewed over the course of completing this engineering report. As such, the servicing and design considerations contained herein are prepared in accordance with the following documents:

- Geotechnical Report (Chung & Vander Domelen Engineering Ltd, April 2006)
- Lynn Park As-Constructed Drawings (G. Douglas Vallee Limited, March 2021)
- Lynn River Heights As-Constructed Drawings (L.A. Girard Engineering, January 2006)
- Lynn River Heights Phase 2 Draft Plan of Subdivision (MHBC Planning Limited, March 2024)
- Ministry of Environment Stormwater Management Planning and Design Manual (March 2003)
- Norfolk County Design Criteria (February 2019)
- Norfolk County Development Charges Background Study (December 2018)
- Servicing Monitoring Report (Norfolk County, September 2022)
- Topographic Survey (Kim Husted Surveying Ltd., August 2004)
- Zoning By-Law of Norfolk County 1-Z-2014 (July 14, 2014)

This is the first submission from Crozier and the latest engineering submission since 2019. This submission addresses the relevant outstanding comments from the Ainley letter (April 12, 2018) and the latest Norfolk County comments (October 19, 2023).

2.0 PROJECT HISTORY & BACKGROUND

The Lynn River Heights Phase 2 subdivision was originally Draft Plan Approved around 2006 for approximately 484 residential units. Zoning By-law Amendment 73-Z-2006 rezoned the lands from Agricultural (A) and Hazard Land (HL) to Urban Residential Types R1-A(H) and R2(H) and Hazard Land (HL) to implement the subdivision. However, Draft Plan Approval for the development lapsed in 2015.

In 2016, new Draft Plan of Subdivision and Zoning By-Law Amendment applications were initiated by the Owner's engineer Len Girard (Girard Engineering). In accordance with the 2016 pre-consultation direction provided by County Staff, Girard Engineering submitted concurrent Draft Plan of

Subdivision and Zoning By-Law Amendment applications in 2017. Girard Engineering filed a further technical submission with the County on March 22, 2019.

On May 3, 2019, County Staff issued comments as well as a draft set of Engineering Draft Approval Conditions (dated April 25, 2019) in support of the 2017 Draft Plan of Subdivision. Planning Staff advised they had no concerns with the 2017 Draft Plan of Subdivision and were preparing to take a Report to Council recommending Draft Plan Approval of the December 2017 Draft Plan. However, on June 3, 2019, the County advised that all development applications in Port Dover, including the Phase 2 development, were put on hold due to Port Dover servicing constraints. An Interim Control By-law was subsequently enacted.

In March 2022, the Owners were advised the servicing study associated with the Interim Control By-law was completed and that development applications in Port Dover were being reactivated, including the Owners' Phase 2 subdivision suspended in May 2019.

On April 5, 2022, the project team met with County Staff and were advised Staff were re-circulating the 2017 Draft Plan of Subdivision given the project had been on hold for over two years, and there were new staff who were unfamiliar with the Phase 2 development.

After extensive consultation and consideration, the applicant's project team determined that certain revisions to the 2017 Draft Plan of Subdivision would enhance the proposed development, including: the introduction of additional housing types and tenures; the establishment of two mixed-use future development blocks along Highway 6; and relocation of the public park to a more centralized and accessible site adjacent to the SWM facility.

Following further pre-consultation with County Staff, revised Draft Plan of Subdivision and Zoning By-Law Amendment applications were formally filed with the County on July 13, 2023. In response to County Planning comments, minor revisions were subsequently made to the Phase 2 Draft Plan on November 2, 2023. In March 2024, minor revisions were made to the Phase 2 Draft Plan to update the number of units and area of the future development blocks. The March 2024 Draft Plan of Subdivision prepared by MHBC is the development proposal used to prepare the servicing and stormwater strategy outlined in this Report.

3.0 SITE DESCRIPTION

The site encompasses an area of approximately 39.88 ha and currently consist of open greenfield, an existing pond, treed areas, a residential home, driveway, and four (4) agricultural buildings. The property, located on 608 Highway 6 in Port Dover, is in a mixed residential – agricultural area and is bounded by forested areas and the Lynn River to the north, a residential neighbourhood to the east (Lynn River Heights – Phase 1), Highway 6 to the south, and agricultural lands to the west.

According to the Lynn River Heights Phase 2 Draft Plan of Subdivision provided by MHBC Planning Limited, dated March 14, 2024, the elements envisioned for this development include:

- 449 residential units consisting of:
    - 56 semi-detached units.
    - 393 single-detached units.
- 20 m Right-of-Way for internal roadways.
- Outdoor amenities including walkways, parks, and open spaces.

- A stormwater management block.
- Two medium density Future Development blocks.

The existing residential dwelling, accessory buildings, driveway, and pond will be removed prior to construction to accommodate the proposed residential development. Refer to the Draft Plan provided by MHBC Planning included with this report (**Figure 2**).

4.0 EXISTING SOILS AND GROUNDWATER CONDITIONS

As outlined in the Geotechnical Report prepared by Chung & Vander Doelen Engineering Ltd. (April 24, 2006), twenty-four (24) test pits were excavated across the site to determine the soil and groundwater conditions. The test pits were advanced to depths varying from 0.6 m to 4.0 m below ground surface and show that the soils on the property consist of a layer of topsoil overlying either silty sand, sandy silt, silt, and/or clayey silt. The layer of topsoil ranged from 0.18 m to 0.70 m thick, with most test pits containing 0.20 m to 0.35 m of topsoil. The topsoil was typically followed by clayey silt extending to test pit termination.

Nine (9) test pits encountered silty sand, sandy silt to silt above the clayey silt layer, ranging from 0.50 m to 2.10 m below the ground surface. Additional details of the soil composition can be referenced in the Geotechnical Investigation Report (Chung & Vander Doelen Engineering Ltd., April 24, 2006).

Groundwater levels were also recorded and outlined within the Geotechnical Report (Chung & Vander Doelen Engineering Ltd., April 24, 2006). According to the investigation, test pits 1, 4, 5, 13, and 17 encountered water seepage at depths between 0.60 m to 1.05 m. The water seepage emanated from the upper topsoil or the fine granular layers. All other test pits were dry upon completion. Additional details of the ground water conditions can be referenced in the Geotechnical Investigation Report (Chung & Vander Doelen Engineering Ltd., April 24, 2006).

5.0 ROADWAY DESIGN & GRADING

Access to the site will be provided by three (3) municipal entrances from Highway 6, Cardinal Lane and Willowdale Crescent, respectively. The municipal roads within the development (Streets A-J, Cardinal Lane extension, and Willowdale Crescent extension) will be designed using a 20 m right-of-way per the County of Norfolk Design Criteria (February 2019). It should be noted that a modified right-of-way was utilized to remain consistent with the Lynn River Phase 1 development. The municipal roads have been designed with the following parameters:

- 20 m road allowance
- 4.25 m asphalt lanes at 2% cross fall consistent with the Lynn River Heights Phase 1 Development
- Longitudinal cross-fall between 0.5% (min.) - 6% (max.)
- Mountable curb and gutter (OPSD 600.010) consistent with the Lynn River Heights Phase 1 Development
- 1.5 m for sidewalk within the boulevard (single sided)
- 5.85 m grassed boulevard at constant grade between 2 - 8%
- Storm sewer system sized for the 5-year event per the Norfolk County design criteria

The municipal roadway composition as outlined in the Geotechnical Investigation Report prepared by Chung & Vander Doelen Engineering Ltd. (April 2006) is provided in **Table 1** below. Additional details of the pavement structure can be referenced in the Geotechnical Report; prepared under a separate cover.

Table 1: Municipal Road Pavement Structure Design

Pavement Component	Component Thickness (mm)
HL3 Surface Asphaltic Concrete HL8 Binder Asphaltic Concrete	40 50
Granular 'A' Base Course	150
Granular 'B' Sub-Base Course	300

Preliminary road grades have been prepared to demonstrate the site can be developed in accordance with the Norfolk County guidelines (**see Figure 7**). The preliminary road design and grading provides positive drainage per County standards. The grading design will be advanced and refined throughout the detailed design stage.

6.0 SANITARY SERVICING

Sanitary servicing for the site will be achieved through connections to the Norfolk County sanitary sewer system near the site, described in further detail below.

6.1 Existing Sanitary Sewer Infrastructure

According to the As-Constructed Drawings received from Norfolk County, existing sanitary sewage infrastructure at or near the site includes the following:

- 200 mm diameter PVC sanitary sewer draining west to east at 0.96% on Willowdale Crescent (L.A. Girard Engineering – Drawing NPD-0439, January 2006).
- 200 mm diameter PVC sanitary sewer draining west to east at 0.97% on Cardinal Lane (L.A. Girard Engineering - Drawing NPD-0438, January 2006).
- 250 mm diameter PVC sanitary sewer draining west to east at 0.40% on Highway 6 (L.A. Girard Engineering – Drawing NPD-0433, January 2006). The Highway 6 sanitary sewer terminates at the eastern property limits of municipal address 659 Norfolk County Highway 6.

It is anticipated the existing residential dwelling within the Subject Development is serviced by a private on-site sewage system.

Refer to **Appendix A** for as-constructed drawings showing the existing sanitary sewer infrastructure.

6.2 Existing Wastewater Treatment Plant Capacity

A development moratorium was enacted in 2019, placing future developments in Port Dover on hold until upgrades to the wastewater treatment plant were complete. Based on the Servicing Monitoring Report completed by the Norfolk County Environmental and Infrastructure Services Group (September 20, 2022), it is our understanding that improvements are currently being made to Port Dover's wastewater treatment plant.

Currently, the existing capacity of wastewater is 5,400 m^3/day; however, upgrades are being finalized to increase the plant capacity to 6,100 m^3/day. The upgrades are expected to be completed in 2025 which will increase the residual capacity from 829 m^3/day to 1,529 m^3/day after committed development. Please refer to **Table 2** below which outlines the existing capacity and future capacity of the Port Dover wastewater treatment plant.

Table 2: Wastewater Treatment Plant Capacity

	Wastewater (m^3/day)	Upgraded Wastewater (m^3/day)
Capacity	5,400	6,100
Existing Demand	4,236	4,236
Committed Development	335	335
Capacity After Committed	829	1,529
Pending Development	1,886	1,886
Capacity After Pending	-(1,037)	-(357)

Based on the wastewater treatment plant there will be approximately 1,529 m^3/d (17.70 L/s) of residual capacity in the system to service pending development. The planning application for Lynn River Height Phase 2 was completed well before the development memorandum; therefore, it is presumed that the pending development incorporates the proposed Lynn River Heights development.

It should be noted that upgrades are being completed during the current upgrade work to accommodate a future capacity increase to 7,500 m^3/day. We understand the County's peer reviewer will provide commentary on available capacity for the proposed development.

6.3 Design Sanitary Flow

The Norfolk County Design Criteria (February 2019) was referenced to calculate the sanitary sewage design flows for the proposed development. An average design flow of 450 L/capita/day and 0.28 L/s/ha were utilized for the proposed residential and extraneous infiltration flows, respectively.

<u>Lynn River Height Phase 1 Sanitary Connection</u>

The northeastern extents of the site (10.97 ha) will be serviced by a connection to the existing 200 mm sanitary sewer on Cardinal Lane and Willowdale Crescent within the Lynn River Heights Phase 1 development. A total equivalent population of 451 people was determined for this area with reference to the Draft Plan of Subdivision (MHBC Planning, March 14, 2024). Peaking factors were applied to the average flow using the Harmon Formula along with extraneous flows to obtain the total estimated sewage design flows. **Table 3** summarizes the results and **Appendix B** contains the detailed sanitary demand calculations.

Table 3: Estimated Sanitary Design Flows Directed to Lynn River Height Phase 1

Standard[1]	**Type**	**Average Flow** (L/s)	**Peaking Factor**	**Peak Residential Flow** (L/s)	**Infiltration Flow** (L/s)	**Total Peak Flow**[2] (L/s)
Norfolk County	Residential	2.35	4.00	9.39	3.07	12.46

Note: [1] References to the design guidelines are provided in Appendix B.
[2] Total peak flow includes infiltration flow.

As shown in **Table 3**, it is estimated the total peak sanitary flow for the northeastern extents of the proposed development is 12.46 L/s which includes the proposed residential uses and infiltration flows.

Highway 6 Sanitary Connection

The remaining area of the proposed development (21.94ha) will be serviced by a proposed extension of the existing 250mm sanitary sewer on Highway 6. A total population equivalent of 1,169 people was determined for this area with reference to the Draft Plan of Subdivision (MHBC Planning, March 14, 2024). Peaking factors were applied to the average flow using the Harmon Formula along with extraneous flows to obtain the total estimated sewage design flows. **Table 4** summarizes the results and **Appendix B** contains the detailed sanitary demand calculations.

Table 4: Estimated Sanitary Design Flows for Highway 6 Connection

Standard[1]	**Type**	**Average Flow** (L/s)	**Peaking Factor**	**Peak Residential Flow** (L/s)	**Infiltration Flow** (L/s)	**Total Peak Flow**[2] (L/s)
Norfolk County	Residential	5.99	3.76	22.54	6.14	28.68

Note: [1] References to the design guidelines are provided in Appendix B.
[2] Total peak flow includes infiltration flow.

As shown in **Table 4**, it is estimated that the total peak sanitary flow for the remaining portion of the proposed development is 28.68 L/s which includes the proposed residential uses and infiltration flows.

6.4 Proposed Sanitary Servicing

The northeast area (Catchment 101) of the site will be serviced through connection to the existing 200 mm diameter sewer on Cardinal Lane and Willowdale Crescent. The remaining portion of the proposed development (Catchment 102) will be serviced through a proposed extension of the existing 250mm sanitary sewer on Highway 6.

Internal sanitary servicing for the proposed development will be provided through gravity sewer that will follow the internal road network with individual service connections to each house. The Norfolk County Design Criteria (February 2019) and the MECP Design Guidelines for Sewage Works (2008) were used to determine the future sanitary design flows for the proposed development. The Preliminary Sanitary Servicing Plan (**Figure 3**) illustrates the location of the internal sanitary sewer and connection to the existing sewers on Cardinal Lane, Willowdale Crescent, and Highway 6.

The development is proposed to be serviced by 200 -250 mm diameter sanitary sewers. The sanitary sewers will collect and convey the design sanitary flows from the development to either the existing 200 mm diameter sewer on Cardinal Lane or the existing 250 mm sanitary sewer on Highway 6. Based on a minimum pipe slope of 0.5%, the 200 mm and 250 mm diameter sanitary sewer will have a full flow capacity of 23.19 L/s and 42.05 L/s, respectively. Therefore, there will be sufficient capacity to convey the internal sanitary flows from the proposed development to the existing sanitary sewers on Cardinal Lane and Highway 6. Detailed sanitary design sheets will be complete during the detailed design process.

Based on the available background information received from Norfolk County, the Port Dover Wastewater Treatment Plant will have a residual capacity of 1,529 m^3/d (17.70 L/s) following the 2025 upgrades. It is anticipated the proposed development will exceed the residual capacity; however, this will be confirmed through implementation of the proposed sanitary flows into the County's wastewater model.

The existing private on-site sewage system that is assumed to service the existing residential dwelling will be decommissioned as part of the proposed sanitary servicing strategy.

7.0 WATER SUPPLY

Potable water for the site will be supplied through connections to the Norfolk County water distribution system near the site.

7.1 Existing Potable Water Supply Infrastructure

According to the As-Constructed Drawings received from Norfolk County, existing water distribution infrastructure at or near the site includes the following:

- 300 mm diameter PVC watermain located on north side of Highway 6 (L.A. Girard Engineering – Drawing NPD-0433, January 2006).
- 250 mm diameter PVC watermain located on Willowdale Crescent (L.A. Girard Engineering – Drawing NPD-0439, January 2006).
- 200 mm diameter PVC watermain located on Cardinal Lane (L.A. Girard Engineering – Drawing NPD-0438, January 2006).
- It is anticipated the existing residential dwelling is serviced by a private well. The location of the well will need to be confirmed when more information is available.

Relevant as-constructed drawings have been included in **Appendix A.**

7.2 Existing Water Treatment Plant Capacity

A development moratorium was enacted in 2019, putting future developments in Port Dover on hold until upgrades to the water treatment plant were complete. Based on the Servicing Monitoring Report completed by the Norfolk County Environmental and Infrastructure Services group (September 20, 2022), it is our understanding that improvements are currently being made to Port Dover's water treatment plant. The first phase of upgrades was completed in Fall 2022 which increased the water treatment plant capacity to 4,200 m^3/day. The second phase began in early 2023 and is expected to be complete by mid-2024 which will increase the plant capacity to 7,600 m^3/s.

Currently, the treatment plant does not have capacity to supply the existing and committed demand in the Municipality and is deficient by approximately 422 m^3/day. When all upgrades are complete, the residual capacity will be increased from -422 m^3/day to 2,978 m^3/day after committed development. Please refer to **Table 5** below which outlines the existing capacity and future capacity of the Port Dover Water Treatment Plant.

Table 5: Potable Water Treatment Plant Capacity

	Water (m^3/day)	Upgraded Water (m^3/day)
Capacity	4,200	7,600
Existing Demand	4,282	4,282
Committed Development	340	340
Capacity After Committed	-422	2,978
Pending Development	1,893	1,893
Capacity After Pending	-2,315	1,085

Based on the water treatment plant there will be approximately 2,978 m^3/d (34.47 L/s) of residual capacity in the system to service pending development. The planning application for Lynn River Height Phase 2 was complete well before the development memorandum; therefore, it is presumed the pending development incorporates the proposed Lynn River Heights development. We understand the County's peer reviewer will provide commentary on available capacity for the proposed development.

7.3 Design Water Demand

The water demand for the proposed development was calculated with reference to the Norfolk County Design Criteria (February 2019). Based on the Norfolk Design criteria, the required average daily water demand is 450 L/capita/day for residential use.

Per the Watson & Associates - Norfolk County Development Charges Background Study (December 2018) and Norfolk County Design Criteria (February 2019), the following population per unit (PPU) parameters were used to determine the estimated population equivalent for the proposed development:

- 2.75 for residential development (single and semi-detached)
- 1.43 for Apartment Units

Utilizing the above design criteria, the average daily demand, maximum daily demand, and peak hourly water demand were calculated for the proposed development using the associated Norfolk County peaking factors. **Table 6** summarizes the overall water demand for the proposed development and **Appendix C** contains the detailed water demand calculations.

Table 6: Estimated Domestic Water Demand

Standard	**Type**	**Average Daily Water Demand** (L/s)	**Maximum Daily Water Demand** (L/s)	**Peak Hourly Water Demand** (L/s)
Norfolk County	Residential	8.34	18.77	33.37

Note: References to the design guidelines are provided in Appendix C.

Using the Norfolk County Design Criteria (February 2019) for domestic water demand, the estimated maximum daily demand and peak hourly demand for the proposed development are 18.77 L/s and 33.37 L/s, respectively.

7.4 Fire Flow Demand

The Fire Underwriters Survey method (2020) was used to estimate the fire flow requirements for the proposed development. This calculation is based on the following criteria which was determined with reference to projects of similar scope and building types. These assumptions will be confirmed with the building architect and mechanical engineer throughout the design process:

- Building type of ordinary construction (C-value = 1.0) for the single-detached and semi-detached units.
- All buildings to be classified as residential limited hazard occupancy (15% reduction).
- Single-detached and semi-detached units will not be complete with an automatic sprinkler system (0% reduction).

- Unit separations were determined with reference to the Zoning By-Law of Norfolk County (July 14, 2014).

The gross floor areas for each building were determined with reference to the Lynn River Heights Phase 2 Draft Plan of Subdivision (MHBC Planning Limited, dated March 14, 2024). The estimated fire flow requirements are used to estimate the watermain size required to service the proposed development. The building Architect and Mechanical Engineer will confirm the estimated fire flow demand at the Site Plan Approval and Building Permit stage. It should be noted that fire flows were complete for each residential lot type and the results have been included in **Appendix C**. The future development lands have been excluded from the Fire Flow Calculations as the proposed usage is unknown at this time.

Table 7 summarizes the estimated fire flow demand and duration necessary to meet fire protection for the governing fire flow for the proposed development.

Table 7: Estimated Fire Flow Demand

Method	**Demand Flow** (L/s)	**Duration** (h)
Fire Underwriters Survey 2020	133.0	2.0

*The governing fire flow for the development is Unit 284 which is a semi-detached unit.

Based on the results from **Table 7**, the governing fire flow for the proposed development was calculated to be 133.0 L/s for a duration of 2.0 hours.

It should be noted that the fire flows determined from the FUS method is a conservative estimate for comparison purposes only. The Mechanical Engineer for the development will complete the required analysis for fire protection and the Architect will design fire separation methods per the determined fire flow rate to meet the County's available flows and pressures at the Site Plan Approval and Building Permit stage. Based on the estimated domestic water demand (33.37 L/s) and fire flow demand (133.0 L/s) summarized in **Table 6** and **Table 7**, the total design flow for the internal water distribution system is 166.37 L/s.

Coordination with Norfolk County will be completed as part of the design process to determine the existing available pressures and flows within the local watermain on Highway 6 and within Lynn River Heights Phase 1. These results will be used to confirm the existing watermain network has sufficient capacity to service the proposed development.

Refer to **Appendix C** for preliminary water demand and fire flow calculations.

7.5 Proposed Water Servicing

The development is proposed to be serviced by a 200-250 mm diameter water service within the municipal right-of-way, connecting to the existing watermain on Highway 6, Willowdale Crescent, and Cardinal Lane. All detached dwellings will be serviced with individual domestic water services connecting to the proposed internal watermain. Sizes for the domestic services will be confirmed with the mechanical engineer throughout the design process to confirm adequate flows are provided.

Fire suppression for the proposed development will be provided by municipal hydrants located within the municipal right-of-way in accordance with the Norfolk County Design Criteria (February 2019). A flushing unit has been proposed at the system dead end on Willowdale Crescent to prevent water stagnation.

The Preliminary Water Servicing Plan (**Figure 4**) illustrates the location and design of the proposed watermain including the external connection to the local watermain on Highway 6, Willowdale Crescent, and Cardinal Lane.

Based on the available background information received from Norfolk County, the Port Dover Water Treatment Plant has a residual capacity of 2,978 m^3/d (34.47 L/s) following the 2024 upgrades. It is anticipated the proposed development will almost exceed the residual capacity; however, this will be confirmed through implementation of the proposed water demand flows into the County's water model.

The existing private well that services the existing residential dwelling will be decommissioned and capped as part of the proposed water servicing strategy.

8.0 STORMWATER MANAGEMENT

The proposed stormwater management (SWM) and site drainage strategy must comply with the policies and standards of the various regulatory bodies including Norfolk County, the Long Point Region Conservation Authority and the Ministry of the Environment, Conservation and Parks (MECP). The stormwater management criteria that will be met with the proposed stormwater management strategy are as follow:

- Quantity Control**:** Peak runoff flows are to be controlled to the pre-development levels for the 2 through 100-year storm event (Norfolk County Design Criteria, February 2019).

- Quality Control: At least 80% removal of Total Suspended Solids will be provided with "Enhanced Protection" as outlined in the Ministry of Environment Stormwater Management Planning and Design Manual (March 2003).

- Water Balance: The volume of runoff discharged from the site during the 25 mm storm shall not increase as a result of the proposed development. Infiltration measures shall be employed where soils and water table conditions support such measures.

- Erosion Control: The proposed SWM design must retain runoff from a 25 mm rainfall event for 24 hours as outlined in the Ministry of Environment Stormwater Management Planning and Design Manual (March 2003).

8.1 Existing Storm Servicing

The Lynn River Heights As-Constructed Drawings (L.A. Girard Engineering, January 2006) was referenced to determine the existing municipal storm infrastructure surrounding the site. The existing storm infrastructure close to the site includes:

- A 750 mm diameter storm sewer within the northwestern servicing easement draining west to east at a slope of 0.80% (L.A. Girard Engineering – Drawing NPD-0435, January 2006). The storm sewer collects external drainage from Lynn River Heights Phase 2 and directs it to the existing storm sewer on Sparrow Way.

- A 450 mm diameter storm sewer within the southwestern servicing easement draining west to east at a slope of 1.03% (L.A. Girard Engineering – Drawing NPD-0435, January 2006). The storm sewer collects external drainage from Lynn River Height Phase 2 and directs it to the existing storm sewer on Sparrow Way.

- A 300 mm diameter storm sewer on Cardinal Lane draining west to east at a slope of 1.10% (L.A. Girard Engineering – Drawing NPD-0438, January 2006).

- A 600 mm diameter storm sewer on Willowdale Crescent draining west to east at a slope of 0.99% (L.A. Girard Engineering – Drawing NPD-0439, January 2006).

Relevant as-constructed drawings have been included in **Appendix A**.

8.2 Existing Drainage Conditions

The existing site conditions are outlined in the following sections and provide an overview of internal and external pre-development drainage conditions, and existing outlets affecting stormwater management.

8.2.1 Internal Drainage

To determine the existing internal drainage patterns and catchment areas, a topographic survey was completed on August 26, 2004 by Kim Husted Surveying for the site. Due to the age of the survey a new survey is being commissioned to provide an updated overview of the existing conditions of the site. Review of the topography indicates that runoff from the site generally flows from west to east towards the existing residential development known as Lynn River Heights Phase 1 with an average slope of approximately 1% to 2%.

Runoff is conveyed across the site through a combination of sheet flow and channelized flow to a roadside ditch along Highway 6, an existing 450 mm storm sewer within Phase 1, and an existing 750 mm storm sewer within Phase 1. The northern portion of the site along the existing Lynn River valley lands drains south to north through sheet flow towards the Lynn River. Based on the topographic survey, four internal catchment areas (PRE-1 to PRE-4) were delineated. Hydrologic parameter sheets for these internal catchments may be found in **Appendix D.**

The internal pre-development catchment areas, and their outlets are summarized in **Table 8.** Refer to **Figure 5** for the Pre-Development Drainage Plan and outlet locations.

8.2.2 External Drainage

LiDAR mapping was sourced to review the external drainage areas for the site. Review of the LiDAR contour mapping resulted in delineation of four external catchment areas (EXT-1 to EXT-4). EXT-1 and EXT-2 are comprised of agricultural lands to the west of the site where runoff is conveyed into the site through a combination of sheet flow and channelized flow. EXT-1 combines with runoff from PRE-1 and outlets to the Lynn River while EX-2 combines with flows from Pre-4 and outlets to the Highway 6 ditch.

Catchment EXT-3 and EXT-4 consist of rear lot drainage from the existing residential lots fronting Highway 6 and Lynn River Phase 1. Flows from EXT-3 and EXT-4 are directed to the Lynn River Phase 1 450 mm sewer and the Lynn River Phase 1 750 mm sewer located within storm sewer easements along the eastern property limits of Phase 2.

The pre-development catchment areas and their outlets are summarized in **Table 8.**

Table 8: Pre-Development Catchment Areas

Catchment ID	Catchment Area (ha)	Land Use(s)	SCS Curve Number / Percent Impervious	Outlet
Pre-1	14.87	Wetland, Cultivated	87 (CN)	Lynn River
Pre-2	13.11	Cultivated	89 (CN)	750 mm Easement Sewer
Pre-3	6.55	Cultivated	89 (CN)	450 mm Easement Sewer
Pre-4	5.27	Cultivated	89 (CN)	Highway 6 Ditch
EXT-1	8.29	Cultivated	89 (CN)	Lynn River
EXT-2	8.68	Cultivated	89 (CN)	Highway 6 Ditch
EXT-3	0.98	Building, Lawn	15%	450 mm Easement Sewer
EXT-4	0.31	Building, Lawn	55%	750 mm Easement Sewer

8.3 Proposed Drainage Conditions

Per the Norfolk County Design Standards (February 2019), the proposed development will incorporate a storm sewer and catchbasin system for frequent, minor rain/runoff events, and an overland flow system through the road network for infrequent, major events. Both systems will direct runoff to the development's proposed stormwater management facility, located in the southeast corner of the site.

External drainage from the agricultural lands to the west will be conveyed through a property line swale along the western property limits. A highpoint has been incorporated into the swale to direct runoff to the appropriate northern and southern outlet which include the Lynn River and Highway 6 Ditch, consistent with existing drainage conditions.

As the proposed stormwater management facility will control runoff for most of the proposed development, much of the runoff in the post-development drainage plan has been redirected from Lynn River Outlet to the existing 750 mm sewer outlet in Phase 1. Please refer to **Figure 6** for the Post-Development Drainage Plan.
The proposed site grading divides the site into five internal post-development catchment areas. Please refer to **Figure 7** and **Figure 8** for the Grading Plan and Preliminary Storm Servicing Plan.

- Catchment POST-1 (Area = 6.36 ha) consists of uncontrolled drainage from the rear yards of the proposed residential lots along the northern extents of the proposed development, roof runoff, and woodlot runoff. All storm events up to and including the 100-year event for this catchment will be conveyed via overland flow towards the Lynn River.

- Catchment POST-2 (Area = 29.24 ha) consists of drainage from the proposed residential lots, future development area, internal roadways, parkland, and the stormwater management block. Storm events up to and including the 5-year event (minor storm events) will be collected and conveyed by the internal storm sewer system to the proposed stormwater management pond located at the southeast corner of the proposed development. Storm events greater than the 5-year event (major storm events) will be conveyed overland within the internal roadways (Streets A-J, Cardinal Lane, and Willowdale Crescent) to the proposed stormwater management pond. The proposed stormwater management pond will provide quantity, quality, and erosion controls for the stormwater runoff from Catchment POST-2 prior to out letting to the existing Phase 1 750 mm sewer easement outlet.

- Catchment POST-3 (Area = 3.30 ha) consists of drainage from the proposed residential lots, and internal roadways (Street F, Street G, and Willowdale Crescent). Storm events up to and including the 5-year event (minor storm events) will be collected and conveyed by the internal storm sewer system to the existing 600 mm diameter storm sewer on Willowdale Crescent. Storm events greater than the 5-year event (major storm events) will be conveyed overland within the internal roadways to the phase one development.

- Catchment POST-4 (Area = 0.68 ha) consists of uncontrolled drainage from the future development lands, and internal roadways. All storm events up to and including the 100-year event for this catchment will be conveyed overland towards the existing Highway 6 ditch.

- Catchment UC-1 (Area = 0.22 ha) consists of uncontrolled drainage from the proposed residential lot rear yards. All storm events up to and including the 100-year event for this catchment will be conveyed overland towards the existing the existing Phase 1 750 mm sewer easement outlet where it will be captured in the existing catchbasin manhole.

The post-development drainage areas, with their respective outlets, are summarized in **Table 9.**

Table 9: Post-Development Catchment Areas

Catchment ID	Catchment Area (ha)	Land Use(s)	SCS Curve Number / Percent Impervious	Outlet
POST-1	6.36	Building, Woodland, Lawn	85 (CN)	Lynn River
POST-2	29.24	Building, Roadway, Sidewalk, Lawn, Future Dev., SWMF	66%	SWM Facility, 750mm Easement Sewer
POST-3	3.30	Building, Roadway, Sidewalk, Lawn	55%	Willowdale Crescent Sewer
POST-4	0.68	Building, Roadway, Future Dev., Lawn	74%	Highway 6 Ditch
UC-1	0.22	Building, Lawn	55%	SWM Facility, 750mm Easement Sewer
EXT-1	8.29	Cultivated	89 (CN)	Lynn River
EXT-2	8.68	Cultivated	89 (CN)	Highway 6 Ditch
EXT-3	0.98	Building, Lawn	15%	450mm Easement Sewer
EXT-4	0.31	Building, Lawn	55%	SWM Facility, 750mm Easement Sewer

8.4 Stormwater Quantity Control & Hydrologic Analysis

The proposed stormwater management facility will be a stormwater management wet pond located in the southeast corner of the proposed development and will control post-development peak flows to their pre-development levels or lower ('Post-to-Pre control'). The proposed stormwater management pond will discharge to the Phase 1 750 mm sewer easement outlet before being conveyed to the Phase 1 stormwater management facility through the existing municipal storm sewers within the Phase 1 development. The ultimate receiver of the stormwater from the proposed development is the Lynn River which is located directly north of the proposed development.

The proposed stormwater management pond will use an outlet control structure to control peak flows from the 2-year through 100-year event. Events larger than the 100-year will be safely conveyed to the Phase 1 750mm sewer easement outlet via an emergency spillway. The preliminary outlet control structure consists of a 250 mm diameter extended detention orifice with its invert positioned at the permanent pool elevation, and a 39 mm rectangular weir set at 0.70 m above the permanent pool elevation.

A *RouteResevoir* component was used in Visual OTTHYMO to model the proposed stormwater management pond and determine the active storage volumes required to control the peak flows for the 2-year to 100-year storm events. The 3-hour Chicago design storm was modelled using Norfolk County's IDF parameters. To meet quantity control criteria, 16,372 m^3 of active storage volume is required to control the 100-year 3-hour Chicago design storm. Required active storage volumes for each storm event are summarized below in **Table 10**. The total active storage provided in the stormwater management pond is 16,504 m^3.

A post-development and pre-development peak flow comparison is shown in **Table 10.**

Table 10: Stormwater Management Pond Storage Volume Summary

Return Period (Years)	Active Storage Required (m^3)
	3 Hour Chicago
2	6,216
5	9,057
10	10,805
25	12,949
50	14,616
100	16,372

Table 11: Summary of Pre-Development and Post-Development Peak Flow Rates

Return Period (Years)	Lynn River Outlet		Phase 1 750mm Sewer		Phase 1 450mm Sewer	
	Pre-Development (23.16 ha)	Post-Development (14.73 ha)	Pre-Development (13.42 ha)	Post-Development (28.49 ha)	Pre-Development (7.53 ha)	Post-Development (1.29 ha)
3-Hour Chicago						
2	0.418	0.238	0.294	0.156	0.158	0.030
5	0.787	0.454	0.535	0.362	0.286	0.062
10	1.084	0.629	0.724	0.518	0.373	0.097
25	1.469	0.853	0.964	0.725	0.495	0.136
50	1.783	1.036	1.157	0.882	0.593	0.169
100	2.094	1.216	1.347	1.012	0.689	0.202

Return Period (Years)	Highway 6 Ditch		Phase 1 600mm Sewer	-
	Pre-Development (13.95 ha)	Post-Development (10.25 ha)	*Post-Development (3.30 ha)	
3-Hour Chicago				
2	0.288	0.134	0.298	-
5	0.527	0.179	0.470	
10	0.707	0.209	0.595	
25	0.934	0.246	0.758	
50	1.116	0.274	0.886	
100	1.294	0.302	1.013	

* Post-development flows from the development to be controlled below the capacity in the existing 750 mm sewer (1.026 m^3/s).
** The Phase 1 600 mm sewer does not accept runoff from Lynn River Heights Phase 2 under pre-development conditions; however, the storm sewer was sized to convey 0.493 m^3/s per the Lynn River Phase 1 Stormwater Management Reports.

As shown in **Table 10** and **Table 11**, the proposed stormwater management pond provides adequate 'Post-to-Pre' quantity control for all storm events up to and including the 100-year event. Additionally, all flows directed to each respective outlet are reduced for all storm events up to and including the 100-year storm event. Visual OTTHYMO input and output files and model schematics have been provided in **Appendix D**.

It should be noted that no flows are directed to the existing 600 mm sewer within Willowdale Crescent from Lynn River Heights Phase 2 under the pre-development conditions; however, following review of the Lynn River Heights Phase 1 Stormwater Management Report, it was determined that the Phase 1 development accounted for 0.493 m^3/s of external flows. Therefore, the stormwater management design was complete to direct a portion of the proposed development (Catchment POST-3) to the Willowdale Cresent storm sewer.

8.5 Stormwater Quality & Erosion Control

Catchment Post-2 Stormwater Management Facility

The proposed stormwater management pond will provide stormwater quality control to an Enhanced Protection Level (80% Total Suspended Solids removal), as well as appropriate erosion control, outlined in the Ministry of Environment Stormwater Management Planning and Design

Manual (March 2003). The water quality control and stormwater management pond operating characteristics are summarized in **Table 12** below.

Table 12: Stormwater Management Pond Quality Control Characteristics

Quality Control Component		Required Volume (m^3)	Provided Volume (m^3)
Permanent Pool		5,325	6,074 (dead storage)
Extended Detention	MOE Extended Detention	1,517	5,022
	Erosion Control	5,022	

The design of the extended detention portion of the stormwater management pond was guided by erosion control requirements and guidelines from the MOE's Stormwater Management and Design Manual (2003). Erosion control requirements dictated that the extended detention should be based on targeting a minimum drawdown time of 24 hours for runoff received by the stormwater management pond during the 25 mm design storm event, whereas MOE guidelines require a total water quality volume of 180 m^3/ha for a wet pond with an average total imperviousness of 51%. This water quality volume consists of 140 m^3/ha for permanent pool and 40 m^3/ha for extended detention.

MOE guidelines also require a minimum drawdown time of 24 hours to allow for adequate settling of suspended solids. The preliminary outlet control structure was designed with a 250 mm diameter orifice plate which releases the 25 mm quality event over a 24-hour period, meeting the MOE requirements.

Please refer to **Appendix D** for the relevant stormwater quality and erosion control calculations.

Catchment POST-3 Willowdale Crescent Storm Sewer

Water quality control for Catchment POST-3 will be provided using an oil-grit separator (Stormceptor EFO8 or approved equivalent). The oil-grit separator is upstream of the existing Willowdale Crescent storm sewer to provide quality control for runoff before discharging towards the existing storm sewer within Lynn River Heights Phase 1.

Catchment POST-1 and POST-4

Catchment POST-1 and POST-4 will discharge uncontrolled towards the Lynn River and the existing Highway 6 ditch, consistent with the existing overland flow conditions. The runoff from these catchments will primarily consist of clean runoff (i.e., rear yards, rooftop runoff); therefore, quality controls have not been provided.

8.6 Stormwater Management Pond Operating Characteristics

Considering the presented design criteria, a preliminary stormwater management pond design has been completed, demonstrating that the stormwater management block is adequate in size and may meet the requirements set by the various regulatory bodies. A summary of the preliminary stormwater management pond's characteristics is shown below in **Table 13**.

Table 13: Stormwater Management Pond Operating Characteristics

Component	Elevation (m)	Storage Required (m^3)	Storage Provided (m^3)
Bottom of Pond	196.10	---	---
Permanent Pool	197.20	5,325	5,059
Extended Detention	197.86	5,022	5,022
100-Year High Water Level	199.00	16,372	16,504
Top of Berm	199.30	---	20,088

As demonstrated in **Table 13,** the stormwater management facility presented within this report is sufficiently sized to meet all design criteria. The design of the preliminary stormwater management pond is presented in **Figure 7**. Refer to **Appendix D** for detailed SWM facility calculations.

9.0 WATER BALANCE

Based on review of the Geotechnical Report prepared by Chung & Vander Doelen Engineering Ltd. (April 24, 2006), the boreholes on the property encountered predominantly clayey silt deposits with a permeability/hydraulic conductivity ranging from 1 x 10^{-6} cm/s to 1 x 10^{-7} cm/s giving the soils an infiltration rate of less than 12 mm/hr. Therefore, the existing soils are not conducive to infiltration and the implementation of LID's.

Due to the existing site constraints, no LID's have been proposed at this time to meet the water balance objectives for the proposed development.

10.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment controls will be implemented prior to the commencement of any site servicing works for the development and will be maintained throughout construction until the site is stabilized or as directed by the Site Engineer and/or Norfolk County.

Controls will be inspected after each significant rainfall event and maintained in proper working condition. The Site Alteration/Erosion and Sediment Control Plan (**Figure 10**) has been prepared for the proposed development. This plan includes a temporary sediment basin, silt fencing, rock mud mats, and silt sacks within catchbasins to ensure sediment impacts to the existing environmental features, external road network, and the Lynn River are eliminated/mitigated during construction activates.

Further details on the erosion and control measures have been summarized below:

<u>Temporary Sediment Basin</u>

A temporary sediment basin will be proposed in the ultimate location of the stormwater management pond for the proposed development. The basin will be used to retain sediment on site and minimize sediment discharge downstream. The design of the temporary sediment basin will be designed per Norfolk County and Ministry of Environment, Conservation, and Parks design criteria.

Light Duty Silt Fencing

Light duty silt fencing will be installed on the perimeter of the site to intercept sheet flow. Additional silt fencing may be added based on field decisions by the Site Engineer and Contractor, prior to, during, and following construction.

Rock Mud Mat

A rock mud mat will be installed at the entrance to the construction zone to prevent mud tracking from the site onto surrounding lands and the perimeter roadway network. All construction traffic will be restricted to this access only.

Silt sacks in Catchbasins

A silt sack will be installed in each new catch basin as they are installed. The silt sack will provide sediment control to prevent silt and sediment from entering the storm sewer system. Silt sacks will also be installed on the existing catchbasins during construction to prevent sediment from entering the existing storm sewer pipe.

The Removals, Erosion and Sediment Control Plan will be refined throughout the planning application process with consultation with the County and Conservation Authority to ensure potential environmental hazards during construction are minimized.

11.0 UTILITIES

The proposed development will be serviced with natural gas, telephone, cable TV and hydro. All such utilities are presumed to be available on the boundary roadways. Utilities have not been contacted at the time of this investigation. Circulation and coordination with the utilities will be undertaken to confirm capacity at the appropriate phase of design.

12.0 STREET LIGHTING

The proposed development will feature urbanized public roadways with street lighting as per the Norfolk County Design Criteria (February 2019). A photometric plan will be prepared during detailed design to demonstrate that the lighting requirements have been met with the placement of streetlights within the public and private roadways.

13.0 CONCLUSIONS AND RECOMMENDATIONS

This report has been prepared in support of the Lynn River Heights Phase 2 Draft Plan of Subdivision and associated Zoning By-law Amendment for the property located within Lot 8, Concession 2 in Norfolk County. The proposed development can be serviced for water, sanitary and stormwater management in accordance with the Norfolk County requirements. Our conclusions and recommendations include:

Proposed Sanitary Services

1. Total peak sanitary flow for the proposed development is 41.14 L/s. A total of 12.46 L/s will be directed to Lynn River Heights Phase 1 and 28.68 L/s will be directed to the existing sanitary sewer on Highway 6.

2. The northeast area of the site will be serviced through connection to the existing 200 mm diameter sewer on Cardinal Lane and Willowdale Crescent. The remaining portion of the proposed development will be serviced through a proposed extension of the existing 250mm sanitary sewer on Highway 6.

3. Individual sanitary services will be provided for each residential unit with a connection to the proposed internal 200 mm – 250 mm diameter sanitary sewer.

4. Additional correspondence with the Norfolk County will be required throughout the design process to ensure that sufficient sanitary allocation is provided for the site.

Proposed Water Services

1. The domestic maximum day demand and peak hourly water demand for the proposed development are 18.77 L/s and 33.37 L/s, respectively.

2. The proposed development is proposed to be serviced by a 200-250 mm diameter water service within the municipal right-of-way, connecting to the existing watermain on Highway 6, Willowdale Crescent, and Cardinal Lane.

3. The pressure boundary conditions at the site will be confirmed with the County through the use of their existing water modelling.

Stormwater Management

1. The proposed developments stormwater runoff (Catchment POST-2) will be collected in catchbasins and conveyed through the internal storm sewer system for events up to and including the 5-year storm event. Storm events larger than the 5-year storm event will be conveyed towards the proposed stormwater management pond through the municipal right-of-way. Stormwater runoff from Catchments POST-1, POST-3, and POST-4 will flow uncontrolled towards the existing the Lynn River, the existing storm sewer on Willowdale Crescent, and the existing Highway 6 ditch.

2. Stormwater quantity controls are provided for Catchment POST-2 to attenuate the post-development flows to the pre-development peak flow rates.

3. Stormwater quality controls for Catchment POST-2 and POST-3 will be provided by the proposed stormwater management pond and oil-grit separator, respectively. Quality controls have not been provided for Catchments POST-1 and POST-4.

4. Due to the existing site constraints no LID's have been proposed at this time to meet the water balance objectives for the proposed development.

5. Extended detention has been provided to ensure 24-hour detention for the 25 mm storm event to meet the erosion control requirements for the proposed development.

Roadway Design and Grading

1. The proposed road design and grading has been complete in accordance with the Norfolk County Design Criteria (February 2019).

2. The municipal roadways will be constructed in accordance with the Geotechnical Report prepared by Chung & Vander Doelen Engineering Ltd. (April 2006).

Erosion and Sediment Controls

1. Erosion and sediment controls will be implemented prior to construction and maintained to the satisfaction of the County and Site Engineer until the site is stabilized.

Utilities

1. The proposed development will be serviced with natural gas, telephone, cable TV and hydro. All such utilities are presumed to be available on the boundary roadways. Utilities have will be contacted during detailed design to confirm sufficient capacity.

Based on the above conclusions, we recommend the approval of the Lynn River Heights Phase 2 Draft Plan of Subdivision and Zoning By-Law Amendment applications from the perspective of functional servicing and stormwater management.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.

Brendan Walton, P. Eng..
Project Manager

LICENSED PROFESSIONAL ENGINEER
B. G. D. WALTON
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MAR 28, 2024
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PROVINCE OF ONTARIO

C.F. CROZIER & ASSOCIATES INC.

Jonathan Kerschbaumer, P.Eng.
Project Engineer

LICENSED PROFESSIONAL ENGINEER
J. T. KERSCHBAUMER
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2024-03-28
PROVINCE OF ONTARIO

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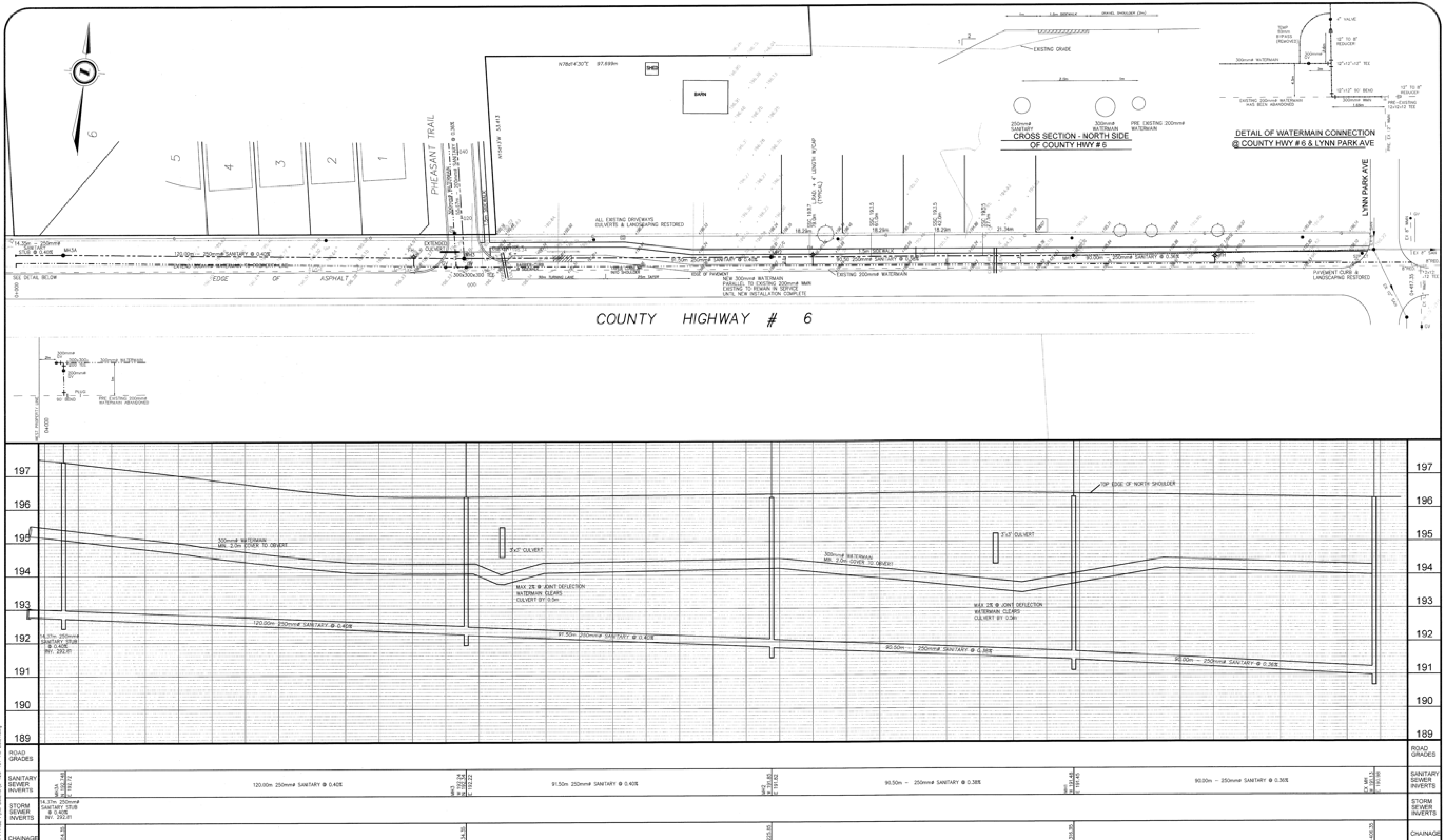
APPENDIX A

As-Constructed Drawings & Background Material



GENERAL NOTES ALL WORK HAS BEEN COMPLETED IN ACCORDANCE WITH COUNTY OF NORFOLK STANDARDS, OPSS & OPSD

ROADWORK:
ROAD SECTION – SEE DETAIL DWG 100
ROAD STRUCTURE – 40mm HL3
50mm HL4
150mm GRANULAR 'A'
450mm GRANULAR 'B'
RADII – 9m TO EDGE OF PAVEMENT
CURB & GUTTER – OPSD 600.10

SANITARY SEWERS:
PIPE MATERIAL: PVC SDR 35
MIN. COVER TO OBVERT – 2m
MANHOLES – OPSD 701.01 & 701.02 W/BENCHING
FRAMES & COVERS – OPSD 401.01 TYPE A CLOSED
SERVICE PIPE: PVC SDR 28 – 125mm⌀
SERVICE CONNECTIONS AS PER OPSD 1006.02
2.6m MIN DEPTH AT PROPERY LINE
FACTORY MANUFACTURED TEES HAVE BEEN USED FOR ALL SERVICE CONNECTIONS

STORM SEWERS:
MINIMUM COVER – 1.2m TO OBVERT
MANHOLES TO OPSD 701.010 & 701.011
CATCH BASINS TO OPSD 705.010 & 705.030 WITH 600mm SUMP
FRAMES & GRATES – OPSD 400.01
CATCHBASIN LEADS ARE 250mm FOR SINGLE AND 300mm FOR DOUBLE CB – MIN GRADE – 2%
CONCRETE STORM HAS RUBBER GASKETS
PIPE MATERIAL: PVC SDR 35 OR RIBBED PVC, CONC ES & RC CLASS III
SERVICE CONNECTION PIPE: 100mm⌀ PVC SDR28
BACKFLOW PREVENTER (CHECK VALVE) REQUIRED FOR STM POC'S.

WATERMAINS:
MINIMUM COVER – 2.0m TO OBVERT
PIPE MATERIAL: PVC DR18 CLASS 150 OR CL52 DI CEMENT LINED
SERVICE CONNECTIONS: 20mm⌀ TYPE K COPPER
SERVICE CONNECTIONS: OPSD 1104.01 WITH PREFABRICATED PVC TAPPING TEES
MIN. DEPTH AT PROPERTY LINE – 1.7m
HYDRANTS – CANADA VALVE CENTURY OR EQUAL
TWO 65mm HOSE THREAD NOZZLES, ONE 146mm FRONT PUMPER PORT
INSTALLED ACCORDING TO OPSD 1104.03
HYDRANT COLOUR – YELLOW, PORTS – BLACK
GATE VALVES – CANADA VALVE DARLING NO 55
VALVE BASE – CANADA VALVE 125mm SCREW TYPE
MECHANICAL THRUST BLOCKING HAVE BEEN INSTALLED AT ALL HORIZ. AND VERTICAL DIRECTION CHANGES, DEAD ENDS, CROSSES, & TEES – OPSD 1103.01 & 1103.02
RESTRAINTS ARE "UNIFLANGE" OR APPROVED EQUAL
MAINCOCKS & CURB STOPS HAVE BALL VALVES (TEFLON COATED)
CURB BOXES – MUELLER A-726/TYPE 304 S.S. RODS/PINS
TRACER WIRE – TWU # 8 GAUGE STRANDED WIRE
11 O'CLOCK POSITION – STRAPPED AT 6m INTERVALS
50mm⌀ BLOWOFF

WATERMAIN
SANITARY SEWER
STORM SEWER
SANITARY MANHOLE
STORM MANHOLE
CATCHBASIN
DOUBLE CATCHBASIN
DBL CB MANHOLE
EASEMENT
GAS
HYDRO
BELL/CABLE

COUNTY OF NORFOLK

No.	REVISION	BY	DATE
1	1ST SUBMISSION	TH	MAR 21/03
2	REVISED STORM OUTLET	TH	NOV 27/03
3	REVISED AS PER COUNTY	TH	JAN 14/04
4	2ND SUBMISSION	TH	JAN 21/04
5	PH I STG I ISSUED FOR CONSTRUCTION	TH	FEB 11/04
6	REVISED LOT BOUNDRIES	TH	APR 25/05
7	PH I STG I AS CONSTRUCTED	TS	NOV 05
8	PH I STG II ISSUED FOR CONSTRUCTION	TH	MAR 1/06
9	PH I STG II AS CONSTRUCTED	TS	MAY 25/06
10	PH I STG I&II AS CONSTRUCTED	DF	JAN 07

BOBAN DEVELOPMENTS NATIONAL LTD.
1201 RATCLIFFE, RR # 21
CAMBRIDGE, ONTARIO

L.A. GIRARD ENGINEERING (ONTARIO) LTD.
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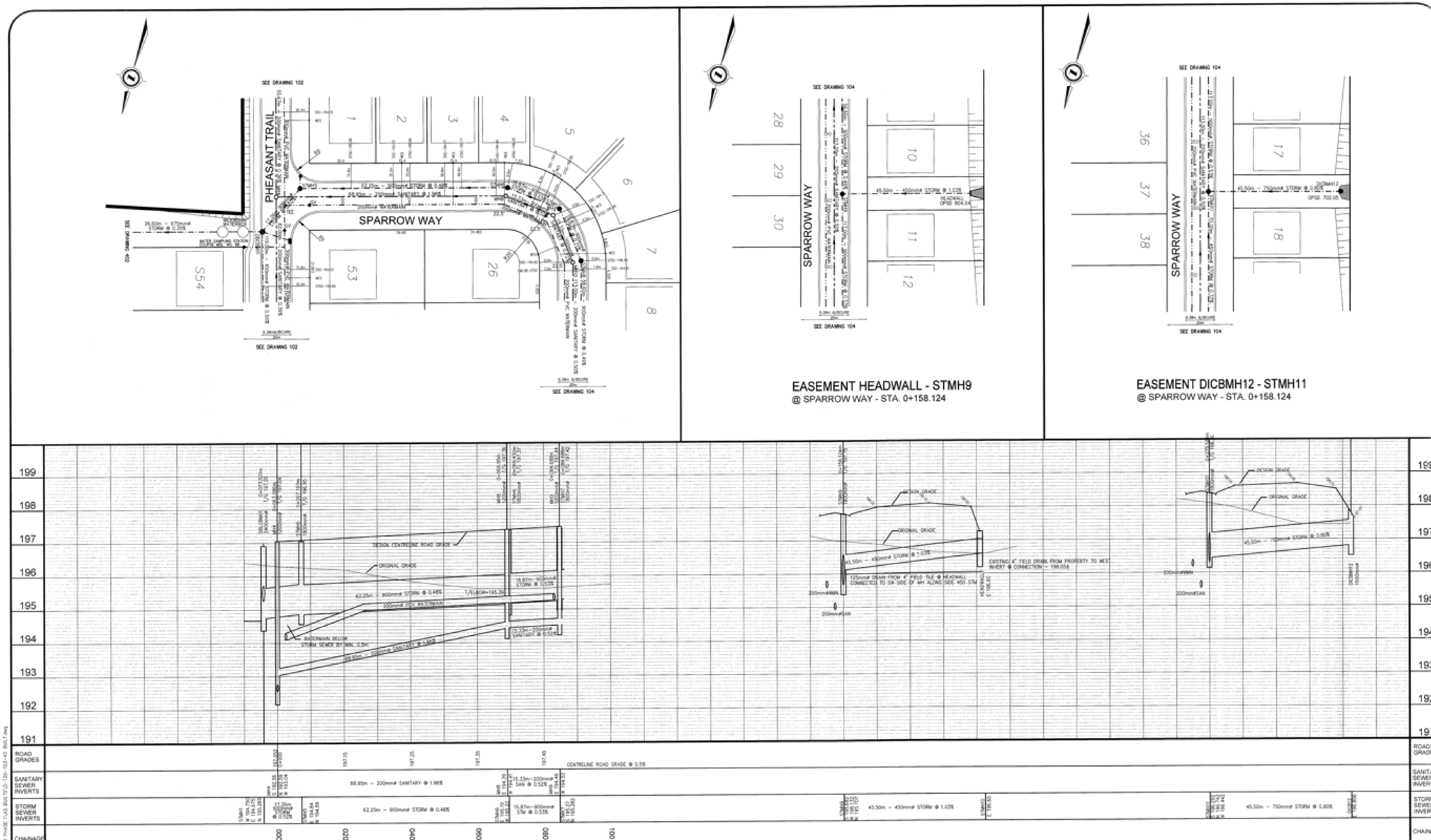
Otterville, Ontario N0J 1R0
Tel: 1-519-879-6875
Fax: 1-519-879-6536
lgirard@girardengineering.ca

LYNN RIVER HEIGHTS
PORT DOVER, ONTARIO

PLAN & PROFILE COUNTY HIGHWAY #6

SCALE: HORIZ. 1:500 VERT. 1:50
DATE: MARCH 2003
DRAWING BY: TH
CHECKED BY: L.A.G.
PROJECT NO. 0-120
DRAWING NAME: 0-120-101
DRAWING NO. 101

NPD-0433



GENERAL NOTES ALL WORK HAS BEEN COMPLETED IN ACCORDANCE WITH COUNTY OF NORFOLK STANDARDS, OPSS & OPSD

ROADWORK:
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ROAD STRUCTURE - 40mm HL3
50mm HL4
150mm GRANULAR "A"
450mm GRANULAR "B"
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CURB & GUTTER - OPSD 600.10

SANITARY SEWERS:
PIPE MATERIAL: PVC SDR 35
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MANHOLES - OPSD 701.01 & 701.02
W/BENCHING
FRAMES & COVERS - OPSD 401.01 TYPE A CLOSED
SERVICE PIPE: PVC SDR 28 - 125mmø
SERVICE CONNECTIONS AS PER OPSD 1006.02
2.0m MIN DEPTH AT PROPERY LINE
FACTORY MANUFACTURED TEES HAVE BEEN USED
FOR ALL SERVICE CONNECTIONS

STORM SEWERS:
MINIMUM COVER - 1.2m TO OBVERT
MANHOLES TO OPSD 701.010 & 701.011
CATCH BASINS TO OPSD 705.010 & 705.020
WITH 600mm SUMP
FRAMES & GRATES - OPSD 400.01
CATCHBASIN LEADS ARE 250mm FOR SINGLE
AND 300mm FOR DOUBLE CB - MIN GRADE - 2%
CONCRETE STORM HAS RUBBER GASKETS
PIPE MATERIAL: PVC SDR 35 OR RIBBED PVC, CONC ES & RC CLASS III
SERVICE CONNECTION PIPE: 100mmø PVC SDR28
BACKFLOW PREVENTER (CHECK VALVE) REQUIRED
FOR STM PDC'S.

WATERMAINS:
MINIMUM COVER - 2.0m TO OBVERT
PIPE MATERIAL: PVC DR18 CLASS 150 OR CL52 DI CEMENT LINED
SERVICE CONNECTIONS: 20mmø TYPE K COPPER
SERVICE CONNECTIONS: OPSD 1104.01 WITH PREFABRICATED PVC TAPPING TEES
MIN. DEPTH AT PROPERTY LINE - 1.7m
HYDRANTS - CANADA VALVE CENTURY OR EQUAL
TWO 65mm HOSE THREAD NOZZLES, ONE 140mm FRONT PUMPER PORT
INSTALLED ACCORDING TO OPSD 1104.03
HYDRANT COLOUR - YELLOW, PORTS - BLACK
GATE VALVES - CANADA VALVE DARLING NO 55
VALVE BASE - CANADA VALVE 125mm SCREW TYPE
MECHANICAL THRUST BLOCKING HAVE BEEN INSTALLED AT ALL HORIZ.
AND VERTICAL DIRECTION CHANGES, DEAD ENDS, CROSSES, &
TEES - OPSD 1103.01 & 1103.02
RESTRAINTS ARE "UNIFLANGE" OR APPROVED EQUAL
MAINCOCKS & CURB STOPS HAVE BALL VALVES (TEFLON COATED)
CURB BOXES - MUELLER A-726/TYPE 304 S.S. RODS/PINS
TRACER WIRE - TWU # 8 GAUGE STRANDED WIRE
11 O'CLOCK POSITION - STRAPPED AT 6m INTERVALS
50mmø BLOWOFF

WATERMAIN
SANITARY SEWER
STORM SEWER
SANITARY MANHOLE
STORM MANHOLE
CATCHBASIN
DOUBLE CATCHBASIN
DBL CB MANHOLE
EASEMENT
GAS
HYDRO
BELL/CABLE

COUNTY OF NORFOLK

No.	REVISION	BY	DATE
1	1ST SUBMISSION	TH	MAR 21/03
2	REVISED STORM OUTLET	TH	NOV 27/03
3	REVISED AS PER COUNTY	TH	JAN 14/04
4	3RD SUBMISSION	TH	JAN 21/04
5	PH I STG I ISSUED FOR CONSTRUCTION	TH	FEB 11/04
6	REVISED LOT BOUNDRIES	TH	APR 25/05
7	PH I STG I AS CONSTRUCTED	TS	NOV 05
8	PH I STG II ISSUED FOR CONSTRUCTION	TH	MAR 1/06
9	PH I STG II AS CONSTRUCTED	TS	MAY 26/06
10	PH I STG I&II AS CONSTRUCTED	DF	JAN 07

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1201 RATCLIFFE, RR # 21
CAMBRIDGE, ONTARIO

L.A. GIRARD ENGINEERING
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212 Main Street West P.O. Box 253
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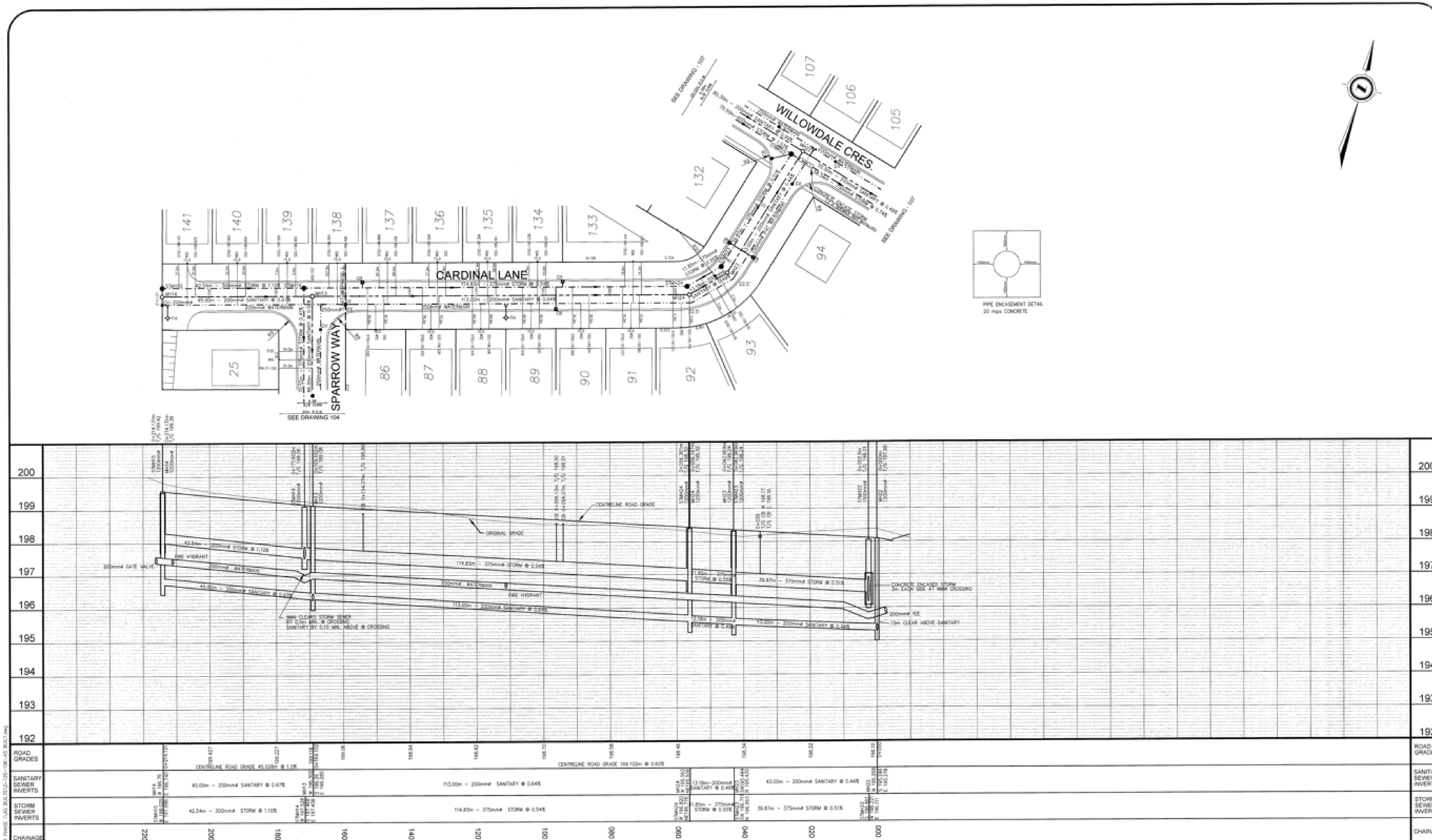
Tel: 1-519-879-6875
Fax: 1-519-879-6536
lgirard@girardengineering.ca

LYNN RIVER HEIGHTS
PORT DOVER, ONTARIO

PLAN & PROFILE - SPARROW WAY
STA. 0+000.00 - STA. 0+084.68

SCALE: HORIZ. 1:500 VERT. 1:50
DATE: MARCH 2003
DRAWING BY: TH
CHECKED BY: L.A.G.
PROJECT NO. 0-120
DRAWING NAME: 0-120-103
DRAWING NO. 103

NPD-0435



GENERAL NOTES

ALL WORK HAS BEEN COMPLETED IN ACCORDANCE WITH COUNTY OF NORFOLK STANDARDS, OPSS & OPSD

ROADWORK:

ROAD SECTION - SEE DETAIL DWG 100
ROAD STRUCTURE - 40mm HL3
50mm HL4
150mm GRANULAR 'A'
450mm GRANULAR 'B'
RADII - 9m TO EDGE OF PAVEMENT
CURB & GUTTER - OPSD 600.10

SANITARY SEWERS:

PIPE MATERIAL: PVC SDR 35
MIN. COVER TO OBVERT - 2m
MANHOLES - OPSD 701.01 & 701.02
W/BENCHING
FRAMES & COVERS - OPSD 401.01 TYPE A CLOSED
SERVICE PIPE: PVC SDR 28 - 125mmø
SERVICE CONNECTIONS AS PER OPSD 1006.02
2.6m MIN DEPTH AT PROPERY LINE
FACTORY MANUFACTURED TEES HAVE BEEN USED
FOR ALL SERVICE CONNECTIONS

STORM SEWERS:

MINIMUM COVER - 1.2m TO OBVERT
MANHOLES TO OPSD 701.010 & 701.011
CATCH BASINS TO OPSD 705.010 & 705.020
WITH 600mm SUMP
FRAMES & GRATES - OPSD 400.01
CATCHBASIN LEADS ARE 250mm FOR SINGLE
AND 300mm FOR DOUBLE CB - MIN GRADE - 2%
CONCRETE STORM HAS RUBBER GASKETS
PIPE MATERIAL: PVC SDR 35 OR RIBBED PVC, CONC ES & RC CLASS III
SERVICE CONNECTION PIPE: 100mmø PVC SDR28
BACKFLOW PREVENTER (CHECK VALVE) REQUIRED
FOR STM PDC'S.

WATERMAINS:

MINIMUM COVER - 2.0m TO OBVERT
PIPE MATERIAL: PVC DR18 CLASS 150 OR CL52 DI CEMENT LINED
SERVICE CONNECTIONS: 20mmø TYPE K COPPER
SERVICE CONNECTIONS: OPSD 1104.01 WITH PREFABRICATED PVC TAPPING TEES
MIN. DEPTH AT PROPERTY LINE - 1.7m
HYDRANTS - CANADA VALVE CENTURY OR EQUAL
TWO 65mm HOSE THREAD NOZZLES, ONE 146mm FRONT PUMPER PORT
INSTALLED ACCORDING TO OPSD 1104.03
HYDRANT COLOUR - YELLOW, PORTS - BLACK
GATE VALVES - CANADA VALVE DARLING NO 55
VALVE BASE - CANADA VALVE 125mm SCREW TYPE
MECHANICAL THRUST BLOCKING HAVE BEEN INSTALLED AT ALL HORIZ.
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TRACER WIRE - TWU # 8 GAUGE STRANDED WIRE
11 O'CLOCK POSITION - STRAPPED AT 6m INTERVALS
50mmø BLOWOFF

WATERMAIN
SANITARY SEWER
STORM SEWER
SANITARY MANHOLE
STORM MANHOLE
CATCHBASIN
DOUBLE CATCHBASIN
DBL CB MANHOLE
EASEMENT
G — G GAS
H — H HYDRO
B/C BELL/CABLE

COUNTY OF NORFOLK

No.	REVISION	BY	DATE
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9	PH I STG II AS CONSTRUCTED	TS	MAY 25/06
10	PH I STG I&II AS CONSTRUCTED	DF	JAN 07

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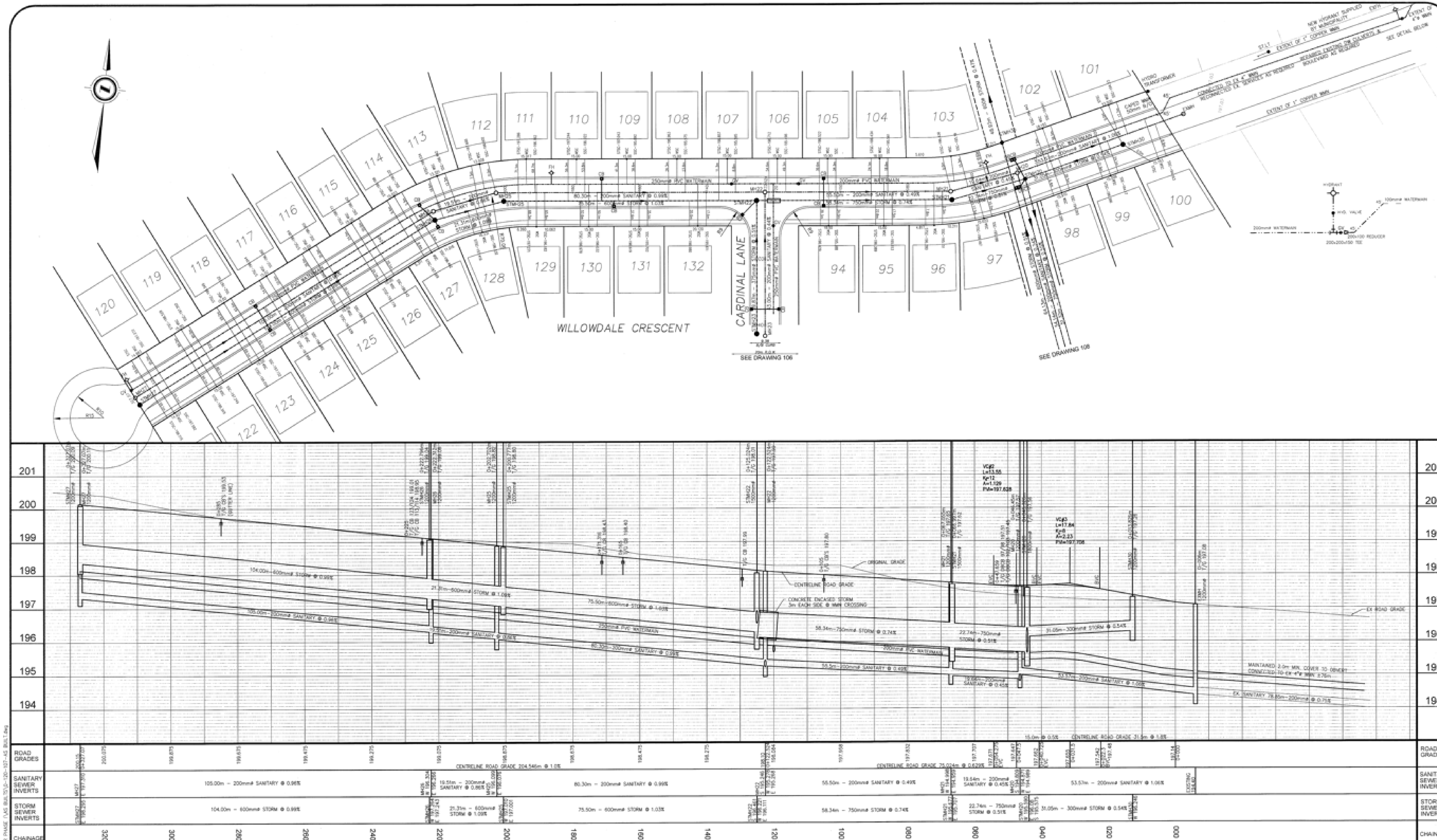
lgirard@girardengineering.ca

LYNN RIVER HEIGHTS
PORT DOVER, ONTARIO

PLAN & PROFILE CARDINAL
STA. 0+000.00 - STA. 0+214.131

SCALE: HORIZ. 1:500 VERT. 1:50
DATE: MARCH 2003
DRAWING BY: TH
CHECKED BY: L.A.G.
PROJECT NO. 0-120
DRAWING NAME: 0-120-106
DRAWING NO. 106

NPD-0438



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CURB & GUTTER – OPSD 600.10

SANITARY SEWERS:

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MANHOLES – OPSD 701.01 & 701.02
W/BENCHING
FRAMES & COVERS – OPSD 401.01 TYPE A CLOSED
SERVICE PIPE: PVC SDR 28 – 125mm⌀
SERVICE CONNECTIONS AS PER OPSD 1006.02
2.6m MIN DEPTH AT PROPERY LINE
FACTORY MANUFACTURED TEES HAVE BEEN USED FOR ALL SERVICE CONNECTIONS

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AND 300mm FOR DOUBLE CB – MIN GRADE – 2%
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FOR STM PDC'S

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INSTALLED ACCORDING TO OPSD 1104.03
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COUNTY OF NORFOLK

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LYNN RIVER HEIGHTS
PORT DOVER, ONTARIO

PLAN & PROFILE - WILLOWDALE
STA. 0+000.00 - STA. 0+327.07

SCALE: HORIZ. 1:500 VERT. 1:50
DATE: MARCH 2003
DRAWING BY: TH
CHECKED BY: L.A.G.
PROJECT NO. 0-120
DRAWING NAME: 0-120-107
DRAWING NO. 107

NPD–0439

APPENDIX B

Sanitary Demand Calculations

CROZIER
CONSULTING ENGINEERS

File:	2604-6978
Date:	2024.03.28
By:	AD
Check By:	BP

(Lynn River Heights PH 2) Sanitary Demand - PH1 Connection

Developed Site Area		10.97	ha
Number of Residential Units and Land Usage			
1) Single Residential		**164**	**Units**
Person Per Residential Unit			
1) Single Residential (Per Norfolk Design Criteria February 2019)		2.75	persons/unit
Total Residential Population		451	Persons
<u>Unit Sewage flows</u>			
Residential (Per Norfolk Design Criteria February 2019)		450	L/C-day
Infiltration *(Per Norfolk Design Criteria February 2019)*		0.28	L/s/ha
<u>Total Design Sewage Flows</u>			
Average Daily Residential Flow		2.35	L/sec
Infiltration/Inflow Residential		3.07	L/sec
Residential Peak Factor	(Harmon Formula) 1+(14/(4+(Residential pop./1000)^0.5))	4.00	
Peak Residential Flow		9.39	
Total Peak Daily Flow		**12.46**	**L/sec**

CROZIER
CONSULTING ENGINEERS

File:	2604-6978
Date:	2024.03.28
By:	AD
Check By:	BP

(Lynn River Heights PH 2) Sanitary Demand - Highway 6 Connection

Developed Site Area		21.94	ha
Number of Residential Units and Land Usage			
1) Single Residential		**285**	**Units**
2) High Density		**257**	**Units**
Person Per Residential Unit			
1) Single Residential (Per Norfolk Design Criteria February 2019)		2.75	persons/unit
2) High Density		1.43	persons/unit
Total Residential Population		1,151	Persons
Unit Sewage flows			
Residential (Per Norfolk Design Criteria February 2019)		450	L/C-day
Infiltration *(Per Norfolk Design Criteria February 2019)*		0.28	L/s/ha
Total Design Sewage Flows			
Average Daily Residential Flow		5.99	L/sec
Infiltration/Inflow Residential		6.14	L/sec
Residential Peak Factor	(Harmon Formula) 1+(14/(4+(Residential pop./1000)^0.5))	3.76	
Peak Residential Flow		22.54	
Total Peak Daily Flow		**28.68**	**L/sec**

APPENDIX C

Water Servicing Calculations

CROZIER
CONSULTING ENGINEERS

File:	2604-6978
Date:	2024.03.28
By:	AD
Check By:	BP

(Lynn River Heights PH 2) Water Demand

Developed Site Area	32.91	ha
(Does not include Environmental Lands and Buffers)		
Number of Residential Units and Land Usage		
1) Single Residential	**449**	**Units**
2) High Density	**257**	**Units**
Person Per Residential Unit		
1) Single Residential (Per Norfolk Design Criteria February 2019)	2.75	persons/unit
2) High Density	1.43	persons/unit
Total Residential Population	1,602	Persons
Domestic Water Design Flows		
Residential (Per Norfolk Design Criteria February 2019)	450	L/Cap-day
Total Domestic Water Design Flows		
Average Residential Daily Flow	8.34	L/sec
Max Day Peak Factor (Per Norfolk Design Criteria February 2019)	2.25	
Max Day Demand Flow	**18.77**	L/sec
Peak Hour Factor (Per Norfolk Design Criteria February 2019)	4.00	
Peak Hour Flow	**33.37**	L/sec

CROZIER
CONSULTING ENGINEERS

Lynn River Heights - Phase 2
Fire Protection Volume Calculation Summary

PROJECT: Lynn River Heights
PROJECT No.: 2604-6978
DATE: 2024-02-08
DESIGN: MS
CHECK: BP

SUMMARY OF FIRE DEMANDS

Unit	Building Type	Base Fire Flow [L/min]	Building Occupancy Reduction [L/min]	Sprinkler Reduction [L/min]	Surcharge for Surrounding Infrastructure [L/min]	Total Required Fire Flow [L/min]	Total Required Fire Flow [L/s]	Duration (hrs)
Unit 284	Semi-Detached	6,000	-900	0	3,060	8,000	133	2
Unit 250	10m Single Detached	4,000	-600	0	1,870	5,000	83	2
Unit 399	12m Single Detached	5,000	-750	0	2,338	7,000	117	2
Unit 352	15m Single Detached	5,000	-750	0	2,338	7,000	117	2

Therefore, the governing fire flow for the development is the Semi-Detached unit 284 on Street H with a total required fire flow of 133 L/s for a duration of 2.0 hours.

CROZIER
CONSULTING ENGINEERS

PROJECT NAME:	Lynn River Heights
PROJECT NUMBER:	2604-6978
PREPARED BY:	MS
CHECKED BY:	BP
DATE:	2024-02-08

Fire Flow Determination Per Fire Underwriters Survey (2020) - 9m Semi-Detached (Unit 284)

Water Supply for Public Fire Protection - 2020
Fire Underwriters Survey
Part II - Guide for Determination of Fire Flows for Public Fire Protection in Canada

An estimate of fire flow required for a given area may be determined by the formula:

RFF = 220 * C * sqrt A

where:

RFF = the required fire flow in litres per minute (L/min)
C = the construction coefficient is related to the type of construction of the building
= 1.5 for Type V Wood Frame Construction
= 0.8 for Type IV-A Mass Timber Construction
= 0.9 for Type IV-B Mass Timber Construction
= 1.0 for Type IV-C Mass Timber Construction
= 1.5 for Type IV-D Mass Timber Construction
= 1.0 for Type III Ordinary Construction
= 0.8 for Type II Non-combustible Construction
= 0.6 for Type I Fire Resistive Construction
A = the total effective floor area (effective building area) in square metres (excluding basements at least 50 percent below grade) in the building considered

STEP A: **Construction Coefficient (C)** 1.0 Type III Ordinary Construction

STEP B: **Total Effective Floor Area**
Proposed Building

	Yes/No/Unknown	
Is basement at least 50% below grade?	Unknown	If yes, basement floor area excluded
Vertical openings protected?	No	*For consideration for effective area calculations

Calculate Effective Floor Area based on the highlighted cell
-C value from 1.0 to 1.5: 100% of all floor areas are used
-C value below 1 and vertical openings are not protected: Consider two largest floors plus 50% of all floor above to a max of eight
-C value below 1 and vertical openings are protected: Consider single largest floor plus 25% of the two immediately adjoining floors

*A building may be subdivided if there is a vertical firewall with a fire-resistance rating greater than 2 hours, and meets the requirements of the National Building Code.

Floors Above Grade	**Total Floor Area (m^2)**	**% of Area Considered**	**Effective Floor Area (m^2)**
Basement	230	100%	230.0
Ground Floor	230	100%	230.0
Second Floor	230	100%	230.0
Total	**690**		**690.0**

Total Effective Floor Area **690 m^2**

STEP C: **Therefore RFF =** **6,000 L/min (rounded to nearest 1000 L/min)**

STEP D: **Occupancy Contents Adjustment Factor**

The required fire flow may be reduced by as much as -25% for occupancies having contents with very low fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Occupancy and Contents Adjustment Factor	
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

*Refer to Table 3 for recommended Occupancy and Contents Charges by major occupancy examples.

Type of Occupancy	**Adjustment Factor**	
Residential Occupancy	Limited Combustible	-15%

Total Reduction % **-900 L/min (reduction)**

RFF = **5,100 L/min (not rounded)**

Note: The RFF flow 5100 L/min is used in Step E and F.

Fire Flow Determination Per Fire Underwriters Survey (2020) - 9m Semi-Detached (Unit 284)

STEP E: Automatic Sprinkler Protection

Sprinklers - The required fire flow may be reduced by up to 50% for complete automatic sprinkler protection depending upon adequacy of system.

	Yes/No/Unknown	*Possible Reduction Available	Actual Reduction Provided
Automatic sprinkler protection designed and installed in accordance with NFPA 13?	No	-30%	0%
Water supply is standard for both the system and Fire Department hose lines?	No	-10%	0%
Fully supervised system?	No	-10%	0%

Total Reduction % **0% (reduction)**

Total Reduced Flow **0 L/min (reduction, not rounded)**

STEP F: Exposure Adjustment Charge

Exposure - A percentage of water for the exposures should be added to the required fire flow for the subject building to provide adequate flow rates for hose streams used to reduce the spreading of fire from the subject building to exposed risks. The required fire flow of a subject building may be increased depending on the severity of exposed risks to the subject building and the distance between the exposed risks and the subject building. This charge considers the usage of water supplies to prevent exposed risks from igniting or being damaged during a major fire incident in the subject building.

Separation Distance	Maximum Exposure Adjustment Charge
0 to 3m	25%
3.1 to 10m	20%
10.1 to 20m	15%
20.1 to 30m	10%
Greater than 30m	0%

*The maximum exposure adjustment charge to be applied to a subject building is 75%
*The distance in metres from the subject building facing wall to the exposed building facing wall, measured to the nearest metre, between the nearest points of the buildings.

Exposed buildings	Lot	Distance	Surcharge Factor	Surcharge (L/min)
North	285	6	20%	1020
East	315	32	0%	0
South	283	0	25%	1275
West	237	15	15%	765

Total Reduced Flow **3,060 L/min Surcharge (not rounded)**

STEP G: Final Required Fire Flow

Step D - Occupancy Adjusted Fire Flow Demand	5,100	L/min
Step E - Sprinkler (Reduction)	0	L/min
Step F - Exposure Charge	3,060	L/min
Final Fire Flow:	**8,160**	**L/min**
	8,000	**L/min (rounded to nearest 1000L/min)**
or	**133**	**L/s**
or	**2,113**	**USGPM**
Required duration:	**2.00**	**hours**

Refer to Table 1 for Duration

Table 1 - FUS 2020

Required Duration of Fire Flow	
Flow Required (L/min)	**Duration (hours)**
2,000 or less	1.00
3,000	1.25
4,000	1.50
5,000	1.75
6,000	2.00
8,000	2.00
10,000	2.00
12,000	2.50
14,000	3.00
16,000	3.50
18,000	4.00
20,000	4.50
22,000	5.00
24,000	5.50
26,000	6.00
28,000	6.50
30,000	7.00
32,000	7.50
34,000	8.00
36,000	8.50
38,000	9.00
40,000 and over	9.50

Interpolate for intermediate figures

CROZIER
CONSULTING ENGINEERS

PROJECT NAME:	Lynn River Heights
PROJECT NUMBER:	2604-6978
PREPARED BY:	MS
CHECKED BY:	BP
DATE:	2024-02-08

Fire Flow Determination Per Fire Underwriters Survey (2020) - 10m Single-Detached (Unit 250)

Water Supply for Public Fire Protection - 2020
Fire Underwriters Survey
Part II - Guide for Determination of Fire Flows for Public Fire Protection in Canada

An estimate of fire flow required for a given area may be determined by the formula:

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where:

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A = the total effective floor area (effective building area) in square metres (excluding basements at least 50 percent below grade) in the building considered

STEP A: Construction Coefficient (C) 1.0 Type III Ordinary Construction

STEP B: Total Effective Floor Area
Proposed Building

	Yes/No/Unknown	
Is basement at least 50% below grade?	Unknown	If yes, basement floor area excluded
Vertical openings protected?	No	*For consideration for effective area calculations

Calculate Effective Floor Area based on the highlighted cell
-C value from 1.0 to 1.5: 100% of all floor areas are used
-C value below 1 and vertical openings are not protected: Consider two largest floors plus 50% of all floor above to a max of eight
-C value below 1 and vertical openings are protected: Consider single largest floor plus 25% of the two immediately adjoining floors

*A building may be subdivided if there is a vertical firewall with a fire-resistance rating greater than 2 hours, and meets the requirements of the National Building Code.

Floors Above Grade	**Total Floor Area (m^2)**	**% of Area Considered**	**Effective Floor Area (m^2)**
Basement	125	100%	125.0
Ground Floor	125	100%	125.0
Second Floor	125	100%	125.0
Total	**375**		**375.0**

Total Effective Floor Area **375 m^2**

STEP C: **Therefore RFF =** **4,000** **L/min (rounded to nearest 1000 L/min)**

STEP D: Occupancy Contents Adjustment Factor

The required fire flow may be reduced by as much as -25% for occupancies having contents with very low fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

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Free Burning	15%
Rapid Burning	25%

*Refer to Table 3 for recommended Occupancy and Contents Charges by major occupancy examples.

Type of Occupancy	**Adjustment Factor**	
Residential Occupancy	Limited Combustible	-15%

Total Reduction % **-600 L/min (reduction)**

RFF = **3,400** **L/min (not rounded)**

Note: The RFF flow 3400 L/min is used in Step E and F.

CROZIER
CONSULTING ENGINEERS

PROJECT NAME:	Lynn River Heights
PROJECT NUMBER:	2604-6978
PREPARED BY:	MS
CHECKED BY:	BP
DATE:	2024-02-08

Fire Flow Determination Per Fire Underwriters Survey (2020) - 10m Single-Detached (Unit 250)

STEP E: Automatic Sprinkler Protection

Sprinklers - The required fire flow may be reduced by up to 50% for complete automatic sprinkler protection depending upon adequacy of system.

	Yes/No/Unknown	*Possible Reduction Available	Actual Reduction Provided
Automatic sprinkler protection designed and installed in accordance with NFPA 13?	No	-30%	0%
Water supply is standard for both the system and Fire Department hose lines?	No	-10%	0%
Fully supervised system?	No	-10%	0%

Total Reduction % **0% (reduction)**

Total Reduced Flow **0 L/min (reduction, not rounded)**

STEP F: Exposure Adjustment Charge

Exposure - A percentage of water for the exposures should be added to the required fire flow for the subject building to provide adequate flow rates for hose streams used to reduce the spreading of fire from the subject building to exposed risks. The required fire flow of a subject building may be increased depending on the severity of exposed risks to the subject building and the distance between the exposed risks and the subject building. This charge considers the usage of water supplies to prevent exposed risks from igniting or being damaged during a major fire incident in the subject building.

Separation Distance	Maximum Exposure Adjustment Charge
0 to 3m	25%
3.1 to 10m	20%
10.1 to 20m	15%
20.1 to 30m	10%
Greater than 30m	0%

*The maximum exposure adjustment charge to be applied to a subject building is 75%
*The distance in metres from the subject building facing wall to the exposed building facing wall, measured to the nearest metre, between the nearest points of the buildings.

Exposed buildings	Lot	Distance	Surcharge Factor	Surcharge (L/min)
North	249	6	20%	680
East	270	15	15%	510
South	251	6	20%	680
West	142	32	0%	0

Total Reduced Flow **1,870 L/min Surcharge (not rounded)**

STEP G: Final Required Fire Flow

Step D - Occupancy Adjusted Fire Flow Demand	3,400	L/min
Step E - Sprinkler (Reduction)	0	L/min
Step F - Exposure Charge	1,870	L/min
Final Fire Flow:	**5,270**	**L/min**
	5,000	**L/min (rounded to nearest 1000L/min)**
or	**83**	**L/s**
or	**1,321**	**USGPM**
Required duration:	**2.00**	**hours**

Refer to Table 1 for Duration

Table 1 - FUS 2020

Required Duration of Fire Flow	
Flow Required (L/min)	**Duration (hours)**
2,000 or less	1.00
3,000	1.25
4,000	1.50
5,000	1.75
6,000	2.00
8,000	2.00
10,000	2.00
12,000	2.50
14,000	3.00
16,000	3.50
18,000	4.00
20,000	4.50
22,000	5.00
24,000	5.50
26,000	6.00
28,000	6.50
30,000	7.00
32,000	7.50
34,000	8.00
36,000	8.50
38,000	9.00
40,000 and over	9.50

Interpolate for intermediate figures

CROZIER
CONSULTING ENGINEERS

PROJECT NAME:	Lynn River Heights
PROJECT NUMBER:	2604-6978
PREPARED BY:	MS
CHECKED BY:	BP
DATE:	2024-02-08

Fire Flow Determination Per Fire Underwriters Survey (2020) - 12m Single-Detached (Unit 399)

Water Supply for Public Fire Protection - 2020
Fire Underwriters Survey
Part II - Guide for Determination of Fire Flows for Public Fire Protection in Canada

An estimate of fire flow required for a given area may be determined by the formula:

RFF = 220 * C * sqrt A

where:

RFF = the required fire flow in litres per minute (L/min)
C = the construction coefficient is related to the type of construction of the building
= 1.5 for Type V Wood Frame Construction
= 0.8 for Type IV-A Mass Timber Construction
= 0.9 for Type IV-B Mass Timber Construction
= 1.0 for Type IV-C Mass Timber Construction
= 1.5 for Type IV-D Mass Timber Construction
= 1.0 for Type III Ordinary Construction
= 0.8 for Type II Non-combustible Construction
= 0.6 for Type I Fire Resistive Construction
A = the total effective floor area (effective building area) in square metres (excluding basements at least 50 percent below grade) in the building considered

STEP A: Construction Coefficient (C) 1.0 Type III Ordinary Construction

STEP B: Total Effective Floor Area
Proposed Building

	Yes/No/Unknown	
Is basement at least 50% below grade?	Unknown	If yes, basement floor area excluded
Vertical openings protected?	No	*For consideration for effective area calculations

Calculate Effective Floor Area based on the highlighted cell
-C value from 1.0 to 1.5: 100% of all floor areas are used
-C value below 1 and vertical openings are not protected: Consider two largest floors plus 50% of all floor above to a max of eight
-C value below 1 and vertical openings are protected: Consider single largest floor plus 25% of the two immediately adjoining floors

*A building may be subdivided if there is a vertical firewall with a fire-resistance rating greater than 2 hours, and meets the requirements of the National Building Code.

Floors Above Grade	Total Floor Area (m^2)	% of Area Considered	Effective Floor Area (m^2)
Basement	150	100%	150.0
Ground Floor	150	100%	150.0
Second Floor	150	100%	150.0
Total	**450**		**450.0**

Total Effective Floor Area **450** m^2

STEP C: **Therefore RFF = 5,000 L/min (rounded to nearest 1000 L/min)**

STEP D: Occupancy Contents Adjustment Factor

The required fire flow may be reduced by as much as -25% for occupancies having contents with very low fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Occupancy and Contents Adjustment Factor	
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

*Refer to Table 3 for recommended Occupancy and Contents Charges by major occupancy examples.

Type of Occupancy	**Adjustment Factor**	
Residential Occupancy	Limited Combustible	-15%

Total Reduction % **-750 L/min (reduction)**

RFF = 4,250 L/min (not rounded)

Note: The RFF flow 4250 L/min is used in Step E and F.

CROZIER
CONSULTING ENGINEERS

PROJECT NAME:	Lynn River Heights
PROJECT NUMBER:	2604-6978
PREPARED BY:	MS
CHECKED BY:	BP
DATE:	2024-02-08

Fire Flow Determination Per Fire Underwriters Survey (2020) - 12m Single-Detached (Unit 399)

STEP E: Automatic Sprinkler Protection

Sprinklers - The required fire flow may be reduced by up to 50% for complete automatic sprinkler protection depending upon adequacy of system.

	Yes/No/Unknown	*Possible Reduction Available	Actual Reduction Provided
Automatic sprinkler protection designed and installed in accordance with NFPA 13?	No	-30%	0%
Water supply is standard for both the system and Fire Department hose lines?	No	-10%	0%
Fully supervised system?	No	-10%	0%

Total Reduction % **0% (reduction)**

Total Reduced Flow **0 L/min (reduction, not rounded)**

STEP F: Exposure Adjustment Charge

Exposure - A percentage of water for the exposures should be added to the required fire flow for the subject building to provide adequate flow rates for hose streams used to reduce the spreading of fire from the subject building to exposed risks. The required fire flow of a subject building may be increased depending on the severity of exposed risks to the subject building and the distance between the exposed risks and the subject building. This charge considers the usage of water supplies to prevent exposed risks from igniting or being damaged during a major fire incident in the subject building.

Separation Distance	Maximum Exposure Adjustment Charge
0 to 3m	25%
3.1 to 10m	20%
10.1 to 20m	15%
20.1 to 30m	10%
Greater than 30m	0%

*The maximum exposure adjustment charge to be applied to a subject building is 75%
*The distance in metres from the subject building facing wall to the exposed building facing wall, measured to the nearest metre, between the nearest points of the buildings.

Exposed buildings	Lot	Distance	Surcharge Factor	Surcharge (L/min)
North	376/377	32	0%	0
East	400	6	20%	850
South	416	15	15%	637.5
West	398	6	20%	850

Total Reduced Flow **2,338 L/min Surcharge (not rounded)**

STEP G: Final Required Fire Flow

Step D - Occupancy Adjusted Fire Flow Demand	4,250	L/min
Step E - Sprinkler (Reduction)	0	L/min
Step F - Exposure Charge	2,338	L/min
Final Fire Flow:	**6,588**	**L/min**
	7,000	**L/min (rounded to nearest 1000L/min)**
or	**117**	**L/s**
or	**1,849**	**USGPM**
Required duration:	**2.00**	**hours**
	**Refer to Table 1 for Duration*	

Table 1 - FUS 2020

Required Duration of Fire Flow	
Flow Required (L/min)	**Duration (hours)**
2,000 or less	1.00
3,000	1.25
4,000	1.50
5,000	1.75
6,000	2.00
8,000	2.00
10,000	2.00
12,000	2.50
14,000	3.00
16,000	3.50
18,000	4.00
20,000	4.50
22,000	5.00
24,000	5.50
26,000	6.00
28,000	6.50
30,000	7.00
32,000	7.50
34,000	8.00
36,000	8.50
38,000	9.00
40,000 and over	9.50

***Interpolate for intermediate figures**

CROZIER
CONSULTING ENGINEERS

PROJECT NAME:	Lynn River Heights
PROJECT NUMBER:	2604-6978
PREPARED BY:	MS
CHECKED BY:	BP
DATE:	2024-02-08

Fire Flow Determination Per Fire Underwriters Survey (2020) - 15m Single-Detached (Unit 352)

Water Supply for Public Fire Protection - 2020
Fire Underwriters Survey
Part II - Guide for Determination of Fire Flows for Public Fire Protection in Canada

An estimate of fire flow required for a given area may be determined by the formula:

RFF = 220 * C * sqrt A

where:

RFF = the required fire flow in litres per minute (L/min)
C = the construction coefficient is related to the type of construction of the building
= 1.5 for Type V Wood Frame Construction
= 0.8 for Type IV-A Mass Timber Construction
= 0.9 for Type IV-B Mass Timber Construction
= 1.0 for Type IV-C Mass Timber Construction
= 1.5 for Type IV-D Mass Timber Construction
= 1.0 for Type III Ordinary Construction
= 0.8 for Type II Non-combustible Construction
= 0.6 for Type I Fire Resistive Construction
A = the total effective floor area (effective building area) in square metres (excluding basements at least 50 percent below grade) in the building considered

STEP A: Construction Coefficient (C) 1.0 Type III Ordinary Construction

STEP B: Total Effective Floor Area
Proposed Building

	Yes/No/Unknown	
Is basement at least 50% below grade?	Unknown	If yes, basement floor area excluded
Vertical openings protected?	No	*For consideration for effective area calculations

Calculate Effective Floor Area based on the highlighted cell
-C value from 1.0 to 1.5: 100% of all floor areas are used
-C value below 1 and vertical openings are not protected: Consider two largest floors plus 50% of all floor above to a max of eight
-C value below 1 and vertical openings are protected: Consider single largest floor plus 25% of the two immediately adjoining floors

*A building may be subdivided if there is a vertical firewall with a fire-resistance rating greater than 2 hours, and meets the requirements of the National Building Code.

Floors Above Grade	**Total Floor Area (m^2)**	**% of Area Considered**	**Effective Floor Area (m^2)**
Basement	190	100%	190.0
Ground Floor	190	100%	190.0
Second Floor	190	100%	190.0
Total	**570**		**570.0**

Total Effective Floor Area **570 m^2**

STEP C: **Therefore RFF = 5,000 L/min (rounded to nearest 1000 L/min)**

STEP D: Occupancy Contents Adjustment Factor

The required fire flow may be reduced by as much as -25% for occupancies having contents with very low fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Occupancy and Contents Adjustment Factor	
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

*Refer to Table 3 for recommended Occupancy and Contents Charges by major occupancy examples.

Type of Occupancy	**Adjustment Factor**	
Residential Occupancy	Limited Combustible	-15%

Total Reduction % **-750 L/min (reduction)**

RFF = 4,250 L/min (not rounded)

Note: The RFF flow 4250 L/min is used in Step E and F.

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PROJECT NAME:	Lynn River Heights
PROJECT NUMBER:	2604-6978
PREPARED BY:	MS
CHECKED BY:	BP
DATE:	2024-02-08

Fire Flow Determination Per Fire Underwriters Survey (2020) - 15m Single-Detached (Unit 352)

STEP E: Automatic Sprinkler Protection

Sprinklers - The required fire flow may be reduced by up to 50% for complete automatic sprinkler protection depending upon adequacy of system.

	Yes/No/Unknown	*Possible Reduction Available	Actual Reduction Provided
Automatic sprinkler protection designed and installed in accordance with NFPA 13?	No	-30%	0%
Water supply is standard for both the system and Fire Department hose lines?	No	-10%	0%
Fully supervised system?	No	-10%	0%

Total Reduction % **0% (reduction)**

Total Reduced Flow **0 L/min (reduction, not rounded)**

STEP F: Exposure Adjustment Charge

Exposure - A percentage of water for the exposures should be added to the required fire flow for the subject building to provide adequate flow rates for hose streams used to reduce the spreading of fire from the subject building to exposed risks. The required fire flow of a subject building may be increased depending on the severity of exposed risks to the subject building and the distance between the exposed risks and the subject building. This charge considers the usage of water supplies to prevent exposed risks from igniting or being damaged during a major fire incident in the subject building.

Separation Distance	Maximum Exposure Adjustment Charge
0 to 3m	25%
3.1 to 10m	20%
10.1 to 20m	15%
20.1 to 30m	10%
Greater than 30m	0%

*The maximum exposure adjustment charge to be applied to a subject building is 75%
*The distance in metres from the subject building facing wall to the exposed building facing wall, measured to the nearest metre, between the nearest points of the buildings.

Exposed buildings	Lot	Distance	Surcharge Factor	Surcharge (L/min)
North	328/329	15	15%	637.5
East	353	6	20%	850
South	365/366	32	0%	0
West	351	6	20%	850

Total Reduced Flow **2,338 L/min Surcharge (not rounded)**

STEP G: Final Required Fire Flow

Step D - Occupancy Adjusted Fire Flow Demand	4,250	L/min
Step E - Sprinkler (Reduction)	0	L/min
Step F - Exposure Charge	2,338	L/min
Final Fire Flow:	**6,588**	**L/min**
	7,000	**L/min (rounded to nearest 1000L/min)**
or	**117**	**L/s**
or	**1,849**	**USGPM**
Required duration:	**2.00**	**hours**
	**Refer to Table 1 for Duration*	

Table 1 - FUS 2020

Required Duration of Fire Flow	
Flow Required (L/min)	**Duration (hours)**
2,000 or less	1.00
3,000	1.25
4,000	1.50
5,000	1.75
6,000	2.00
8,000	2.00
10,000	2.00
12,000	2.50
14,000	3.00
16,000	3.50
18,000	4.00
20,000	4.50
22,000	5.00
24,000	5.50
26,000	6.00
28,000	6.50
30,000	7.00
32,000	7.50
34,000	8.00
36,000	8.50
38,000	9.00
40,000 and over	9.50

Interpolate for intermediate figures

APPENDIX D

Stormwater Management Calculation

Project Name:	Lynn River Phase 2
Project No.:	2604-6978
Date:	2024.01.31
By:	BP

D.A. NAME **PRE-1**
D.A. AREA (ha) **14.87**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment PRE-1

Curve Number Calculation

Note: RC and CN values obtained from the MTO Drainage Management Manual (1997)
*On-site soils clayey silt with poor hydraulic conductivity per CVD Geotechnical Investigation Report (April 2006)

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area (ha)
BRANTFORD LOAMY	BR	D	40%	5.92
WATFORD-FOX	WF	D	60%	8.95
Total Area			100%	14.87

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
BR	0	98	0	98	0	98	0	98	0	50	0	0
WF	0	98	0	98	0	98	0	98	0	50	0	0
Subtotal	0		0		0		0		0			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
BR	5.92	83	0	81	0	50	0	84	0	89	5.92	491.36
WF	0	83	0	81	0	50	0	84	8.95	89	8.95	796.55
Subtotal	5.92		0		0		0		8.95			

	Composite Area Calculations	Total Pervious Area	14.87
		Total Impervious Area	0
		% Impervious	0.00%
		Composite Curve Number	86.6
		Total Area Check	14.87

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient								
				BRANTFORD		WATFORD-FOX		0		0		
Landuse	IA (mm)	Area (ha)	A * IA	RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	5.92	59.20	0.35	5.92		0		0		0	2.07
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0	0		0		0		0		0	0
Cultivated	7	8.95	62.65		0	0.55	8.95		0		0	4.92
Impervious	2	0.0	0.0		0		0		0		0	0
Composite		14.87	8.19	Composite Runoff Coefficient								0.47

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Overland	400	10.5	2.63%	2.7	0.44	0.25	0.17	0.17	0.24	0.16	0.50	0.33

Appropriate calculated time to	0.33	Appropriate Method:	Airport

CROZIER CONSULTING ENGINEERS

Project Name:	Lynn River Phase 2	**D.A. NAME**	**PRE-2**
Project No.:	2604-6978	**D.A. AREA (ha)**	**13.11**
Date:	2024.01.31		
By:	BP		

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment PRE-2

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area (ha)
BRANTFORD LOAMY	BR	D	48%	6.29
WATFORD-FOX	WF	D	52%	6.82
Total Area			100%	13.11

Note: RC and CN values obtained from the MTO Drainage Management Manual (1997)
*On-site soils clayey silt with poor hydraulic conductivity per CVD Geotechnical Investigation Report (April 2006)

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
BR	0	98	0	98	0	98	0	98	0	50	0	0
WF	0	98	0	98	0	98	0	98	0	50	0	0
Subtotal	0		0		0		0		0			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
BR	0	83	0	81	0	50	0	84	6.29	89	6.29	559.81
WF	0	83	0	81	0	50	0	84	6.82	89	6.82	606.98
Subtotal	0		0		0		0		13.11			

Composite Area Calculations	Total Pervious Area	13.11
	Total Impervious Area	0
	% Impervious	0.00%
	Composite Curve Number	89.0
	Total Area Check	13.11

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient								
				BRANTFORD		WATFORD-FOX		0		0		
Landuse	IA (mm)	Area (ha)	A * IA	RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0	0		0		0		0		0	0
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0	0		0		0		0		0	0
Cultivated	7	13.11	91.77	0.55	6.29	0.55	6.82		0		0	7.21
Impervious	2	0.0	0.0		0		0		0		0	0
Composite		13.11	7.00	Composite Runoff Coefficient								0.55

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Overland	564	10	1.77%	2.7	0.36	0.44	0.29	0.29	0.37	0.25	0.59	0.39

Appropriate calculated time to	0.39	Appropriate Method:	Airport

Project Name:	Lynn River Phase 2	D.A. NAME	PRE-3
Project No.:	2604-6978	D.A. AREA (ha)	6.55
Date:	2024.01.31		
By:	BP		

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment PRE-3

Curve Number Calculation

Note: RC and CN values obtained from the MTO Drainage Management Manual (1997)
*On-site soils clayey silt with poor hydraulic conductivity per CVD Geotechnical Investigation Report (April 2006)

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area (ha)
BRANTFORD LOAMY	BR	D	69%	4.53
WATFORD-FOX	WF	D	31%	2.02
Total Area			100%	6.55

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
BR	0	98	0	98	0	98	0	98	0	50	0	0
WF	0	98	0	98	0	98	0	98	0	50	0	0
Subtotal	0		0		0		0		0			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
BR	0	83	0	81	0	50	0	84	4.53	89	4.53	403.17
WF	0	83	0	81	0	50	0	84	2.02	89	2.02	179.78
Subtotal	0		0		0		0		6.55			

Composite Area Calculations		
	Total Pervious Area	6.55
	Total Impervious Area	0
	% Impervious	0.00%
	Composite Curve Number	89.0
	Total Area Check	6.55

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient								
				BRANTFORD		WATFORD-FOX		0		0		
Landuse	IA (mm)	Area (ha)	A * IA	RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0	0		0		0		0		0	0
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0	0		0		0		0		0	0
Cultivated	7	6.55	45.85	0.55	4.53	0.55	2.02		0		0	3.60
Impervious	2	0.0	0.0		0		0		0		0	0
Composite		6.55	7.00	Composite Runoff Coefficient								0.55

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Overland	635	10.5	1.65%	2.7	0.35	0.51	0.34	0.34	0.45	0.30	0.64	0.43

Appropriate calculated time to	0.43	Appropriate Method:	Airport

CROZIER CONSULTING ENGINEERS

Project Name:	Lynn River Phase 2	D.A. NAME	PRE-4
Project No.:	2604-6978	D.A. AREA (ha)	5.27
Date:	2024.01.31		
By:	BP		

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment PRE-4

Curve Number Calculation

Note: RC and CN values obtained from the MTO Drainage Management Manual (1997)
*On-site soils clayey silt with poor hydraulic conductivity per CVD Geotechnical Investigation Report (April 2006)

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area (ha)
BRANTFORD LOAMY	BR	D	63%	3.30
WATFORD-FOX	WF	D	37%	1.97
Total Area			100%	5.27

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
BR	0	98	0	98	0	98	0	98	0	50	0	0
WF	0	98	0	98	0	98	0	98	0	50	0	0
Subtotal	0		0		0		0		0			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
BR	0	83	0	81	0	50	0	84	3.30	89	3.30	293.70
WF	0	83	0	81	0	50	0	84	1.97	89	1.97	175.33
Subtotal	0		0		0		0		5.27			

Composite Area Calculations		
	Total Pervious Area	5.27
	Total Impervious Area	0
	% Impervious	0.00%
	Composite Curve Number	89.0
	Total Area Check	5.27

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient								
				BRANTFORD		WATFORD-FOX		0		0		
Landuse	IA (mm)	Area (ha)	A * IA	RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0	0		0		0		0		0	0
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0	0		0		0		0		0	0
Cultivated	7	5.27	36.89	0.55	3.30	0.55	1.97		0		0	2.90
Impervious	2	0.0	0.0		0		0		0		0	0
Composite		5.27	7.00	Composite Runoff Coefficient								0.55

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Overland	528	8.5	1.61%	2.7	0.34	0.43	0.29	0.29	0.39	0.26	0.59	0.39

Appropriate calculated time to	0.39	Appropriate Method:	Airport

CROZIER CONSULTING ENGINEERS

Project Name:	Lynn River Phase 2	**D.A. NAME**	**EXT-1**
Project No.:	2604-6978	**D.A. AREA (ha)**	**8.29**
Date:	2024.01.31		
By:	BP		

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment EXT-1

Curve Number Calculation

Note: RC and CN values obtained from the MTO Drainage Management Manual (1997)
*On-site soils clayey silt with poor hydraulic conductivity per CVD Geotechnical Investigation Report (April 2006)

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area (ha)
BRANTFORD LOAMY	BR	D	0%	0.00
WATFORD-FOX	WF	D	100%	8.29
Total Area			100%	8.29

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
BR	0	98	0	98	0	98	0	98	0	50	0	0
WF	0	98	0	98	0	98	0	98	0	50	0	0
Subtotal	0		0		0		0		0			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
BR	0	83	0	81	0	50	0	84	0	89	0	0
WF	0	83	0	81	0	50	0	84	8.29	89	8.29	737.81
Subtotal	0		0		0		0		8.29			

Composite Area Calculations		
	Total Pervious Area	8.29
	Total Impervious Area	0
	% Impervious	0.00%
	Composite Curve Number	89.0
	Total Area Check	8.29

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient								
				BRANTFORD		WATFORD-FOX		0		0		
Landuse	IA (mm)	Area (ha)	A * IA	RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0	0		0		0		0		0	0
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0	0		0		0		0		0	0
Cultivated	7	8.29	58.03		0	0.55	8.29		0		0	4.56
Impervious	2	0.0	0.0		0		0		0		0	0
Composite		8.29	7.00	Composite Runoff Coefficient								0.55

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Overland	520	3.5	0.67%	2.7	0.22	0.65	0.44	0.44	0.43	0.29	0.78	0.52

Appropriate calculated time to	0.52	Appropriate Method:	Airport

CROZIER CONSULTING ENGINEERS

Project Name:	Lynn River Phase 2	**D.A. NAME**	**EXT-2**
Project No.:	2604-6978	**D.A. AREA (ha)**	**8.68**
Date:	2024.01.31		
By:	BP		

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment EXT-2

Curve Number Calculation

Note: RC and CN values obtained from the MTO Drainage Management Manual (1997)
*On-site soils clayey silt with poor hydraulic conductivity per CVD Geotechnical Investigation Report (April 2006)

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area (ha)
BRANTFORD LOAMY	BR	D	0%	0.00
WATFORD-FOX	WF	D	100%	8.68
Total Area			100%	8.68

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
BR	0	98	0	98	0	98	0	98	0	50	0	0
WF	0	98	0	98	0	98	0	98	0	50	0	0
Subtotal	0		0		0		0		0			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
BR	0	83	0	81	0	50	0	84	0	89	0	0
WF	0	83	0	81	0	50	0	84	8.68	89	8.68	772.52
Subtotal	0		0		0		0		8.68			

Composite Area Calculations	Total Pervious Area	8.68
	Total Impervious Area	0
	% Impervious	0.00%
	Composite Curve Number	89.0
	Total Area Check	8.68

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient								
Landuse	IA (mm)	Area (ha)	A * IA	BRANTFORD		WATFORD-FOX		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0	0		0		0		0		0	0
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0	0		0		0		0		0	0
Cultivated	7	8.68	60.76		0	0.55	8.68		0		0	4.77
Impervious	2	0.0	0.0		0		0		0		0	0
Composite		8.68	7.00	Composite Runoff Coefficient								0.55

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Overland	445	3.5	0.79%	2.7	0.24	0.52	0.35	0.35	0.36	0.24	0.68	0.46

Appropriate calculated time to	0.46	Appropriate Method:	Airport

Project Name:	Lynn River Phase 2	**D.A. NAME**	**EXT-3**
Project No.:	2604-6978	**D.A. AREA (ha)**	**0.98**
Date:	2024.01.31		
By:	BP		

Hydrologic Parameters: CALIB STANDHYD Command
Pre Development Drainage Area: Catchment EXT-3

Curve Number Calculation

Note: RC and CN values obtained from the MTO Drainage Management Manual (1997)
*On-site soils clayey silt with poor hydraulic conductivity per CVD Geotechnical Investigation Report (April 2006)

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
BRANTFORD LOAMY PHASE	BR	D	100%	0.98
WATFORD-FOX	WF	D	0%	
Total Area Check			100%	0.98

Impervious Landuses Present:												
	Roadway/Future Dev.		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
BR	0	98	0	98	0	98	0.15	98	0	50	0.15	14.70
WF	0	98	0	98	0	98	0.00	98	0	50	0	0
Subtotal Area	0		0		0		0.15		0			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
BR	0	83	0	81	0	50	0.83	84	0	89	0.83	69.72
WF	0	83	0	81	0	50	0.00	84	0	89	0	0
Subtotal Area	0		0		0		0.83		0			

Pervious Area Calculations	Total Pervious Area	0.83
	Composite Pervious Curve Number	84.00
	Composite Initial Abstraction	5.00
Impervious Area Calculations	Total Directly Connected Area	0.00
	Total Indirectly Connected Area	0.15
	Total Impervious Area	0.15
	% X imp	0.0
	% T imp	15.3
	Total Area Check	0.98

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.83	4.15
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2.0	30	0.25
Impervious	1.0	1.0	81	0.013

$$A = 1.5LGI^2$$

Note: LGI formula retrieved from Visual OTTHYMO Reference Manual (pg. 7)

where LGI represents impervious length (m)

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Project Name:	Lynn River Phase 2	**D.A. NAME**	**EXT-4**
Project No.:	2604-6978	**D.A. AREA (ha)**	**0.31**
Date:	2024.01.31		
By:	BP		

Hydrologic Parameters: CALIB STANDHYD Command
Pre Development Drainage Area: Catchment EXT-4

Curve Number Calculation

Note: RC and CN values obtained from the MTO Drainage Management Manual (1997)
*On-site soils clayey silt with poor hydraulic conductivity per CVD Geotechnical Investigation Report (April 2006)

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
BRANTFORD LOAMY PHASE	BR	D	32%	0.10
WATFORD-FOX	WF	D	68%	0.21
Total Area Check			100%	0.31

Impervious Landuses Present:

Soils	Roadway/Future Dev. Area (ha)	CN	Sidewalk Area (ha)	CN	Driveway Area (ha)	CN	Building Area (ha)	CN	SWMF Area (ha)	CN	Subtotals Area	A*CN
BR	0	98	0	98	0	98	0.05	98	0	50	0.05	5.37
WF	0	98	0	98	0	98	0.12	98	0	50	0	11.29
Subtotal Area	0		0		0		0.17		0			

Pervious Landuses Present:

Soils	Woodland Area (ha)	CN	Meadow Area (ha)	CN	Wetland Area (ha)	CN	Lawn Area (ha)	CN	Cultivated Area (ha)	CN	Subtotals Area	A*CN
BR	0	83	0	81	0	50	0.05	84	0	89	0.05	3.79
WF	0	83	0	81	0	50	0.09	84	0	89	0	8
Subtotal Area	0		0		0		0.14		0			

Pervious Area Calculations	Total Pervious Area	0.14
	Composite Pervious Curve Number	84.00
	Composite Initial Abstraction	5.00
Impervious Area Calculations	Total Directly Connected Area	0.00
	Total Indirectly Connected Area	0.17
	Total Impervious Area	0.17
	% X imp	0.0
	% T imp	54.8
	Total Area Check	0.31

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.14	0.70
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2.0	20	0.25
Impervious	1.0	2.0	45	0.013

$$A = 1.5LGI^2$$

Note: LGI formula retrieved from Visual OTTHYMO Reference Manual (pg. 7)

where LGI represents impervious length (m)

Project Name:	Lynn River Phase 2	**D.A. NAME**	**POST-1**
Project No.:	2604-6978	**D.A. AREA (ha)**	**6.36**
Date:	2024.01.31		
By:	BP		

Hydrologic Parameters: CALIB NASHYD Command
Post Development Drainage Area: Catchment POST-1

Curve Number Calculation

Note: RC and CN values obtained from the MTO Drainage Management Manual (1997)
*On-site soils clayey silt with poor hydraulic conductivity per CVD Geotechnical Investigation Report (April 2006)

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area (ha)
BRANTFORD LOAMY	BR	D	18%	1.14
WATFORD-FOX	WF	D	82%	5.22
Total Area			100%	6.36

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
BR	0	98	0	98	0	98	0.16	98	0	50	0.16	15.28
WF	0	98	0	98	0	98	0.71	98	0	50	0.71	69.98
Subtotal	0		0		0		0.87		0			
Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
BR	0.78	83	0	81	0	50	0.20	84	0	89	0.98	81.88
WF	3.57	83	0	81	0	50	0.94	84	0	89	4.51	374.93
Subtotal	4.35		0		0		1.14		0			

Composite Area Calculations	Total Pervious Area	5.49
	Total Impervious Area	0.87
	% Impervious	13.68%
	Composite Curve Number	85.2
	Total Area Check	6.36

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient								
Landuse	IA (mm)	Area (ha)	A * IA	BRANTFORD		WATFORD-FOX		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	4.35	43.50	0.35	0.78	0.35	3.57		0		0	1.52
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	1.14	5.70	0.25	0.20	0.25	0.94		0		0	0.29
Cultivated	7	0	0		0		0		0		0	0
Impervious	2	0.87	1.74	0.90	0.16	0.90	0.71		0		0	0.78
Composite		6.36	8.01	Composite Runoff Coefficient								0.41

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Overland	100	5	5.00%	2.7	0.60	0.05	0.03	0.03	0.06	0.04	0.22	0.15

Appropriate calculated time to	0.15	Appropriate Method:	Airport

Project Name:	Lynn River Phase 2	**D.A. NAME**	**POST-2**
Project No.:	2604-6978	**D.A. AREA (ha)**	**29.24**
Date:	2024.01.31		
By:	BP		

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment POST-2

Curve Number Calculation

Note: RC and CN values obtained from the MTO Drainage Management Manual (1997)
*On-site soils clayey silt with poor hydraulic conductivity per CVD Geotechnical Investigation Report (April 2006)

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
BRANTFORD LOAMY PHASE	BR	D	45%	13.16
WATFORD-FOX	WF	D	55%	16.08
Total Area Check			100%	29.24

Impervious Landuses Present:	Roadway/Future Dev.		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
BR	3.06	98	0	98	1.23	98	3.59	98	1.70	50	9.57	856.43
WF	3.73	98	0	98	1.50	98	4.38	98	0.00	50	9.62	943
Subtotal Area	6.79		0		2.73		7.97		1.70			

Note: Roadway includes sidewalk.

Pervious Landuses Present:	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
BR	0	83	0	81	0	50	4.52	84	0	89	4.52	379.95
WF	0	83	0	81	0	50	5.53	84	0	89	5.53	464
Subtotal Area	0		0		0		10.05		0			

Pervious Area Calculations	Total Pervious Area	10.05
	Composite Pervious Curve Number	84.00
	Composite Initial Abstraction	5.00
Impervious Area Calculations	Total Directly Connected Area	11.22
	Total Indirectly Connected Area	7.97
	Total Impervious Area	19.19
	% X imp	38.4
	% T imp	65.6
	Total Area Check	29.24

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	10.05	50.25
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2.0	30	0.25
Impervious	1.5	1.0	442	0.013

$$A = 1.5LGI^2$$

Note: LGI formula retrieved from Visual OTTHYMO Reference Manual (pg. 7)

where LGI represents impervious length (m)

Project Name:	Lynn River Phase 2	**D.A. NAME**	**POST-3**
Project No.:	2604-6978	**D.A. AREA (ha)**	**3.30**
Date:	2024.01.31		
By:	BP		

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment POST-3

Curve Number Calculation

Note: RC and CN values obtained from the MTO Drainage Management Manual (1997)
*On-site soils clayey silt with poor hydraulic conductivity per CVD Geotechnical Investigation Report (April 2006)

Soil Types Present:

Type	ID	Hydrologic	% Area	Area
BRANTFORD LOAMY PHASE	BR	D	17%	0.55
WATFORD-FOX	WF	D	83%	2.75
Total Area Check			100%	3.30

Impervious Landuses Present:

	Roadway/Future Dev.		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
BR	0.10	98	0	98	0.05	98	0.15	98	0	50	0.30	29.73
WF	0.49	98	0	98	0.26	98	0.77	98	0	50	1.52	148.63
Subtotal Area	0.59		0		0.31		0.92		0			

Note: Roadway includes sidewalk.

Pervious Landuses Present:

	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
BR	0	83	0	81	0	50	0.25	84	0	89	0.25	20.72
WF	0	83	0	81	0	50	1.23	84	0	89	1.23	104
Subtotal Area	0		0		0		1.48		0			

Pervious Area Calculations	Total Pervious Area	1.48
	Composite Pervious Curve Number	84.00
	Composite Initial Abstraction	5.00
Impervious Area Calculations	Total Directly Connected Area	0.90
	Total Indirectly Connected Area	0.92
	Total Impervious Area	1.82
	% X imp	27.3
	% T imp	55.2
	Total Area Check	3.30

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	1.48	7.40
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2.0	20	0.25
Impervious	1.5	1.0	148	0.013

$$A = 1.5LGI^2$$

Note: LGI formula retrieved from Visual OTTHYMO Reference Manual (pg. 7)

where LGI represents impervious length (m)

CROZIER CONSULTING ENGINEERS

Project Name:	Lynn River Phase 2	**D.A. NAME**	**POST-4**
Project No.:	2604-6978	**D.A. AREA (ha)**	**0.68**
Date:	2024.01.31		
By:	BP		

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment POST-4

Curve Number Calculation

Note: RC and CN values obtained from the MTO Drainage Management Manual (1997)
*On-site soils clayey silt with poor hydraulic conductivity per CVD Geotechnical Investigation Report (April 2006)

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
BRANTFORD LOAMY PHASE	BR	D	100%	0.68
WATFORD-FOX	WF	D	0%	
Total Area Check			100%	0.68

Impervious Landuses Present:

	Roadway/Future Dev.		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
BR	0.68	98	0	98	0	98	0	98	0	50	0.68	66.64
WF	0.00	98	0	98	0	98	0	98	0	50	0	0
Subtotal Area	0.68		0		0		0		0			

Note: Roadway includes sidewalk.

Pervious Landuses Present:

	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
BR	0	83	0	81	0	50	0	84	0	89	0	0
WF	0	83	0	81	0	50	0	84	0	89	0	0
Subtotal Area	0		0		0		0		0			

Pervious Area Calculations	Total Pervious Area	0.00
	Composite Pervious Curve Number	84.00
	Composite Initial Abstraction	5.00
Impervious Area Calculations	Total Directly Connected Area	0.68
	Total Indirectly Connected Area	0.00
	Total Impervious Area	0.68
	% X imp	100.0
	% T imp	100.0
	Total Area Check	0.68

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0	0
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2.0	20	0.25
Impervious	1.5	1.0	67	0.013

$$A = 1.5LGI^2$$

Note: LGI formula retrieved from Visual OTTHYMO Reference Manual (pg. 7)

where LGI represents impervious length (m)

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Project Name:	Lynn River Phase 2	**D.A. NAME**	**UC-1**
Project No.:	2604-6978	**D.A. AREA (ha)**	**0.22**
Date:	2024.01.31		
By:	BP		

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment UC-1

Curve Number Calculation

Note: RC and CN values obtained from the MTO Drainage Management Manual (1997)
*On-site soils clayey silt with poor hydraulic conductivity per CVD Geotechnical Investigation Report (April 2006)

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
BRANTFORD LOAMY PHASE	BR	D	0%	0.00
WATFORD-FOX	WF	D	100%	0.22
Total Area Check			100%	0.22

Impervious Landuses Present:

	Roadway/Future Dev.		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
BR	0	98	0	98	0	98	0.00	98	0	50	0.00	0.00
WF	0	98	0	98	0	98	0.12	98	0	50	0	11.76
Subtotal Area	0		0		0		0.12		0			

Pervious Landuses Present:

	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
BR	0	83	0	81	0	50	0.00	84	0	89	0.00	0.00
WF	0	83	0	81	0	50	0.10	84	0	89	0	8
Subtotal Area	0		0		0		0.10		0			

Pervious Area Calculations	Total Pervious Area	0.10
	Composite Pervious Curve Number	84.00
	Composite Initial Abstraction	5.00
Impervious Area Calculations	Total Directly Connected Area	0.00
	Total Indirectly Connected Area	0.12
	Total Impervious Area	0.12
	% X imp	0.0
	% T imp	54.5
	Total Area Check	0.22

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.10	0.50
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2.0	20	0.25
Impervious	1.0	2.0	38	0.013

$$A = 1.5LGI^2$$

Note: LGI formula retrieved from Visual OTTHYMO Reference Manual (pg. 7)

where LGI represents impervious length (m)

Project No:	2604-6978
Project:	Lynn River Phase 2
File:	Water Quality
Design by:	BP
Checked by:	JK
Date:	2024.02.07

Post-Development Scenario Water Quality Requirements

Areas Contributing	Area (ha)	% Imp	25mm RV (mm)	25mm RV (m^3)
POST-2	29.24	66	15.23	4453
EX-2	8.68	0	6.55	569
Total	**37.92**	**51**		**5022**

MOE Total WQ Volume (m^3/ha)	180
MOE ED Volume (m^3/ha)	40
MOE ED Volume (m^3)	1517
MOE PP Volume (m^3/ha)	140
MOE PP Volume (m^3)	5325
Pond Required ED Volume (m^3)	**5022**
Pond Required PP Volume (m^3)	**5325**

Note: 25mm runoff volume per VO Model.

CROZIER
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Project No:	2604-6978
Project:	Lynn River Phase 2
File:	Extended Detention
Design by:	BP
Checked by:	JK
Date:	2023.08.03

Extended Detention Specifications

(Per MECP)

Extended Detention Volume (Area x runoff from 25mm event)		5022
t (drawdown time - seconds, *hours in italics*)	*24.0*	86400
Ao (cross section area of orifice - sqm)		0.0471
h (maximum water elevation above orifice for extended detention- m)		0.66
C (discharge coefficient)		0.64
Ap (average surface area for extended detention - sqm)		7137

t = 2*Ap*(h^0.5)/(C*Ao*(g*2)^0.5)

Ao =	0.047 sqm	d =	246	mm
Extended Detention Orifice Diameter (as designed)		d =	**245**	mm

ACTUAL DRAWDOWN TIME

* Neglecting tailwater conditions*

Extended Detention Volume Used	5022
d (orifice diameter, mm)	245
h (maximum head acting on orifice for extended detention, m)	0.66
Ao (cross section area of orifice, m^2)	0.0471
C (discharge coefficient)	0.64
Ap (average surface area for extended detention, m^2)	7137

t = 2*Ap*(h^0.5)/(C*Ao*(g*2)^0.5)

t (hours)	24

Project No:	2604-6978
Project:	Lynn River Phase 2
File:	Stage-Storage-Discharge
Design by:	BP
Checked by:	JK
Date:	2024.02.13

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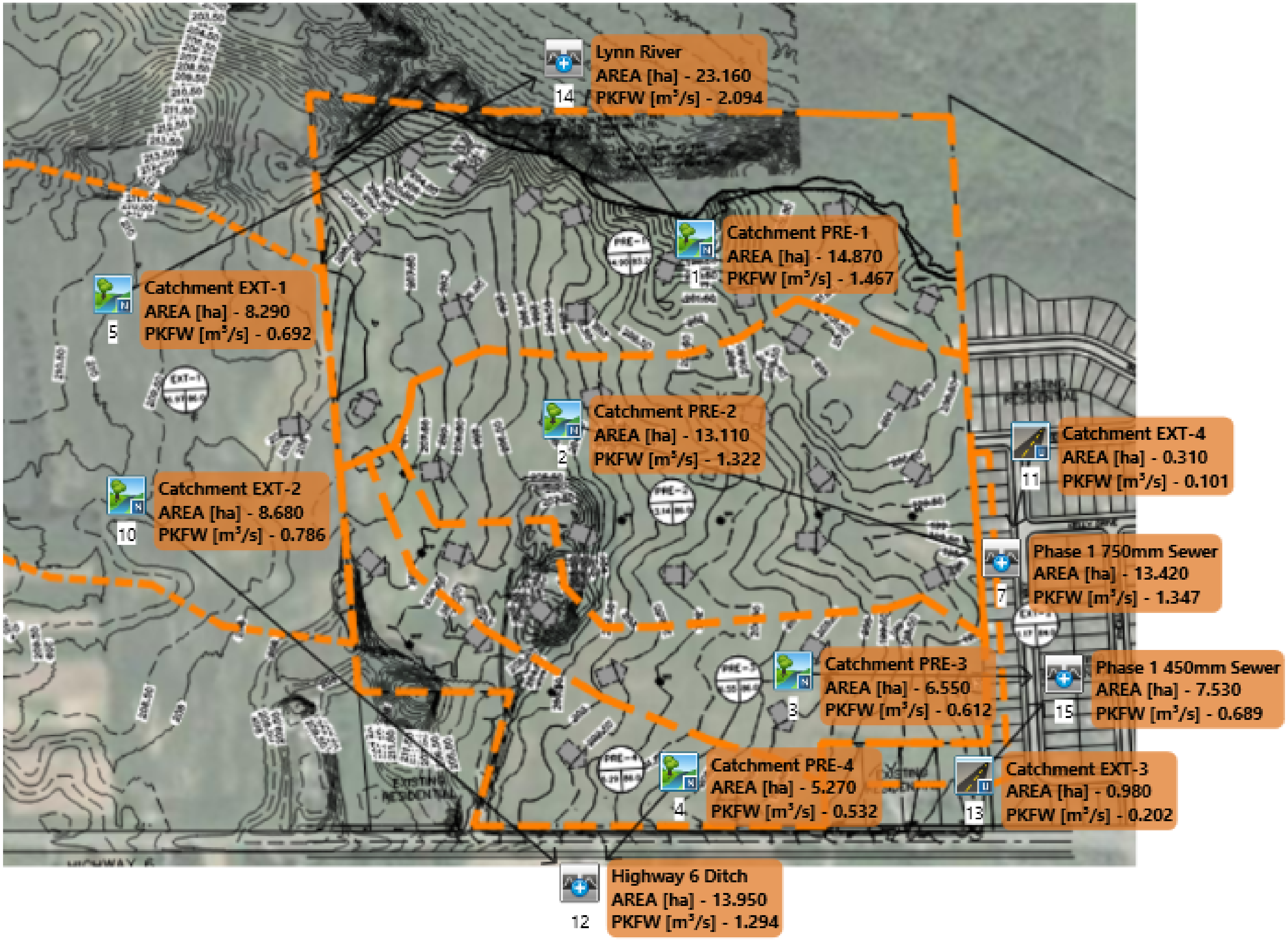
Storage - Outflow Calculations

Outlet Structure			Main Cell Spillway		
E.D. Orifice Diameter:	0.245	m	Emergency Spill Elev.	199.00	m
E.D. Orifice Invert Elevation:	197.20	m	Emerg Spill Bot. Width	3	m
V-notch angle	N/A	degrees	Trap. Side Slopes	3	:1
V-notch constant	N/A	const			
V-notch invert	N/A	m			
Rect weir length	0.390	m			
Rect weir invert	197.90	m			
Extended Detention Depth:	0.66	m			

Pond Dimensions				Total Storage	Outlet Structure			Cell Spillway			
Elev. (m)	Depth Above PP (m)	Area (sqm)	Storage Volume (cu.m)	Volume (cu.m)	ED Orifice Discharge (cu.m/s)	V-notch Discharge (cu.m/s)	Rect. Weir Discharge (cu.m/s)	Emerg. Weir Ave. Width (m)	Emerg. Weir Discharge (cu.m/s)	Total Discharge (cu.m/s)	Storage (ha-m)
197.20	0.00	6291	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
197.25	0.05	6429	318	318	0.000	0.000	0.000	0.000	0.000	0.000	0.032
197.35	0.15	6705	975	975	0.022	0.000	0.000	0.000	0.000	0.022	0.097
197.45	0.25	6981	1659	1659	0.048	0.000	0.000	0.000	0.000	0.048	0.166
197.55	0.35	7257	2371	2371	0.064	0.000	0.000	0.000	0.000	0.064	0.237
197.65	0.45	7534	3111	3111	0.076	0.000	0.000	0.000	0.000	0.076	0.311
197.75	0.55	7810	3878	3878	0.087	0.000	0.000	0.000	0.000	0.087	0.388
197.85	0.65	8086	4996	4996	0.097	0.000	0.000	0.000	0.000	0.097	0.500
197.86	0.65	8113	5020	5020	0.097	0.000	0.000	0.000	0.000	0.097	0.502
197.90	0.70	8224	5404	5404	0.102	0.000	0.000	0.000	0.000	0.102	0.540
197.95	0.75	8362	5818	5818	0.106	0.000	0.008	0.000	0.000	0.114	0.582
198.05	0.85	8638	6668	6668	0.114	0.000	0.042	0.000	0.000	0.156	0.667
198.15	0.95	8914	7546	7546	0.122	0.000	0.090	0.000	0.000	0.211	0.755
198.25	1.05	9190	8451	8451	0.129	0.000	0.149	0.000	0.000	0.277	0.845
198.35	1.15	9466	9384	9384	0.135	0.000	0.217	0.000	0.000	0.352	0.938
198.45	1.25	9742	10344	10344	0.142	0.000	0.293	0.000	0.000	0.435	1.034
198.55	1.35	10019	11332	11332	0.148	0.000	0.376	0.000	0.000	0.524	1.133
198.60	1.40	10157	11837	11837	0.151	0.000	0.420	0.000	0.000	0.571	1.184
198.65	1.45	10295	12348	12348	0.154	0.000	0.466	0.000	0.000	0.620	1.235
198.70	1.50	10433	12866	12866	0.157	0.000	0.513	0.000	0.000	0.670	1.287
198.75	1.55	10571	13391	13391	0.160	0.000	0.562	0.000	0.000	0.722	1.339
198.85	1.65	10847	14462	14462	0.165	0.000	0.664	0.000	0.000	0.830	1.446
198.95	1.75	11123	15561	15561	0.170	0.000	0.772	0.000	0.000	0.943	1.556
199.00	1.80	11261	16504	16504	0.173	0.000	0.828	3.000	0.000	**1.001**	**1.650**
199.15	1.95	11664	18223	18223	0.181	0.000	1.003	3.450	0.369	1.552	1.822
199.30	2.10	11934	20088	20088	0.188	0.000	1.189	4.350	1.315	**2.692**	**2.009**

Pre-Development Uncontrolled Schematic



```
==================================================================================
========================

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        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****


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DATE: 03/01/2024                           TIME: 10:35:32

USER:


COMMENTS: ____________________________________________________________


----------------------------------------------------------------------------------
------------------------
  **************************************************
  ** SIMULATION : 100yr 3hr 10min Chicago       **
  **************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 801.041
| Ptotal= 78.77 mm |                          B=   1.501
--------------------                          C=   0.657
```

```
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00   10.59 |  0.83  160.97 |  1.67   16.17 |  2.50   10.24
                 0.17   12.39 |  1.00   47.72 |  1.83   14.33 |  2.67    9.61
                 0.33   15.24 |  1.17   29.71 |  2.00   12.95 |  2.83    9.08
                 0.50   20.69 |  1.33   22.67 |  2.17   11.86 |
                 0.67   38.70 |  1.50   18.74 |  2.33   10.97 |


--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0002)|   Area    (ha)=  13.11   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   1.284

     PEAK FLOW       (cms)=   1.322 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  49.827
     TOTAL RAINFALL   (mm)=  78.773
     RUNOFF COEFFICIENT   =   0.633

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0011)|   Area    (ha)=   0.31
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.17          0.14
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=      45.46         20.00
     Mannings n          =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     160.97        278.37
                over (min)      10.00         10.00
     Storage Coeff.  (min)=       1.07 (ii)     4.16 (ii)
     Unit Hyd. Tpeak (min)=      10.00         10.00
     Unit Hyd. peak  (cms)=       0.17          0.15
```

```
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.10          0.101 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      77.77        59.42          59.59
     TOTAL RAINFALL   (mm)=      78.77        78.77          78.77
     RUNOFF COEFFICIENT   =       0.99         0.75           0.76

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0011):     0.31   0.101     1.00    59.59
      + ID2= 2 (  0002):    13.11   1.322     1.33    49.83
        ====================================================
        ID = 3 (  0007):    13.42   1.347     1.33    50.05

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   5.27   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   0.516

     PEAK FLOW       (cms)=   0.532 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  49.827
     TOTAL RAINFALL   (mm)=  78.773
     RUNOFF COEFFICIENT   =   0.633

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0010)|   Area    (ha)=   8.68   Curve Number   (CN)= 89.0
```

```
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.46

     Unit Hyd Qpeak  (cms)=   0.721

     PEAK FLOW       (cms)=   0.786 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  49.877
     TOTAL RAINFALL   (mm)=  78.773
     RUNOFF COEFFICIENT   =   0.633

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):      8.68   0.786     1.50    49.88
      + ID2= 2 (  0004):      5.27   0.532     1.33    49.83
        ====================================================
        ID = 3 (  0012):     13.95   1.294     1.50    49.86

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=  14.87   Curve Number   (CN)= 86.6
|ID= 1 DT=10.0 min |   Ia      (mm)=   8.19   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.33

     Unit Hyd Qpeak  (cms)=   1.721

     PEAK FLOW       (cms)=   1.467 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  45.156
     TOTAL RAINFALL   (mm)=  78.773
     RUNOFF COEFFICIENT   =   0.573

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0005)|   Area    (ha)=   8.29   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   0.609
```

```
     PEAK FLOW       (cms)=   0.692 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  49.898
     TOTAL RAINFALL   (mm)=  78.773
     RUNOFF COEFFICIENT   =   0.633

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    14.87   1.467     1.33    45.16
      + ID2= 2 (  0005):     8.29   0.692     1.50    49.90
        ====================================================
        ID = 3 (  0014):    23.16   2.094     1.33    46.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   6.55   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.43

     Unit Hyd Qpeak  (cms)=   0.582

     PEAK FLOW       (cms)=   0.612 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  49.861
     TOTAL RAINFALL   (mm)=  78.773
     RUNOFF COEFFICIENT   =   0.633

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0013)|   Area    (ha)=   0.98
|ID= 1 DT=10.0 min |   Total Imp(%)=  15.00   Dir. Conn.(%)=   1.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15         0.83
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      80.83        30.00
     Mannings n           =      0.013        0.250
```

```
     Max.Eff.Inten.(mm/hr)=     160.97       112.24
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       1.86 (ii)    7.53 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.20         0.202 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00          1.00
     RUNOFF VOLUME    (mm)=      77.77        47.81         48.11
     TOTAL RAINFALL   (mm)=      78.77        78.77         78.77
     RUNOFF COEFFICIENT   =       0.99         0.61          0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0015)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0013):     0.98   0.202     1.00    48.11
      + ID2= 2 (  0003):     6.55   0.612     1.50    49.86
        ===================================================
        ID = 3 (  0015):     7.53   0.689     1.33    49.63

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
==================================================================================
=========================

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        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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```

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  Output  filename:
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0cc-6926-4cf8-aff9-988a3966bdf4\scenar
  Summary filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\e1e78
0cc-6926-4cf8-aff9-988a3966bdf4\scenar


DATE: 03/01/2024                           TIME: 10:35:32

USER:



COMMENTS: ____________________________________________________________


-----------------------------------------------------------------------------------
-------------------------
  ***********************************************
  ** SIMULATION : 10yr 3hr 10min Chicago        **
  ***********************************************


--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 670.324
| Ptotal= 52.95 mm |                          B=   3.007
--------------------                          C=   0.698
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    6.49 |  0.83  111.84 |  1.67   10.30 |  2.50    6.25
                 0.17    7.70 |  1.00   34.58 |  1.83    9.03 |  2.67    5.84
                 0.33    9.66 |  1.17   20.31 |  2.00    8.07 |  2.83    5.49
                 0.50   13.55 |  1.33   15.00 |  2.17    7.33 |
                 0.67   27.43 |  1.50   12.13 |  2.33    6.74 |
```

```
--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0002)|   Area    (ha)=  13.11   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   1.284

     PEAK FLOW       (cms)=   0.707 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  27.245
     TOTAL RAINFALL   (mm)=  52.953
     RUNOFF COEFFICIENT   =   0.515

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0011)|   Area    (ha)=   0.31
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.17         0.14
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      45.46        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     111.84       166.74
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       1.24 (ii)    5.03 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.15
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.06           0.058 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00            1.00
     RUNOFF VOLUME    (mm)=      51.95        35.34           35.49
     TOTAL RAINFALL   (mm)=      52.95        52.95           52.95
     RUNOFF COEFFICIENT   =       0.98         0.67            0.67

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```

```
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0011):     0.31   0.058     1.00    35.49
      + ID2= 2 (  0002):    13.11   0.707     1.33    27.24
        ====================================================
        ID = 3 (  0007):    13.42   0.724     1.33    27.44

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   5.27   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   0.516

     PEAK FLOW       (cms)=   0.284 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  27.245
     TOTAL RAINFALL   (mm)=  52.953
     RUNOFF COEFFICIENT   =   0.514

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0010)|   Area    (ha)=   8.68   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.46

     Unit Hyd Qpeak  (cms)=   0.721

     PEAK FLOW       (cms)=   0.427 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  27.272
     TOTAL RAINFALL   (mm)=  52.953
     RUNOFF COEFFICIENT   =   0.515

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
```

```
--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):     8.68   0.427     1.50    27.27
      + ID2= 2 (  0004):     5.27   0.284     1.33    27.24
        ==================================================
        ID = 3 (  0012):    13.95   0.707     1.50    27.26

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=  14.87   Curve Number   (CN)= 86.6
|ID= 1 DT=10.0 min |   Ia      (mm)=   8.19   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.33

     Unit Hyd Qpeak  (cms)=   1.721

     PEAK FLOW       (cms)=   0.756 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  23.740
     TOTAL RAINFALL   (mm)=  52.953
     RUNOFF COEFFICIENT   =   0.448

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0005)|   Area    (ha)=   8.29   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   0.609

     PEAK FLOW       (cms)=   0.373 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=  27.283
     TOTAL RAINFALL   (mm)=  52.953
     RUNOFF COEFFICIENT   =   0.515

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```

```
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    14.87   0.756     1.33    23.74
      + ID2= 2 (  0005):     8.29   0.373     1.67    27.28
        ====================================================
        ID = 3 (  0014):    23.16   1.084     1.33    25.01

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0003)|   Area    (ha)=   6.55   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.43

     Unit Hyd Qpeak  (cms)=   0.582

     PEAK FLOW       (cms)=   0.335 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  27.263
     TOTAL RAINFALL   (mm)=  52.953
     RUNOFF COEFFICIENT   =   0.515

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0013)|   Area    (ha)=   0.98
|ID= 1 DT=10.0 min |   Total Imp(%)=  15.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15         0.83
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      80.83        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     111.84        60.12
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       2.15 (ii)    9.43 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.11
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.09          0.097 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      51.95        26.25          26.50
     TOTAL RAINFALL   (mm)=      52.95        52.95          52.95
     RUNOFF COEFFICIENT   =       0.98         0.50           0.50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
```

```
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0015)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0013):     0.98   0.097     1.00    26.50
      + ID2= 2 (  0003):     6.55   0.335     1.50    27.26
        ====================================================
        ID = 3 (  0015):     7.53   0.373     1.33    27.16

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

 FINISH
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       V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
```

```
  Output  filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\196a1
b63-7e14-4e27-8970-ae9c34a9f744\scenar
  Summary filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\196a1
b63-7e14-4e27-8970-ae9c34a9f744\scenar


DATE: 03/01/2024                           TIME: 10:35:31

USER:



COMMENTS: ____________________________________________________________


-----------------------------------------------------------------------------------
-------------------------
  ***********************************************
  ** SIMULATION : 25yr 3hr 10min Chicago        **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 721.533
| Ptotal= 63.11 mm |                          B=   2.253
--------------------                          C=   0.679
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    8.07 |  0.83  131.63 |  1.67   12.58 |  2.50    7.79
                 0.17    9.51 |  1.00   39.74 |  1.83   11.08 |  2.67    7.30
                 0.33   11.82 |  1.17   23.97 |  2.00    9.96 |  2.83    6.87
                 0.50   16.33 |  1.33   17.98 |  2.17    9.08 |
                 0.67   31.84 |  1.50   14.70 |  2.33    8.38 |


--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0002)|   Area    (ha)=  13.11   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   1.284
```

```
     PEAK FLOW       (cms)=   0.944 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  35.900
     TOTAL RAINFALL   (mm)=  63.105
     RUNOFF COEFFICIENT   =   0.569

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0011)|   Area    (ha)=   0.31
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.17         0.14
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      45.46        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     131.63       210.99
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       1.16 (ii)    4.61 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.15
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.07           0.075 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00            1.00
     RUNOFF VOLUME    (mm)=      62.11        44.68           44.84
     TOTAL RAINFALL   (mm)=      63.11        63.11           63.11
     RUNOFF COEFFICIENT   =       0.98         0.71            0.71

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
```

```
        ID1= 1 (  0011):      0.31   0.075     1.00    44.84
      + ID2= 2 (  0002):     13.11   0.944     1.33    35.90
        ====================================================
        ID = 3 (  0007):     13.42   0.964     1.33    36.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0004)|   Area    (ha)=   5.27   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   0.516

     PEAK FLOW       (cms)=   0.379 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  35.900
     TOTAL RAINFALL   (mm)=  63.105
     RUNOFF COEFFICIENT   =   0.569

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0010)|   Area    (ha)=   8.68   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.46

     Unit Hyd Qpeak  (cms)=   0.721

     PEAK FLOW       (cms)=   0.565 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  35.936
     TOTAL RAINFALL   (mm)=  63.105
     RUNOFF COEFFICIENT   =   0.569

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):      8.68   0.565     1.50    35.94
      + ID2= 2 (  0004):      5.27   0.379     1.33    35.90
        ====================================================
        ID = 3 (  0012):     13.95   0.934     1.50    35.92
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0001)|   Area    (ha)=  14.87   Curve Number   (CN)= 86.6
|ID= 1 DT=10.0 min |   Ia      (mm)=   8.19   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.33

     Unit Hyd Qpeak  (cms)=   1.721

     PEAK FLOW       (cms)=   1.027 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  31.879
     TOTAL RAINFALL   (mm)=  63.105
     RUNOFF COEFFICIENT   =   0.505

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0005)|   Area    (ha)=   8.29   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   0.609

     PEAK FLOW       (cms)=   0.495 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  35.951
     TOTAL RAINFALL   (mm)=  63.105
     RUNOFF COEFFICIENT   =   0.570

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    14.87   1.027     1.33    31.88
      + ID2= 2 (  0005):     8.29   0.495     1.50    35.95
        ====================================================
        ID = 3 (  0014):    23.16   1.469     1.33    33.34

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
```

```
| CALIB              |
| NASHYD   (  0003)|   Area    (ha)=   6.55   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.43

     Unit Hyd Qpeak  (cms)=   0.582

     PEAK FLOW       (cms)=   0.442 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  35.924
     TOTAL RAINFALL   (mm)=  63.105
     RUNOFF COEFFICIENT   =   0.569

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0013)|   Area    (ha)=   0.98
|ID= 1 DT=10.0 min |   Total Imp(%)=  15.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15         0.83
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      80.83        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     131.63        80.20
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       2.01 (ii)    8.50 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.13          0.136 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      62.11        34.47          34.74
     TOTAL RAINFALL   (mm)=      63.11        63.11          63.11
     RUNOFF COEFFICIENT   =       0.98         0.55           0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
---------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0015)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0013):      0.98   0.136     1.00    34.74
      + ID2= 2 (  0003):      6.55   0.442     1.50    35.92
        ==================================================
        ID = 3 (  0015):      7.53   0.495     1.33    35.77

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------------
==================================================================================
=========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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```


```
                   *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\bea3d
81d-0b5b-4a90-a981-81f796073d40\scenar
  Summary filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\bea3d
81d-0b5b-4a90-a981-81f796073d40\scenar


DATE: 03/01/2024                           TIME: 10:35:32

USER:
```

COMMENTS: ____

```
--------------------------------------------------------------------------------------------------------------
   ************************************************
   ** SIMULATION : 2yr 3hr 10min Chicago         **
   ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 529.711
| Ptotal= 32.56 mm |                          B=   4.501
--------------------                          C=   0.745
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    3.53 |  0.83   72.24 |  1.67    5.90 |  2.50    3.39
                 0.17    4.26 |  1.00   22.78 |  1.83    5.09 |  2.67    3.14
                 0.33    5.49 |  1.17   12.62 |  2.00    4.50 |  2.83    2.94
                 0.50    8.02 |  1.33    8.98 |  2.17    4.04 |
                 0.67   17.69 |  1.50    7.08 |  2.33    3.68 |


--------------------------------------------------------------------------------------------------------
| CALIB            |
| NASHYD   (  0002)|   Area    (ha)=  13.11   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   1.284

     PEAK FLOW       (cms)=   0.287 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  11.447
     TOTAL RAINFALL   (mm)=  32.561
     RUNOFF COEFFICIENT   =   0.352

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------------------
| CALIB            |
| STANDHYD (  0011)|   Area    (ha)=   0.31
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=   1.00
```

```
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.17         0.14
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      45.46        20.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      72.24        82.30
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       1.47 (ii)    6.51 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.13
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.03           0.026 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00            1.00
     RUNOFF VOLUME    (mm)=      31.56        17.55           17.66
     TOTAL RAINFALL   (mm)=      32.56        32.56           32.56
     RUNOFF COEFFICIENT   =       0.97         0.54            0.54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0011):     0.31   0.026     1.00    17.66
      + ID2= 2 (  0002):    13.11   0.287     1.50    11.45
        ==================================================
        ID = 3 (  0007):    13.42   0.294     1.50    11.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   5.27   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   0.516
```

```
     PEAK FLOW       (cms)=   0.115 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  11.447
     TOTAL RAINFALL   (mm)=  32.561
     RUNOFF COEFFICIENT   =   0.352

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0010)|   Area    (ha)=   8.68   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.46

     Unit Hyd Qpeak  (cms)=   0.721

     PEAK FLOW       (cms)=   0.173 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  11.459
     TOTAL RAINFALL   (mm)=  32.561
     RUNOFF COEFFICIENT   =   0.352

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):     8.68   0.173     1.50    11.46
      + ID2= 2 (  0004):     5.27   0.115     1.50    11.45
        ==================================================
        ID = 3 (  0012):    13.95   0.288     1.50    11.45

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0001)|   Area    (ha)=  14.87   Curve Number   (CN)= 86.6
|ID= 1 DT=10.0 min |   Ia      (mm)=   8.19   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.33

     Unit Hyd Qpeak  (cms)=   1.721

     PEAK FLOW       (cms)=   0.274 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=   9.290
```

```
     TOTAL RAINFALL   (mm)=  32.561
     RUNOFF COEFFICIENT   =   0.285

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0005)|   Area    (ha)=   8.29   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   0.609

     PEAK FLOW       (cms)=   0.154 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=  11.464
     TOTAL RAINFALL   (mm)=  32.561
     RUNOFF COEFFICIENT   =   0.352

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    14.87   0.274     1.33     9.29
      + ID2= 2 (  0005):     8.29   0.154     1.67    11.46
        ====================================================
        ID = 3 (  0014):    23.16   0.418     1.50    10.07

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0003)|   Area    (ha)=   6.55   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.43

     Unit Hyd Qpeak  (cms)=   0.582

     PEAK FLOW       (cms)=   0.136 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  11.455
     TOTAL RAINFALL   (mm)=  32.561
     RUNOFF COEFFICIENT   =   0.352

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0013)|   Area    (ha)=   0.98
|ID= 1 DT=10.0 min |   Total Imp(%)=  15.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15         0.83
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      80.83        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      72.24        18.70
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       2.56 (ii)   14.17 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.17         0.07
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.03           0.030 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17            1.17
     RUNOFF VOLUME    (mm)=      31.56        11.45           11.64
     TOTAL RAINFALL   (mm)=      32.56        32.56           32.56
     RUNOFF COEFFICIENT   =       0.97         0.35            0.36

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0015)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0013):     0.98   0.030     1.17    11.64
      + ID2= 2 (  0003):     6.55   0.136     1.50    11.46
        =======================================================
        ID = 3 (  0015):     7.53   0.158     1.50    11.48

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
==================================================================================
```

```
=========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```

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***** D E T A I L E D   O U T P U T *****

```
  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\c27de
945-1fac-4044-bf49-aebed6281275\scenar
  Summary filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\c27de
945-1fac-4044-bf49-aebed6281275\scenar


DATE: 03/01/2024                           TIME: 10:35:32

USER:


COMMENTS: ____________________________________________________________


-----------------------------------------------------------------------------------
-------------------------
  ***********************************************
  ** SIMULATION : 50yr 3hr 10min Chicago       **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 766.038
| Ptotal= 71.04 mm |                          B=   1.898
--------------------                          C=   0.668
                        used in:   INTENSITY =  A / (t + B)^C
```

```
                    Duration of storm  =  3.00 hrs
                    Storm time step    = 10.00 min
                    Time to peak ratio =  0.33

              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.00    9.32 |  0.83  146.50 |  1.67   14.38 |  2.50    9.00
              0.17   10.95 |  1.00   43.93 |  1.83   12.71 |  2.67    8.44
              0.33   13.53 |  1.17   26.91 |  2.00   11.45 |  2.83    7.96
              0.50   18.53 |  1.33   20.36 |  2.17   10.46 |
              0.67   35.40 |  1.50   16.73 |  2.33    9.66 |


-------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0002)|   Area    (ha)=  13.11   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   1.284

     PEAK FLOW       (cms)=   1.135 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  42.882
     TOTAL RAINFALL   (mm)=  71.038
     RUNOFF COEFFICIENT   =   0.604

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0011)|   Area    (ha)=   0.31
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=   1.00
--------------------
                                 IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.17         0.14
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      45.46        20.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     146.50       245.05
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       1.11 (ii)    4.36 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.15
                                                               *TOTALS*
```

```
     PEAK FLOW       (cms)=       0.00          0.09          0.088 (iii)
     TIME TO PEAK    (hrs)=       1.00          1.00           1.00
     RUNOFF VOLUME    (mm)=      70.04         52.10          52.27
     TOTAL RAINFALL   (mm)=      71.04         71.04          71.04
     RUNOFF COEFFICIENT   =       0.99          0.73           0.74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0011):      0.31   0.088     1.00    52.27
      + ID2= 2 (  0002):     13.11   1.135     1.33    42.88
        =================================================
        ID = 3 (  0007):     13.42   1.157     1.33    43.10

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   5.27   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   0.516

     PEAK FLOW       (cms)=   0.456 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  42.882
     TOTAL RAINFALL   (mm)=  71.038
     RUNOFF COEFFICIENT   =   0.604

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0010)|   Area    (ha)=   8.68   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
```

```
--------------------   U.H. Tp(hrs)=   0.46

     Unit Hyd Qpeak  (cms)=   0.721

     PEAK FLOW       (cms)=   0.677 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  42.925
     TOTAL RAINFALL   (mm)=  71.038
     RUNOFF COEFFICIENT   =   0.604

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):     8.68   0.677     1.50    42.92
      + ID2= 2 (  0004):     5.27   0.456     1.33    42.88
        ====================================================
        ID = 3 (  0012):    13.95   1.116     1.50    42.91

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=  14.87   Curve Number   (CN)= 86.6
|ID= 1 DT=10.0 min |   Ia      (mm)=   8.19   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.33

     Unit Hyd Qpeak  (cms)=   1.721

     PEAK FLOW       (cms)=   1.248 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  38.512
     TOTAL RAINFALL   (mm)=  71.038
     RUNOFF COEFFICIENT   =   0.542

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0005)|   Area    (ha)=   8.29   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   0.609
```

```
     PEAK FLOW       (cms)=   0.594 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  42.943
     TOTAL RAINFALL   (mm)=  71.038
     RUNOFF COEFFICIENT   =   0.605

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    14.87   1.248     1.33    38.51
      + ID2= 2 (  0005):     8.29   0.594     1.50    42.94
        ====================================================
        ID = 3 (  0014):    23.16   1.783     1.33    40.10

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   6.55   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.43

     Unit Hyd Qpeak  (cms)=   0.582

     PEAK FLOW       (cms)=   0.528 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  42.910
     TOTAL RAINFALL   (mm)=  71.038
     RUNOFF COEFFICIENT   =   0.604

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0013)|   Area    (ha)=   0.98
|ID= 1 DT=10.0 min |   Total Imp(%)=  15.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15         0.83
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      80.83        30.00
     Mannings n           =      0.013        0.250
```

```
     Max.Eff.Inten.(mm/hr)=     146.50        96.22
               over (min)        10.00        10.00
     Storage Coeff.  (min)=       1.93 (ii)    7.96 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.16           0.169 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00            1.00
     RUNOFF VOLUME    (mm)=      70.04        41.14           41.43
     TOTAL RAINFALL   (mm)=      71.04        71.04           71.04
     RUNOFF COEFFICIENT   =       0.99         0.58            0.58

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0015)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0013):     0.98   0.169     1.00    41.43
      + ID2= 2 (  0003):     6.55   0.528     1.50    42.91
        ====================================================
        ID = 3 (  0015):     7.53   0.593     1.33    42.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
==================================================================================
=========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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```

```
                   *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\36560
df7-137d-4949-a29b-111357e8544f\scenar
  Summary filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\36560
df7-137d-4949-a29b-111357e8544f\scenar


DATE: 03/01/2024                           TIME: 10:35:32

USER:



COMMENTS: ____________________________________________________________


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  ***********************************************
  ** SIMULATION : 5yr 3hr 10min Chicago         **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 583.017
| Ptotal= 44.87 mm |                          B=   3.007
--------------------                          C=   0.703
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    5.42 |  0.83   96.03 |  1.67    8.64 |  2.50    5.22
                 0.17    6.44 |  1.00   29.33 |  1.83    7.56 |  2.67    4.87
                 0.33    8.09 |  1.17   17.13 |  2.00    6.76 |  2.83    4.58
                 0.50   11.39 |  1.33   12.62 |  2.17    6.13 |
                 0.67   23.22 |  1.50   10.19 |  2.33    5.63 |
```

```
------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0002)|   Area    (ha)=  13.11   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   1.284

     PEAK FLOW       (cms)=   0.521 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  20.664
     TOTAL RAINFALL   (mm)=  44.873
     RUNOFF COEFFICIENT   =   0.461

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0011)|   Area    (ha)=   0.31
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.17         0.14
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      45.46        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      96.03       132.14
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       1.31 (ii)    5.48 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.14
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.04           0.045 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00            1.00
     RUNOFF VOLUME    (mm)=      43.87        28.10           28.23
     TOTAL RAINFALL   (mm)=      44.87        44.87           44.87
     RUNOFF COEFFICIENT   =       0.98         0.63            0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
```

```
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0011):      0.31   0.045     1.00    28.23
      + ID2= 2 (  0002):     13.11   0.521     1.50    20.66
        ====================================================
        ID = 3 (  0007):     13.42   0.535     1.33    20.84

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   5.27   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   0.516

     PEAK FLOW       (cms)=   0.209 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  20.664
     TOTAL RAINFALL   (mm)=  44.873
     RUNOFF COEFFICIENT   =   0.461

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0010)|   Area    (ha)=   8.68   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.46

     Unit Hyd Qpeak  (cms)=   0.721

     PEAK FLOW       (cms)=   0.317 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  20.685
     TOTAL RAINFALL   (mm)=  44.873
     RUNOFF COEFFICIENT   =   0.461

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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```

```
--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):     8.68   0.317     1.50    20.68
      + ID2= 2 (  0004):     5.27   0.209     1.50    20.66
        ====================================================
        ID = 3 (  0012):    13.95   0.527     1.50    20.68

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=  14.87   Curve Number   (CN)= 86.6
|ID= 1 DT=10.0 min |   Ia      (mm)=   8.19   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.33

     Unit Hyd Qpeak  (cms)=   1.721

     PEAK FLOW       (cms)=   0.545 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  17.638
     TOTAL RAINFALL   (mm)=  44.873
     RUNOFF COEFFICIENT   =   0.393

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0005)|   Area    (ha)=   8.29   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   0.609

     PEAK FLOW       (cms)=   0.280 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=  20.693
     TOTAL RAINFALL   (mm)=  44.873
     RUNOFF COEFFICIENT   =   0.461

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
```

```
         ID1= 1 (  0001):    14.87   0.545     1.33    17.64
       + ID2= 2 (  0005):     8.29   0.280     1.67    20.69
         ====================================================
         ID = 3 (  0014):    23.16   0.787     1.50    18.73

      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0003)|   Area    (ha)=   6.55   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.43

      Unit Hyd Qpeak  (cms)=   0.582

      PEAK FLOW       (cms)=   0.249 (i)
      TIME TO PEAK    (hrs)=   1.500
      RUNOFF VOLUME    (mm)=  20.678
      TOTAL RAINFALL   (mm)=  44.873
      RUNOFF COEFFICIENT   =   0.461

      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0013)|   Area    (ha)=   0.98
|ID= 1 DT=10.0 min |   Total Imp(%)=  15.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=       0.15         0.83
      Dep. Storage     (mm)=       1.00         5.00
      Average Slope     (%)=       1.00         2.00
      Length            (m)=      80.83        30.00
      Mannings n           =      0.013        0.250

      Max.Eff.Inten.(mm/hr)=      96.03        45.04
                 over (min)      10.00        20.00
      Storage Coeff.  (min)=       2.29 (ii)   10.46 (ii)
      Unit Hyd. Tpeak (min)=      10.00        20.00
      Unit Hyd. peak  (cms)=       0.17         0.08
                                                           *TOTALS*
      PEAK FLOW       (cms)=       0.00         0.06         0.062 (iii)
      TIME TO PEAK    (hrs)=       1.00         1.17          1.17
      RUNOFF VOLUME    (mm)=      43.87        20.05         20.28
      TOTAL RAINFALL   (mm)=      44.87        44.87         44.87
      RUNOFF COEFFICIENT   =       0.98         0.45          0.45

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
```

```
              YOU SHOULD CONSIDER SPLITTING THE AREA.

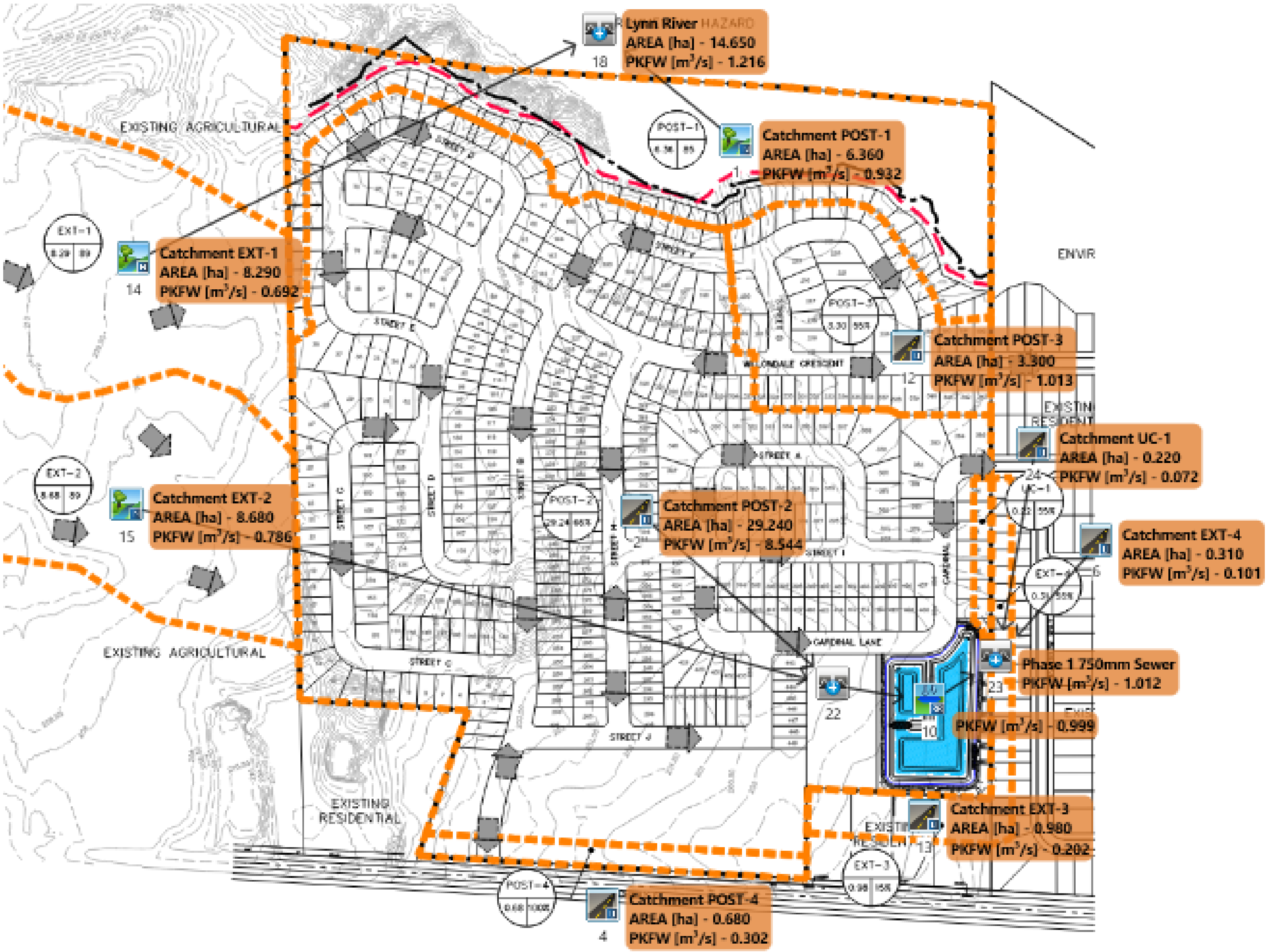
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0015)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0013):     0.98   0.062     1.17    20.28
      + ID2= 2 (  0003):     6.55   0.249     1.50    20.68
        =====================================================
        ID = 3 (  0015):     7.53   0.286     1.33    20.63

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
```

Post-Development Controlled Schematic



```
=========================================================================================================
=========================

      V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
```
Developed and Distributed by Smart City Water Inc


```
                   *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\bbbbd
5d6-349f-4b66-bc0c-18cdb73ba20f\scenar
  Summary filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\bbbbd
5d6-349f-4b66-bc0c-18cdb73ba20f\scenar


DATE: 03/07/2024                           TIME: 09:50:33

USER:


COMMENTS: ____________________________________________________________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-------------------------
  ***********************************************
  ** SIMULATION : 100yr 3hr 10min Chicago       **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 801.041
| Ptotal= 78.77 mm |                          B=   1.501
--------------------                          C=   0.657
```

```
                    used in:   INTENSITY =  A / (t + B)^C

                    Duration of storm  =  3.00 hrs
                    Storm time step    = 10.00 min
                    Time to peak ratio =  0.33

                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00   10.59 |  0.83  160.97 |  1.67   16.17 |  2.50   10.24
                 0.17   12.39 |  1.00   47.72 |  1.83   14.33 |  2.67    9.61
                 0.33   15.24 |  1.17   29.71 |  2.00   12.95 |  2.83    9.08
                 0.50   20.69 |  1.33   22.67 |  2.17   11.86 |
                 0.67   38.70 |  1.50   18.74 |  2.33   10.97 |


-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0004)|   Area    (ha)=   0.68
|ID= 1 DT=10.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.67         0.01
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      67.33        20.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     160.97        87.93
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       1.67 (ii)    6.57 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.13
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.30         0.00           0.302 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00            1.00
     RUNOFF VOLUME    (mm)=      77.27        44.55           76.94
     TOTAL RAINFALL   (mm)=      78.77        78.77           78.77
     RUNOFF COEFFICIENT   =       0.98         0.57            0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
```

```
| CALIB              |
| STANDHYD (  0012)|   Area    (ha)=   3.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  27.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.82          1.48
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     148.32         20.00
     Mannings n          =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     160.97        183.81
                over (min)      10.00         10.00
     Storage Coeff.  (min)=       2.68 (ii)     6.33 (ii)
     Unit Hyd. Tpeak (min)=      10.00         10.00
     Unit Hyd. peak  (cms)=       0.17          0.13
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.39          0.62            1.013 (iii)
     TIME TO PEAK    (hrs)=       1.00          1.00             1.00
     RUNOFF VOLUME    (mm)=      77.27         54.30            60.50
     TOTAL RAINFALL   (mm)=      78.77         78.77            78.77
     RUNOFF COEFFICIENT   =       0.98          0.69             0.77

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0013)|   Area    (ha)=   0.98
|ID= 1 DT=10.0 min |   Total Imp(%)=  15.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15          0.83
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      80.83         30.00
     Mannings n          =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     160.97        112.24
                over (min)      10.00         10.00
     Storage Coeff.  (min)=       1.86 (ii)     7.53 (ii)
     Unit Hyd. Tpeak (min)=      10.00         10.00
     Unit Hyd. peak  (cms)=       0.17          0.12
                                                              *TOTALS*
```

```
     PEAK FLOW       (cms)=       0.00         0.20          0.202 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      77.77        47.81          48.11
     TOTAL RAINFALL   (mm)=      78.77        78.77          78.77
     RUNOFF COEFFICIENT   =       0.99         0.61           0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0001)|   Area    (ha)=   6.36   Curve Number   (CN)= 85.2
|ID= 1 DT=10.0 min |   Ia      (mm)=   8.01   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

     Unit Hyd Qpeak  (cms)=   1.619

     PEAK FLOW       (cms)=   0.932 (i)
     TIME TO PEAK    (hrs)=   1.000
     RUNOFF VOLUME    (mm)=  40.523
     TOTAL RAINFALL   (mm)=  78.773
     RUNOFF COEFFICIENT   =   0.514

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0014)|   Area    (ha)=   8.29   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   0.609

     PEAK FLOW       (cms)=   0.692 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  49.898
     TOTAL RAINFALL   (mm)=  78.773
     RUNOFF COEFFICIENT   =   0.633

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0018)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     6.36   0.932     1.00    40.52
      + ID2= 2 (  0014):     8.29   0.692     1.50    49.90
        ====================================================
        ID = 3 (  0018):    14.65   1.216     1.17    45.83

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0015)|   Area    (ha)=   8.68   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.46

     Unit Hyd Qpeak  (cms)=   0.721

     PEAK FLOW       (cms)=   0.786 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  49.877
     TOTAL RAINFALL   (mm)=  78.773
     RUNOFF COEFFICIENT   =   0.633

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=  29.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  66.00   Dir. Conn.(%)=  38.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      19.30         9.94
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     441.51        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     160.97       216.42
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       5.15 (ii)    9.51 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.15         0.11
                                                                *TOTALS*
     PEAK FLOW       (cms)=       4.42         4.13           8.544 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00            1.00
```

```
     RUNOFF VOLUME    (mm)=      77.27        56.36          64.31
     TOTAL RAINFALL   (mm)=      78.77        78.77          78.77
     RUNOFF COEFFICIENT   =       0.98         0.72           0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0022)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0015):      8.68   0.786     1.50    49.88
      + ID2= 2 (  0002):     29.24   8.544     1.00    64.31
        ===================================================
        ID = 3 (  0022):     37.92   8.829     1.00    61.00

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1600      0.6340
                          0.0000     0.0320   |   0.2160      0.7220
                          0.0220     0.0970   |   0.2820      0.8130
                          0.0490     0.1660   |   0.3580      0.9060
                          0.0660     0.2370   |   0.4400      1.0020
                          0.0790     0.3110   |   0.5300      1.1010
                          0.0910     0.3880   |   0.6260      1.2020
                          0.1010     0.4670   |   0.7280      1.3070
                          0.1060     0.5080   |   0.8360      1.4140
                          0.1060     0.5080   |   1.0080      1.6500

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0022)     37.920      8.829      1.00      61.00
   OUTFLOW: ID= 1 (  0010)     37.920      0.999      2.92      60.14

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.31
                    TIME SHIFT OF PEAK FLOW        (min)=115.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  1.6372
```

```
-------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0006)|   Area    (ha)=   0.31
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.17         0.14
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      45.46        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     160.97       278.37
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       1.07 (ii)    4.16 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.15
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.10          0.101 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      77.77        59.42          59.59
     TOTAL RAINFALL   (mm)=      78.77        78.77          78.77
     RUNOFF COEFFICIENT   =       0.99         0.75           0.76

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0024)|   Area    (ha)=   0.22
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.12         0.10
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      38.30        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     160.97       278.37
                over (min)      10.00        10.00
```

```
     Storage Coeff.  (min)=       0.96 (ii)    4.06 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.16
                                                               *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.07             0.072 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00              1.00
     RUNOFF VOLUME    (mm)=      77.77        59.42             59.59
     TOTAL RAINFALL   (mm)=      78.77        78.77             78.77
     RUNOFF COEFFICIENT   =       0.99         0.75              0.76

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0023)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    37.92   0.999     2.92    60.14
      + ID2= 2 (  0024):     0.22   0.072     1.00    59.59
        ====================================================
        ID = 3 (  0023):    38.14   1.004     2.92    60.14

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0023)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0023):    38.14   1.004     2.92    60.14
      + ID2= 2 (  0006):     0.31   0.101     1.00    59.59
        ====================================================
        ID = 1 (  0023):    38.45   1.012     2.92    60.13

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
==================================================================================
=========================

       V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
```

```
        V   V    I     SS    U   U  AAAAA  L
        V   V    I      SS   U   U  A   A  L
         VV      I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```

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***** D E T A I L E D   O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\fea235da-aa10-496f-b465-9569c9ac37e8\scenar

Summary filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\fea235da-aa10-496f-b465-9569c9ac37e8\scenar

DATE: 03/07/2024   TIME: 09:50:33

USER:

COMMENTS: ____

```
------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 10yr 3hr 10min Chicago        **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 670.324
| Ptotal= 52.95 mm |                          B=   3.007
--------------------                          C=   0.698
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33
```

```
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    6.49 |  0.83  111.84 |  1.67   10.30 |  2.50    6.25
                 0.17    7.70 |  1.00   34.58 |  1.83    9.03 |  2.67    5.84
                 0.33    9.66 |  1.17   20.31 |  2.00    8.07 |  2.83    5.49
                 0.50   13.55 |  1.33   15.00 |  2.17    7.33 |
                 0.67   27.43 |  1.50   12.13 |  2.33    6.74 |


------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0004)|   Area    (ha)=   0.68
|ID= 1 DT=10.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.67         0.01
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      67.33        20.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     111.84        45.50
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       1.93 (ii)    8.31 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.21         0.00           0.209 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00            1.00
     RUNOFF VOLUME    (mm)=      51.45        23.87           51.17
     TOTAL RAINFALL   (mm)=      52.95        52.95           52.95
     RUNOFF COEFFICIENT   =       0.97         0.45            0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0012)|   Area    (ha)=   3.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  27.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area     (ha)=       1.82         1.48
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     148.32        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     111.84       104.93
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       3.09 (ii)    7.66 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.12
                                                               *TOTALS*
     PEAK FLOW       (cms)=       0.27         0.33           0.595 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00            1.00
     RUNOFF VOLUME    (mm)=      51.45        31.21           36.67
     TOTAL RAINFALL   (mm)=      52.95        52.95           52.95
     RUNOFF COEFFICIENT   =       0.97         0.59            0.69

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0013)|   Area    (ha)=   0.98
|ID= 1 DT=10.0 min |   Total Imp(%)=  15.00   Dir. Conn.(%)=   1.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15         0.83
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      80.83        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     111.84        60.12
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       2.15 (ii)    9.43 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.11
                                                               *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.09           0.097 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00            1.00
     RUNOFF VOLUME    (mm)=      51.95        26.25           26.50
     TOTAL RAINFALL   (mm)=      52.95        52.95           52.95
     RUNOFF COEFFICIENT   =       0.98         0.50            0.50
```

```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0001)|   Area    (ha)=   6.36   Curve Number   (CN)= 85.2
|ID= 1 DT=10.0 min |   Ia      (mm)=   8.01   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

     Unit Hyd Qpeak  (cms)=   1.619

     PEAK FLOW       (cms)=   0.436 (i)
     TIME TO PEAK    (hrs)=   1.000
     RUNOFF VOLUME    (mm)=  21.085
     TOTAL RAINFALL   (mm)=  52.953
     RUNOFF COEFFICIENT   =   0.398

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0014)|   Area    (ha)=   8.29   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   0.609

     PEAK FLOW       (cms)=   0.373 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=  27.283
     TOTAL RAINFALL   (mm)=  52.953
     RUNOFF COEFFICIENT   =   0.515

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0018)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```

```
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):      6.36   0.436     1.00    21.09
      + ID2= 2 (  0014):      8.29   0.373     1.67    27.28
        ====================================================
        ID = 3 (  0018):     14.65   0.629     1.17    24.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0015)|   Area    (ha)=   8.68   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.46

     Unit Hyd Qpeak  (cms)=   0.721

     PEAK FLOW       (cms)=   0.427 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  27.272
     TOTAL RAINFALL   (mm)=  52.953
     RUNOFF COEFFICIENT   =   0.515

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0002)|   Area    (ha)=  29.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  66.00   Dir. Conn.(%)=  38.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      19.30          9.94
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     441.51         30.00
     Mannings n           =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     111.84        125.98
                over (min)      10.00         20.00
     Storage Coeff.  (min)=       5.95 (ii)   11.37 (ii)
     Unit Hyd. Tpeak (min)=      10.00         20.00
     Unit Hyd. peak  (cms)=       0.14          0.08
                                                            *TOTALS*
     PEAK FLOW       (cms)=       2.95          1.97          3.960 (iii)
     TIME TO PEAK    (hrs)=       1.00          1.17           1.00
     RUNOFF VOLUME    (mm)=      51.45         32.85          39.92
     TOTAL RAINFALL   (mm)=      52.95         52.95          52.95
     RUNOFF COEFFICIENT   =       0.97          0.62           0.75

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
```

```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0022)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0015):     8.68   0.427     1.50    27.27
      + ID2= 2 (  0002):    29.24   3.960     1.00    39.92
        ====================================================
        ID = 3 (  0022):    37.92   4.090     1.00    37.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1600      0.6340
                          0.0000     0.0320   |   0.2160      0.7220
                          0.0220     0.0970   |   0.2820      0.8130
                          0.0490     0.1660   |   0.3580      0.9060
                          0.0660     0.2370   |   0.4400      1.0020
                          0.0790     0.3110   |   0.5300      1.1010
                          0.0910     0.3880   |   0.6260      1.2020
                          0.1010     0.4670   |   0.7280      1.3070
                          0.1060     0.5080   |   0.8360      1.4140
                          0.1060     0.5080   |   1.0080      1.6500

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0022)     37.920      4.090      1.00      37.03
   OUTFLOW: ID= 1 (  0010)     37.920      0.511      3.08      36.16

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.49
                  TIME SHIFT OF PEAK FLOW         (min)=125.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.0805

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   0.31
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=   1.00
```

```
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.17         0.14
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      45.46        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     111.84       166.74
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       1.24 (ii)    5.03 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.15
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.06       0.058 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00        1.00
     RUNOFF VOLUME    (mm)=      51.95        35.34       35.49
     TOTAL RAINFALL   (mm)=      52.95        52.95       52.95
     RUNOFF COEFFICIENT   =       0.98         0.67        0.67

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0024)|   Area    (ha)=   0.22
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.12         0.10
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      38.30        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     111.84       166.74
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       1.12 (ii)    4.91 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.15
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.04       0.041 (iii)
```

```
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      51.95        35.34          35.49
     TOTAL RAINFALL   (mm)=      52.95        52.95          52.95
     RUNOFF COEFFICIENT   =       0.98         0.67           0.67

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0023)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    37.92   0.511     3.08    36.16
      + ID2= 2 (  0024):     0.22   0.041     1.00    35.49
        ====================================================
        ID = 3 (  0023):    38.14   0.513     3.00    36.16

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0023)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0023):    38.14   0.513     3.00    36.16
      + ID2= 2 (  0006):     0.31   0.058     1.00    35.49
        ====================================================
        ID = 1 (  0023):    38.45   0.518     3.00    36.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
==================================================================================
=========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M  OOO    TM
```

```
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
```

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***** D E T A I L E D   O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\593bc1e8-d7f0-4baa-a41d-b502256204da\scenar
Summary filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\593bc1e8-d7f0-4baa-a41d-b502256204da\scenar

DATE: 03/07/2024   TIME: 09:50:34

USER:

COMMENTS: ____

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-----------------------------------------------------------------------------------------------------------------
  **********************************************
  ** SIMULATION : 25mm 3hr 10min Chicago      **
  **********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 529.711
| Ptotal= 32.56 mm |                          B=   4.501
--------------------                          C=   0.745
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    3.53 |  0.83   72.24 |  1.67    5.90 |  2.50    3.39
                 0.17    4.26 |  1.00   22.78 |  1.83    5.09 |  2.67    3.14
```

```
                0.33    5.49 |  1.17   12.62 |  2.00    4.50 |  2.83    2.94
                0.50    8.02 |  1.33    8.98 |  2.17    4.04 |
                0.67   17.69 |  1.50    7.08 |  2.33    3.68 |


-------------------------------------------------------------------------------
--------------------
| MODIFY STORM      |    MODIFYING PARAMETERS
--------------------    Time shift  (min)    =  0.00

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.167    2.71 | 1.000   55.47 | 1.833    4.53 |  2.67    2.60
               0.333    3.27 | 1.167   17.49 | 2.000    3.91 |  2.83    2.41
               0.500    4.21 | 1.333    9.69 | 2.167    3.45 |  3.00    2.26
               0.667    6.16 | 1.500    6.89 | 2.333    3.10 |
               0.833   13.58 | 1.667    5.43 | 2.500    2.83 |

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0004)|   Area    (ha)=   0.68
|ID= 1 DT=10.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.67         0.01
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      67.33        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      55.47         7.32
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       2.55 (ii)   15.80 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.17         0.06
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.10         0.00          0.102 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.33           1.00
     RUNOFF VOLUME    (mm)=      23.50         5.85          23.32
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.94         0.23           0.93

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

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--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0012)|   Area    (ha)=   3.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  27.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.82         1.48
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     148.32        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      55.47        28.43
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       4.10 (ii)   11.80 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.16         0.08
                                                                *TOTALS*
     PEAK FLOW       (cms)=       0.13         0.07           0.156 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17            1.00
     RUNOFF VOLUME    (mm)=      23.50         9.28           13.12
     TOTAL RAINFALL   (mm)=      25.00        25.00           25.00
     RUNOFF COEFFICIENT   =       0.94         0.37            0.52

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0013)|   Area    (ha)=   0.98
|ID= 1 DT=10.0 min |   Total Imp(%)=  15.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15         0.83
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      80.83        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      55.47        10.58
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       2.85 (ii)   17.43 (ii)
```

```
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.16         0.06
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.01        0.015 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.33         1.33
     RUNOFF VOLUME    (mm)=      24.00         6.89         7.05
     TOTAL RAINFALL   (mm)=      25.00        25.00        25.00
     RUNOFF COEFFICIENT   =       0.96         0.28         0.28

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0001)|   Area    (ha)=   6.36   Curve Number   (CN)= 85.2
|ID= 1 DT=10.0 min |   Ia      (mm)=   8.01   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

     Unit Hyd Qpeak  (cms)=   1.619

     PEAK FLOW       (cms)=   0.071 (i)
     TIME TO PEAK    (hrs)=   1.167
     RUNOFF VOLUME    (mm)=   4.392
     TOTAL RAINFALL   (mm)=  25.000
     RUNOFF COEFFICIENT   =   0.176

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0014)|   Area    (ha)=   8.29   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   0.609

     PEAK FLOW       (cms)=   0.083 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=   6.555
     TOTAL RAINFALL   (mm)=  25.000
     RUNOFF COEFFICIENT   =   0.262
```

```
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0018)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     6.36   0.071     1.17     4.39
      + ID2= 2 (  0014):     8.29   0.083     1.67     6.56
        ====================================================
        ID = 3 (  0018):    14.65   0.125     1.50     5.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0015)|   Area    (ha)=   8.68   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.46

     Unit Hyd Qpeak  (cms)=   0.721

     PEAK FLOW       (cms)=   0.093 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=   6.552
     TOTAL RAINFALL   (mm)=  25.000
     RUNOFF COEFFICIENT   =   0.262

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=  29.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  66.00   Dir. Conn.(%)=  38.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      19.30         9.94
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     441.51        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      55.47        36.08
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       7.88 (ii)   16.81 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.12         0.06
```

```
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.33         0.46          1.529 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17           1.00
     RUNOFF VOLUME    (mm)=      23.50        10.15          15.23
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.94         0.41           0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0022)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0015):     8.68   0.093     1.67     6.55
      + ID2= 2 (  0002):    29.24   1.529     1.00    15.23
        ==================================================
        ID = 3 (  0022):    37.92   1.547     1.00    13.24

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1600      0.6340
                          0.0000     0.0320   |   0.2160      0.7220
                          0.0220     0.0970   |   0.2820      0.8130
                          0.0490     0.1660   |   0.3580      0.9060
                          0.0660     0.2370   |   0.4400      1.0020
                          0.0790     0.3110   |   0.5300      1.1010
                          0.0910     0.3880   |   0.6260      1.2020
                          0.1010     0.4670   |   0.7280      1.3070
                          0.1060     0.5080   |   0.8360      1.4140
                          0.1060     0.5080   |   1.0080      1.6500

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0022)     37.920      1.547      1.00       13.24
   OUTFLOW: ID= 1 (  0010)     37.920      0.096      3.25       12.38

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.19
```

```
                    TIME SHIFT OF PEAK FLOW         (min)=135.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.4256

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0006)|   Area    (ha)=   0.31
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=   1.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.17         0.14
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      45.46        20.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      55.47        51.68
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       1.64 (ii)    7.70 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.01          0.015 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      24.00        11.55          11.67
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.96         0.46           0.47

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0024)|   Area    (ha)=   0.22
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=   1.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.12         0.10
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      38.30        20.00
     Mannings n          =      0.013        0.250
```

```
     Max.Eff.Inten.(mm/hr)=      55.47        51.68
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       1.48 (ii)    7.54 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                               *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.01              0.011 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00               1.00
     RUNOFF VOLUME    (mm)=      24.00        11.55              11.65
     TOTAL RAINFALL   (mm)=      25.00        25.00              25.00
     RUNOFF COEFFICIENT   =       0.96         0.46               0.47

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0023)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    37.92   0.096     3.25    12.38
      + ID2= 2 (  0024):     0.22   0.011     1.00    11.65
        ==================================================
        ID = 3 (  0023):    38.14   0.096     3.00    12.37

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0023)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0023):    38.14   0.096     3.00    12.37
      + ID2= 2 (  0006):     0.31   0.015     1.00    11.67
        ==================================================
        ID = 1 (  0023):    38.45   0.098     3.00    12.37

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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 FINISH
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\66994
0e1-74b1-4c92-8cb9-9fa465eb1de6\scenar
  Summary filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\66994
0e1-74b1-4c92-8cb9-9fa465eb1de6\scenar


DATE: 03/07/2024                           TIME: 09:50:33

USER:


COMMENTS: ____________________________________________________________


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  ************************************************
  ** SIMULATION : 25yr 3hr 10min Chicago       **
  ************************************************

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```
| CHICAGO STORM    |     IDF curve parameters: A= 721.533
| Ptotal= 63.11 mm |                           B=   2.253
--------------------                           C=   0.679
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    8.07 |  0.83  131.63 |  1.67   12.58 |  2.50    7.79
                 0.17    9.51 |  1.00   39.74 |  1.83   11.08 |  2.67    7.30
                 0.33   11.82 |  1.17   23.97 |  2.00    9.96 |  2.83    6.87
                 0.50   16.33 |  1.33   17.98 |  2.17    9.08 |
                 0.67   31.84 |  1.50   14.70 |  2.33    8.38 |


-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0004)|   Area    (ha)=   0.68
|ID= 1 DT=10.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.67         0.01
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      67.33        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     131.63        61.70
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       1.81 (ii)    7.45 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.13
                                                               *TOTALS*
     PEAK FLOW       (cms)=       0.25         0.00              0.246 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00               1.00
     RUNOFF VOLUME    (mm)=      61.61        31.71              61.30
     TOTAL RAINFALL   (mm)=      63.11        63.11              63.11
     RUNOFF COEFFICIENT   =       0.98         0.50               0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0012)|   Area    (ha)=   3.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  27.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.82         1.48
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     148.32        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     131.63       135.82
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       2.90 (ii)    7.02 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.13
                                                                *TOTALS*
     PEAK FLOW       (cms)=       0.32         0.44           0.758 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00            1.00
     RUNOFF VOLUME    (mm)=      61.61        40.10           45.90
     TOTAL RAINFALL   (mm)=      63.11        63.11           63.11
     RUNOFF COEFFICIENT   =       0.98         0.64            0.73

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0013)|   Area    (ha)=   0.98
|ID= 1 DT=10.0 min |   Total Imp(%)=  15.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15         0.83
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      80.83        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     131.63        80.20
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       2.01 (ii)    8.50 (ii)
```

```
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                               *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.13           0.136 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00            1.00
     RUNOFF VOLUME    (mm)=      62.11        34.47           34.74
     TOTAL RAINFALL   (mm)=      63.11        63.11           63.11
     RUNOFF COEFFICIENT   =       0.98         0.55            0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=   6.36   Curve Number   (CN)= 85.2
|ID= 1 DT=10.0 min |   Ia      (mm)=   8.01   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

     Unit Hyd Qpeak  (cms)=   1.619

     PEAK FLOW       (cms)=   0.623 (i)
     TIME TO PEAK    (hrs)=   1.000
     RUNOFF VOLUME    (mm)=  28.445
     TOTAL RAINFALL   (mm)=  63.105
     RUNOFF COEFFICIENT   =   0.451

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0014)|   Area    (ha)=   8.29   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   0.609

     PEAK FLOW       (cms)=   0.495 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  35.951
     TOTAL RAINFALL   (mm)=  63.105
     RUNOFF COEFFICIENT   =   0.570
```

```
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0018)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     6.36   0.623     1.00    28.44
      + ID2= 2 (  0014):     8.29   0.495     1.50    35.95
        ====================================================
        ID = 3 (  0018):    14.65   0.853     1.17    32.69

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0015)|   Area    (ha)=   8.68   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.46

     Unit Hyd Qpeak  (cms)=   0.721

     PEAK FLOW       (cms)=   0.565 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  35.936
     TOTAL RAINFALL   (mm)=  63.105
     RUNOFF COEFFICIENT   =   0.569

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=  29.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  66.00   Dir. Conn.(%)=  38.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      19.30         9.94
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     441.51        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     131.63       161.58
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       5.58 (ii)   10.48 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.08
```

```
                                                                    *TOTALS*
     PEAK FLOW       (cms)=       3.54         2.61          4.915 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17           1.00
     RUNOFF VOLUME    (mm)=      61.61        41.93          49.41
     TOTAL RAINFALL   (mm)=      63.11        63.11          63.11
     RUNOFF COEFFICIENT   =       0.98         0.66           0.78

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0022)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0015):     8.68   0.565     1.50    35.94
      + ID2= 2 (  0002):    29.24   4.915     1.00    49.41
        ====================================================
        ID = 3 (  0022):    37.92   5.101     1.00    46.32

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1600      0.6340
                          0.0000     0.0320   |   0.2160      0.7220
                          0.0220     0.0970   |   0.2820      0.8130
                          0.0490     0.1660   |   0.3580      0.9060
                          0.0660     0.2370   |   0.4400      1.0020
                          0.0790     0.3110   |   0.5300      1.1010
                          0.0910     0.3880   |   0.6260      1.2020
                          0.1010     0.4670   |   0.7280      1.3070
                          0.1060     0.5080   |   0.8360      1.4140
                          0.1060     0.5080   |   1.0080      1.6500

                                AREA     QPEAK      TPEAK       R.V.
                                (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0022)     37.920      5.101      1.00       46.32
   OUTFLOW: ID= 1 (  0010)     37.920      0.716      3.00       45.46

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.03
```

```
                   TIME SHIFT OF PEAK FLOW         (min)=120.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.2949

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0006)|   Area    (ha)=   0.31
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.17          0.14
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=      45.46         20.00
     Mannings n           =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     131.63        210.99
                over (min)      10.00         10.00
     Storage Coeff.  (min)=       1.16 (ii)     4.61 (ii)
     Unit Hyd. Tpeak (min)=      10.00         10.00
     Unit Hyd. peak  (cms)=       0.17          0.15
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.00          0.07            0.075 (iii)
     TIME TO PEAK    (hrs)=       1.00          1.00             1.00
     RUNOFF VOLUME    (mm)=      62.11         44.68            44.84
     TOTAL RAINFALL   (mm)=      63.11         63.11            63.11
     RUNOFF COEFFICIENT   =       0.98          0.71             0.71

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0024)|   Area    (ha)=   0.22
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.12          0.10
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=      38.30         20.00
     Mannings n           =      0.013         0.250
```

```
     Max.Eff.Inten.(mm/hr)=     131.63       210.99
                over (min)      10.00        10.00
     Storage Coeff.  (min)=      1.05 (ii)    4.50 (ii)
     Unit Hyd. Tpeak (min)=     10.00        10.00
     Unit Hyd. peak  (cms)=      0.17         0.15
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.00         0.05          0.053 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=     62.11        44.68          44.84
     TOTAL RAINFALL   (mm)=     63.11        63.11          63.11
     RUNOFF COEFFICIENT   =      0.98         0.71           0.71

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0023)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    37.92   0.716     3.00    45.46
      + ID2= 2 (  0024):     0.22   0.053     1.00    44.84
        ====================================================
        ID = 3 (  0023):    38.14   0.720     3.00    45.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0023)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0023):    38.14   0.720     3.00    45.46
      + ID2= 2 (  0006):     0.31   0.075     1.00    44.84
        ====================================================
        ID = 1 (  0023):    38.45   0.725     3.00    45.45

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
==================================================================================
=========================
```

```
       V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```

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```
                   *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\8ee5e
e02-50e7-44aa-b970-e7e853aaa9b4\scenar
  Summary filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\8ee5e
e02-50e7-44aa-b970-e7e853aaa9b4\scenar


DATE: 03/07/2024                           TIME: 09:50:33

USER:


COMMENTS: ____________________________________________________________


------------------------------------------------------------------------------------
-------------------------
  ***********************************************
  ** SIMULATION : 2yr 3hr 10min Chicago        **
  ***********************************************


--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 529.711
| Ptotal= 32.56 mm |                          B=   4.501
--------------------                          C=   0.745
                        used in:   INTENSITY =  A / (t + B)^C
```

```
                  Duration of storm  =  3.00 hrs
                  Storm time step    = 10.00 min
                  Time to peak ratio =  0.33

           TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
            hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
           0.00    3.53 |  0.83   72.24 |  1.67    5.90 |  2.50    3.39
           0.17    4.26 |  1.00   22.78 |  1.83    5.09 |  2.67    3.14
           0.33    5.49 |  1.17   12.62 |  2.00    4.50 |  2.83    2.94
           0.50    8.02 |  1.33    8.98 |  2.17    4.04 |
           0.67   17.69 |  1.50    7.08 |  2.33    3.68 |


-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0004)|   Area    (ha)=   0.68
|ID= 1 DT=10.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS   PERVIOUS (i)
     Surface Area     (ha)=       0.67         0.01
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      67.33        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      72.24        17.49
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       2.29 (ii)   11.65 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.17         0.08
                                                               *TOTALS*
     PEAK FLOW       (cms)=       0.13         0.00              0.134 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17              1.00
     RUNOFF VOLUME    (mm)=      31.06        10.00             30.84
     TOTAL RAINFALL   (mm)=      32.56        32.56             32.56
     RUNOFF COEFFICIENT   =       0.95         0.31              0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0012)|   Area    (ha)=   3.30
```

```
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  27.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.82         1.48
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     148.32        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      72.24        47.94
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       3.69 (ii)    9.93 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.11
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.17         0.13          0.298 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      31.06        14.65          19.08
     TOTAL RAINFALL   (mm)=      32.56        32.56          32.56
     RUNOFF COEFFICIENT   =       0.95         0.45           0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0013)|   Area    (ha)=   0.98
|ID= 1 DT=10.0 min |   Total Imp(%)=  15.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15         0.83
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      80.83        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      72.24        18.70
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       2.56 (ii)   14.17 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.17         0.07
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.03          0.030 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17           1.17
```

```
     RUNOFF VOLUME    (mm)=      31.56        11.45          11.64
     TOTAL RAINFALL   (mm)=      32.56        32.56          32.56
     RUNOFF COEFFICIENT   =       0.97         0.35           0.36

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0001)|   Area    (ha)=   6.36   Curve Number   (CN)= 85.2
|ID= 1 DT=10.0 min |   Ia      (mm)=   8.01   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

     Unit Hyd Qpeak  (cms)=   1.619

     PEAK FLOW       (cms)=   0.149 (i)
     TIME TO PEAK    (hrs)=   1.167
     RUNOFF VOLUME    (mm)=   8.160
     TOTAL RAINFALL   (mm)=  32.561
     RUNOFF COEFFICIENT   =   0.251

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0014)|   Area    (ha)=   8.29   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   0.609

     PEAK FLOW       (cms)=   0.154 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=  11.464
     TOTAL RAINFALL   (mm)=  32.561
     RUNOFF COEFFICIENT   =   0.352

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
```

```
--------------------
| ADD HYD  (  0018)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     6.36   0.149     1.17     8.16
      + ID2= 2 (  0014):     8.29   0.154     1.67    11.46
        ====================================================
        ID = 3 (  0018):    14.65   0.238     1.33    10.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0015)|   Area    (ha)=   8.68   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.46

     Unit Hyd Qpeak  (cms)=   0.721

     PEAK FLOW       (cms)=   0.173 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  11.459
     TOTAL RAINFALL   (mm)=  32.561
     RUNOFF COEFFICIENT   =   0.352

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=  29.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  66.00   Dir. Conn.(%)=  38.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      19.30         9.94
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     441.51        30.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      72.24        59.41
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       7.09 (ii)   14.41 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.13         0.07
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.80         0.83          2.182 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17           1.00
     RUNOFF VOLUME    (mm)=      31.06        15.78          21.59
     TOTAL RAINFALL   (mm)=      32.56        32.56          32.56
```

```
     RUNOFF COEFFICIENT   =       0.95         0.48           0.66

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0022)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0015):      8.68   0.173     1.50    11.46
      + ID2= 2 (  0002):     29.24   2.182     1.00    21.59
        ====================================================
        ID = 3 (  0022):     37.92   2.223     1.00    19.27

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1600      0.6340
                          0.0000     0.0320   |   0.2160      0.7220
                          0.0220     0.0970   |   0.2820      0.8130
                          0.0490     0.1660   |   0.3580      0.9060
                          0.0660     0.2370   |   0.4400      1.0020
                          0.0790     0.3110   |   0.5300      1.1010
                          0.0910     0.3880   |   0.6260      1.2020
                          0.1010     0.4670   |   0.7280      1.3070
                          0.1060     0.5080   |   0.8360      1.4140
                          0.1060     0.5080   |   1.0080      1.6500

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0022)     37.920      2.223      1.00      19.27
   OUTFLOW: ID= 1 (  0010)     37.920      0.155      3.25      18.40

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.95
                   TIME SHIFT OF PEAK FLOW         (min)=135.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.6216

-------------------------------------------------------------------------------
--------------------
```

```
| CALIB             |
| STANDHYD (  0006)|   Area    (ha)=   0.31
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.17         0.14
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      45.46        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      72.24        82.30
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       1.47 (ii)    6.51 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.13
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.03          0.026 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      31.56        17.55          17.66
     TOTAL RAINFALL   (mm)=      32.56        32.56          32.56
     RUNOFF COEFFICIENT   =       0.97         0.54           0.54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0024)|   Area    (ha)=   0.22
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.12         0.10
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      38.30        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      72.24        82.30
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       1.33 (ii)    6.36 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
```

```
     Unit Hyd. peak  (cms)=       0.17         0.13
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.02          0.019 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      31.56        17.55          17.67
     TOTAL RAINFALL   (mm)=      32.56        32.56          32.56
     RUNOFF COEFFICIENT   =       0.97         0.54           0.54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0023)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    37.92   0.155     3.25    18.40
      + ID2= 2 (  0024):     0.22   0.019     1.00    17.67
        ====================================================
        ID = 3 (  0023):    38.14   0.155     3.17    18.40

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0023)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0023):    38.14   0.155     3.17    18.40
      + ID2= 2 (  0006):     0.31   0.026     1.00    17.66
        ====================================================
        ID = 1 (  0023):    38.45   0.156     3.00    18.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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==================================================================================
=========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
```

```
         VV      I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```

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***** D E T A I L E D   O U T P U T *****

```
  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\02fde
d4c-5355-4e4c-8a2a-728e3185d601\scenar
  Summary filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\02fde
d4c-5355-4e4c-8a2a-728e3185d601\scenar


DATE: 03/07/2024                           TIME: 09:50:33

USER:



COMMENTS: ____________________________________________________________


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  ************************************************
  ** SIMULATION : 50yr 3hr 10min Chicago        **
  ************************************************


--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 766.038
| Ptotal= 71.04 mm |                          B=   1.898
--------------------                          C=   0.668
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
```

```
                   hrs    mm/hr |    hrs    mm/hr |'   hrs    mm/hr |    hrs    mm/hr
                  0.00     9.32 |  0.83  146.50 |  1.67   14.38 |  2.50    9.00
                  0.17    10.95 |  1.00   43.93 |  1.83   12.71 |  2.67    8.44
                  0.33    13.53 |  1.17   26.91 |  2.00   11.45 |  2.83    7.96
                  0.50    18.53 |  1.33   20.36 |  2.17   10.46 |
                  0.67    35.40 |  1.50   16.73 |  2.33    9.66 |


-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0004)|   Area    (ha)=   0.68
|ID= 1 DT=10.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.67          0.01
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      67.33         20.00
     Mannings n           =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     146.50         74.77
                over (min)      10.00         10.00
     Storage Coeff.  (min)=       1.73 (ii)     6.96 (ii)
     Unit Hyd. Tpeak (min)=      10.00         10.00
     Unit Hyd. peak  (cms)=       0.17          0.13
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.27          0.00          0.274 (iii)
     TIME TO PEAK    (hrs)=       1.00          1.00           1.00
     RUNOFF VOLUME    (mm)=      69.54         38.11          69.22
     TOTAL RAINFALL   (mm)=      71.04         71.04          71.04
     RUNOFF COEFFICIENT   =       0.98          0.54           0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0012)|   Area    (ha)=   3.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  27.00
--------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.82          1.48
     Dep. Storage     (mm)=       1.50          5.00
```

```
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     148.32        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     146.50       159.96
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       2.78 (ii)    6.64 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.13
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.36         0.53             0.886 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00              1.00
     RUNOFF VOLUME    (mm)=      69.54        47.23             53.25
     TOTAL RAINFALL   (mm)=      71.04        71.04             71.04
     RUNOFF COEFFICIENT   =       0.98         0.66              0.75

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0013)|   Area    (ha)=   0.98
|ID= 1 DT=10.0 min |   Total Imp(%)=  15.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15         0.83
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      80.83        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     146.50        96.22
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       1.93 (ii)    7.96 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.16             0.169 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00              1.00
     RUNOFF VOLUME    (mm)=      70.04        41.14             41.43
     TOTAL RAINFALL   (mm)=      71.04        71.04             71.04
     RUNOFF COEFFICIENT   =       0.99         0.58              0.58

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
```

```
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0001)|   Area    (ha)=   6.36   Curve Number   (CN)= 85.2
|ID= 1 DT=10.0 min |   Ia      (mm)=   8.01   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

     Unit Hyd Qpeak  (cms)=   1.619

     PEAK FLOW       (cms)=   0.776 (i)
     TIME TO PEAK    (hrs)=   1.000
     RUNOFF VOLUME    (mm)=  34.470
     TOTAL RAINFALL   (mm)=  71.038
     RUNOFF COEFFICIENT   =   0.485

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0014)|   Area    (ha)=   8.29   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   0.609

     PEAK FLOW       (cms)=   0.594 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  42.943
     TOTAL RAINFALL   (mm)=  71.038
     RUNOFF COEFFICIENT   =   0.605

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0018)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     6.36   0.776     1.00    34.47
```

```
    + ID2= 2 (  0014):     8.29   0.594     1.50    42.94
      ===================================================
      ID = 3 (  0018):    14.65   1.036     1.17    39.26

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0015)|   Area    (ha)=   8.68   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.46

     Unit Hyd Qpeak  (cms)=   0.721

     PEAK FLOW       (cms)=   0.677 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  42.925
     TOTAL RAINFALL   (mm)=  71.038
     RUNOFF COEFFICIENT   =   0.604

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0002)|   Area    (ha)=  29.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  66.00   Dir. Conn.(%)=  38.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      19.30          9.94
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     441.51         30.00
     Mannings n           =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     146.50        189.22
                over (min)      10.00         10.00
     Storage Coeff.  (min)=       5.35 (ii)     9.95 (ii)
     Unit Hyd. Tpeak (min)=      10.00         10.00
     Unit Hyd. peak  (cms)=       0.14          0.11
                                                            *TOTALS*
     PEAK FLOW       (cms)=       3.98          3.52          7.498 (iii)
     TIME TO PEAK    (hrs)=       1.00          1.00           1.00
     RUNOFF VOLUME    (mm)=      69.54         49.19          56.92
     TOTAL RAINFALL   (mm)=      71.04         71.04          71.04
     RUNOFF COEFFICIENT   =       0.98          0.69           0.80

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```

```
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0022)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0015):      8.68   0.677     1.50    42.92
      + ID2= 2 (  0002):     29.24   7.498     1.00    56.92
        ====================================================
        ID = 3 (  0022):     37.92   7.733     1.00    53.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1600      0.6340
                          0.0000     0.0320   |   0.2160      0.7220
                          0.0220     0.0970   |   0.2820      0.8130
                          0.0490     0.1660   |   0.3580      0.9060
                          0.0660     0.2370   |   0.4400      1.0020
                          0.0790     0.3110   |   0.5300      1.1010
                          0.0910     0.3880   |   0.6260      1.2020
                          0.1010     0.4670   |   0.7280      1.3070
                          0.1060     0.5080   |   0.8360      1.4140
                          0.1060     0.5080   |   1.0080      1.6500

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0022)     37.920      7.733      1.00      53.72
   OUTFLOW: ID= 1 (  0010)     37.920      0.871      2.92      52.85

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.26
                   TIME SHIFT OF PEAK FLOW        (min)=115.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.4616

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   0.31
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=   1.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area     (ha)=       0.17         0.14
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      45.46        20.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     146.50       245.05
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       1.11 (ii)    4.36 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.15
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.09             0.088 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00              1.00
     RUNOFF VOLUME    (mm)=      70.04        52.10             52.27
     TOTAL RAINFALL   (mm)=      71.04        71.04             71.04
     RUNOFF COEFFICIENT   =       0.99         0.73              0.74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0024)|   Area    (ha)=   0.22
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=   1.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.12         0.10
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      38.30        20.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     146.50       245.05
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       1.00 (ii)    4.25 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.15
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.06             0.063 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00              1.00
     RUNOFF VOLUME    (mm)=      70.04        52.10             52.27
```

```
     TOTAL RAINFALL   (mm)=      71.04        71.04          71.04
     RUNOFF COEFFICIENT   =       0.99         0.73           0.74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0023)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    37.92   0.871     2.92    52.85
      + ID2= 2 (  0024):     0.22   0.063     1.00    52.27
        ====================================================
        ID = 3 (  0023):    38.14   0.875     2.92    52.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0023)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0023):    38.14   0.875     2.92    52.85
      + ID2= 2 (  0006):     0.31   0.088     1.00    52.27
        ====================================================
        ID = 1 (  0023):    38.45   0.882     2.92    52.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
==================================================================================
=========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
```

```
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\34848
ef6-7882-465b-b8ed-cbac96b69b7d\scenar
  Summary filename:
C:\Users\bpond\AppData\Local\Civica\VH5\e55df1b5-4c1e-4752-aed1-aa1e9decd964\34848
ef6-7882-465b-b8ed-cbac96b69b7d\scenar


DATE: 03/07/2024                           TIME: 09:50:33

USER:


COMMENTS: ____________________________________________________________


-----------------------------------------------------------------------------------
-------------------------
  ************************************************
  ** SIMULATION : 5yr 3hr 10min Chicago         **
  ************************************************


--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 583.017
| Ptotal= 44.87 mm |                          B=   3.007
--------------------                          C=   0.703
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    5.42 |  0.83   96.03 |  1.67    8.64 |  2.50    5.22
                 0.17    6.44 |  1.00   29.33 |  1.83    7.56 |  2.67    4.87
                 0.33    8.09 |  1.17   17.13 |  2.00    6.76 |  2.83    4.58
                 0.50   11.39 |  1.33   12.62 |  2.17    6.13 |
```

```
                0.67   23.22 |  1.50   10.19 |  2.33    5.63 |


-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0004)|   Area    (ha)=   0.68
|ID= 1 DT=10.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.67         0.01
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      67.33        20.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      96.03        33.48
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       2.05 (ii)    9.26 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.11
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.18         0.00          0.179 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      43.37        18.01          43.11
     TOTAL RAINFALL   (mm)=      44.87        44.87          44.87
     RUNOFF COEFFICIENT   =       0.97         0.40           0.96

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0012)|   Area    (ha)=   3.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  27.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.82         1.48
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     148.32        20.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      96.03        81.19
```

```
              over (min)       10.00        10.00
     Storage Coeff.  (min)=       3.29 (ii)    8.35 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.12
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.23         0.24           0.470 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00            1.00
     RUNOFF VOLUME    (mm)=      43.37        24.39           29.51
     TOTAL RAINFALL   (mm)=      44.87        44.87           44.87
     RUNOFF COEFFICIENT   =       0.97         0.54            0.66

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0013)|   Area    (ha)=   0.98
|ID= 1 DT=10.0 min |   Total Imp(%)=  15.00   Dir. Conn.(%)=   1.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15         0.83
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      80.83        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      96.03        45.04
              over (min)       10.00        20.00
     Storage Coeff.  (min)=       2.29 (ii)   10.46 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.17         0.08
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.06           0.062 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17            1.17
     RUNOFF VOLUME    (mm)=      43.87        20.05           20.28
     TOTAL RAINFALL   (mm)=      44.87        44.87           44.87
     RUNOFF COEFFICIENT   =       0.98         0.45            0.45

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
```

```
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0001)|   Area    (ha)=   6.36   Curve Number   (CN)= 85.2
|ID= 1 DT=10.0 min |   Ia      (mm)=   8.01   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

     Unit Hyd Qpeak  (cms)=   1.619

     PEAK FLOW       (cms)=   0.300 (i)
     TIME TO PEAK    (hrs)=   1.000
     RUNOFF VOLUME    (mm)=  15.600
     TOTAL RAINFALL   (mm)=  44.873
     RUNOFF COEFFICIENT   =   0.348

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0014)|   Area    (ha)=   8.29   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   0.609

     PEAK FLOW       (cms)=   0.280 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=  20.693
     TOTAL RAINFALL   (mm)=  44.873
     RUNOFF COEFFICIENT   =   0.461

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0018)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     6.36   0.300     1.00    15.60
      + ID2= 2 (  0014):     8.29   0.280     1.67    20.69
        ====================================================
        ID = 3 (  0018):    14.65   0.454     1.17    18.48

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0015)|   Area    (ha)=   8.68   Curve Number   (CN)= 89.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.46

     Unit Hyd Qpeak  (cms)=   0.721

     PEAK FLOW       (cms)=   0.317 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  20.685
     TOTAL RAINFALL   (mm)=  44.873
     RUNOFF COEFFICIENT   =   0.461

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0002)|   Area    (ha)=  29.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  66.00   Dir. Conn.(%)=  38.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      19.30         9.94
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     441.51        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      96.03        98.44
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       6.33 (ii)   12.31 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.13         0.07
                                                         *TOTALS*
     PEAK FLOW       (cms)=       2.48         1.48         3.221 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17          1.00
     RUNOFF VOLUME    (mm)=      43.37        25.85         32.51
     TOTAL RAINFALL   (mm)=      44.87        44.87         44.87
     RUNOFF COEFFICIENT   =       0.97         0.58          0.72

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0022)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0015):     8.68   0.317     1.50    20.68
      + ID2= 2 (  0002):    29.24   3.221     1.00    32.51
        =================================================
        ID = 3 (  0022):    37.92   3.311     1.00    29.80

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1600      0.6340
                          0.0000     0.0320   |   0.2160      0.7220
                          0.0220     0.0970   |   0.2820      0.8130
                          0.0490     0.1660   |   0.3580      0.9060
                          0.0660     0.2370   |   0.4400      1.0020
                          0.0790     0.3110   |   0.5300      1.1010
                          0.0910     0.3880   |   0.6260      1.2020
                          0.1010     0.4670   |   0.7280      1.3070
                          0.1060     0.5080   |   0.8360      1.4140
                          0.1060     0.5080   |   1.0080      1.6500

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0022)     37.920      3.311      1.00      29.80
   OUTFLOW: ID= 1 (  0010)     37.920      0.357      3.08      28.94

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.79
                   TIME SHIFT OF PEAK FLOW        (min)=125.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.9057

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   0.31
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=   1.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.17         0.14
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      45.46        20.00
     Mannings n           =      0.013        0.250
```

```
     Max.Eff.Inten.(mm/hr)=      96.03       132.14
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       1.31 (ii)    5.48 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.14
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.04           0.045 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00            1.00
     RUNOFF VOLUME    (mm)=      43.87        28.10           28.23
     TOTAL RAINFALL   (mm)=      44.87        44.87           44.87
     RUNOFF COEFFICIENT   =       0.98         0.63            0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0024)|   Area    (ha)=   0.22
|ID= 1 DT=10.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.12         0.10
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      38.30        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      96.03       132.14
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       1.19 (ii)    5.35 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.14
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.03           0.032 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00            1.00
     RUNOFF VOLUME    (mm)=      43.87        28.10           28.23
     TOTAL RAINFALL   (mm)=      44.87        44.87           44.87
     RUNOFF COEFFICIENT   =       0.98         0.63            0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
```

```
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0023)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    37.92   0.357     3.08    28.94
      + ID2= 2 (  0024):     0.22   0.032     1.00    28.23
        ====================================================
        ID = 3 (  0023):    38.14   0.359     3.08    28.93

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0023)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0023):    38.14   0.359     3.08    28.93
      + ID2= 2 (  0006):     0.31   0.045     1.00    28.23
        ====================================================
        ID = 1 (  0023):    38.45   0.362     3.00    28.93

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
```

LIST OF FIGURES

Legend

= SUBJECT LANDS

Project

LYNN RIVER HEIGHTS PHASE II
NORFOLK COUNTY

Drawing

SITE LOCATION PLAN

CROZIER
CONSULTING ENGINEERS

Drawn By	M.H.C.	Design By	J.K./B.P.	Project	2604-6978
Scale	N.T.S.	Date	MAR/27/2024	Check By	R.D.M.
Drawing	FIG. 1				

Legal Description

LYNN RIVER HEIGHTS PHASE 2
PART OF LOT 8, CONCESSION 2, GEOGRAPHIC
TOWNSHIP OF WOODHOUSE
NOW IN NORFOLK COUNTY

Owner's Certificate

I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.

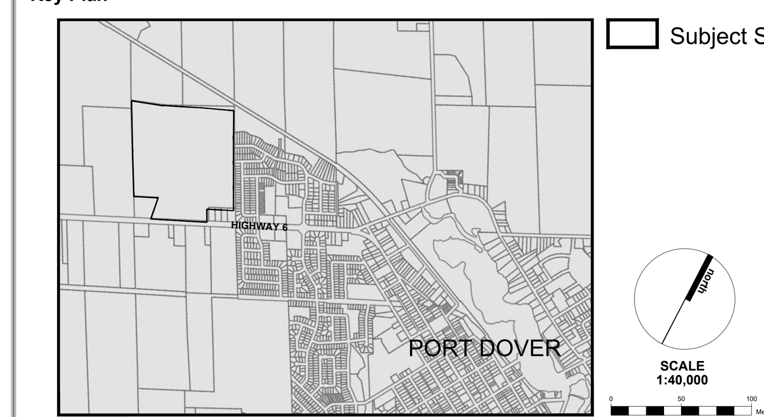
DATE: March 2024 — DEMOCRAT PORT DOVER LIMITED.

Surveyor's Certificate

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

DATE: JUNE 2017 — KIM S. HUSTED, - O.L.S.

Key Plan



Revision No.	Date	Issued / Revision	By

Additional Information Required Under Section 51(17) of the Planning Act R.S.O. 1990, c.P.13 as Amended

A. As Shown B. As Shown C. As Shown
D. Residential, Employment, Commercial, Park, Stormwater Management, Open Space
E. As Shown F. As Shown
G. As Shown H. Municipal Water Supply I. Loam
J. As Shown K. All Services As Required L. As Shown

Description	Lots/Blocks	Units	Area
9.0m Semi Detached	260-307, 434-441	56	1.69ha/4.18ac
10m Single Detached	227-259,308-319,423-433, 442-449	64	2.17ha/5.38ac
12m Single Detached	1-9, 89-150, 201-214, 320-339,371-378, 393-422	139	5.74ha/14.19ac
15m Single Detached	10-88, 151-200, 215-226, 340-370,379-392	190	11.20ha/27.67ac
Total Residential	1-449	449	**20.83ha/51.45ac**
20m ROW	Street A-J, Cardinal Lane, Willowdale Crescent	N/A	8.78ha/21.69ac
Total Roadways			**8.77ha/21.69ac**
Walkway/Access	455,456	N/A	0.04ha/0.10ac
Parks & Open Space	450	N/A	0.58ha/1.44ac
SWM	451	N/A	1.52ha/3.74ac
6m Buffer	457	N/A	0.44ha/1.09ac
Hazard	458	N/A	4.35ha/10.76ac
Future Development	452, 453	N/A	3.21ha/7.95ac
Future Road Access	454	N/A	0.06ha/0.15ac
0.3 Reserves* (already included in lot area calculations)	459-518	N/A	0.05ha/0.12ac
Drainage	519	N/A	0.03ha/0.07ac
Total Other	69 (Blocks 450 - 519)		**10.28ha/25.42ac**

Total Draft Plan of Subdivision: 39.88ha/98.54ac

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
230-7050 WESTON ROAD WOODBRIDGE, ON, L4L 8G7 | P: 905 761 5588 F: 905 761 5589 | WWW.MHBCPLAN.COM

Stamp

Date	**March 14, 2024**
File No.	**08103-B**
Plan Scale	**1:1500 (Arch D)**
Drawn By	**P.B.**
Checked By	**D.W.**
Other	

Project

LYNN RIVER HEIGHTS PHASE 2

north

File Name **DRAFT PLAN OF SUBDIVISION**

Dwg No. 1 of 1

Scale Bar 0 2 4 Meters

N:\08103\B - Lynn River Heights Phase II, Port Dover\6 - Tech Production\1-Final Figures\DPOS\CAD

50 0m 50 100 150
SCALE: 1:2000

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SURVEY NOTES:

SURVEY COMPLETED BY KIM HUSTED SURVEYING LTD. ON AUGUST 24, 2004. ELEVATIONS ARE GEODETIC AND ARE REFERRED TO TABLET (No. 724316) IN EAST SIDE OF CONCRETE FOUNDATION 39 CENTIMETRES BELOW BRICK WORK AND 24 CENTIMETRES NORTH OF SOUTEAST CORNER OF BUILDING ELEVATION = 208.596

Town
Norfolk COUNTY

No.	ISSUE	DATE: YYYY/MM/DD
0	ISSUED FOR 1st SUBMISSION OPA/ZBA	2024/03/28

Engineer | Engineer

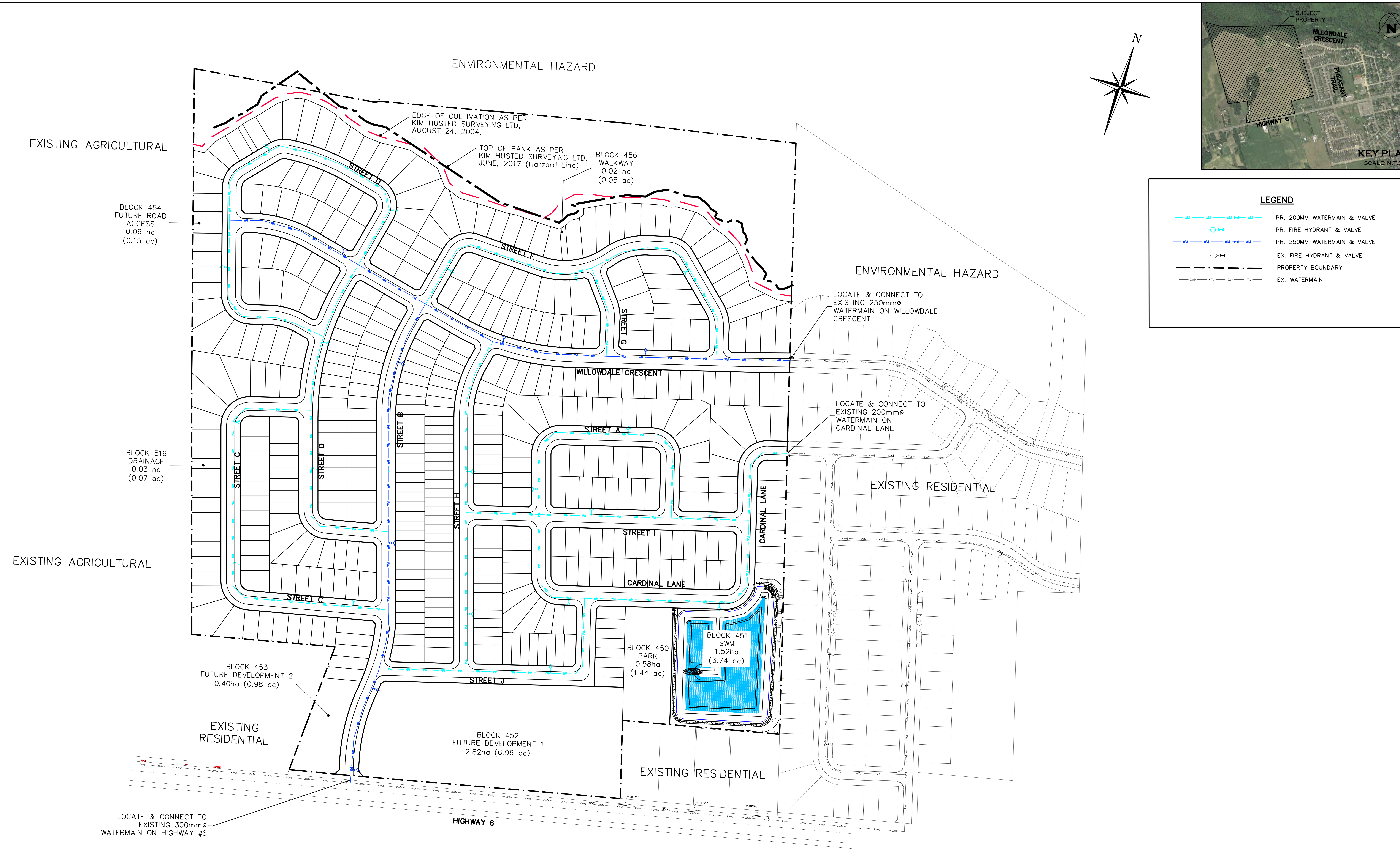
PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project
LYNN RIVER HEIGHTS PHASE II
NORFOLK COUNTY

Drawing
PRELIMINARY SANITARY SERVICING PLAN

CROZIER CONSULTING ENGINEERS

Drawn By R.D.M./H.R. | Design By B.P./J.K. | Project 2604-6978
Check By B.W. | Check By J.K. | Drawing FIG 3



50 0m 50 100 150

SCALE: 1:2000

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Town

Norfolk COUNTY

No.	ISSUE	DATE: YYYY/MM/DD
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Engineer

Engineer

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Project

LYNN RIVER HEIGHTS PHASE II
NORFOLK COUNTY

Drawing

PRELIMINARY WATER SERVICING PLAN

CROZIER CONSULTING ENGINEERS

Drawn By R.D.M./H.R.	Design By B.P./J.K.	Project 2604–6978
Check By B.W.	Check By J.K.	Drawing FIG 4

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Engineer | Engineer

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Project: LYNN RIVER HEIGHTS PHASE II
NORFOLK COUNTY

Drawing: PRE-DEVELOPMENT DRAINAGE PLAN

CROZIER
CONSULTING ENGINEERS

Drawn By	R.D.M./H.R.	Design By	B.P./J.K.	Project	2604-6978
Check By	B.W.	Check By	J.K.	Drawing	FIG 5

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Engineer

Engineer

PRELIMINARY

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Project

LYNN RIVER HEIGHTS PHASE II
NORFOLK COUNTY

Drawing

POST DEVELOPMENT PLAN

CROZIER
CONSULTING ENGINEERS

Drawn By R.D.M./H.R.	Design By B.P./J.K.	Project 2604–6978
Check By B.W.	Check By J.K.	Drawing FIG 6

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Engineer | Engineer

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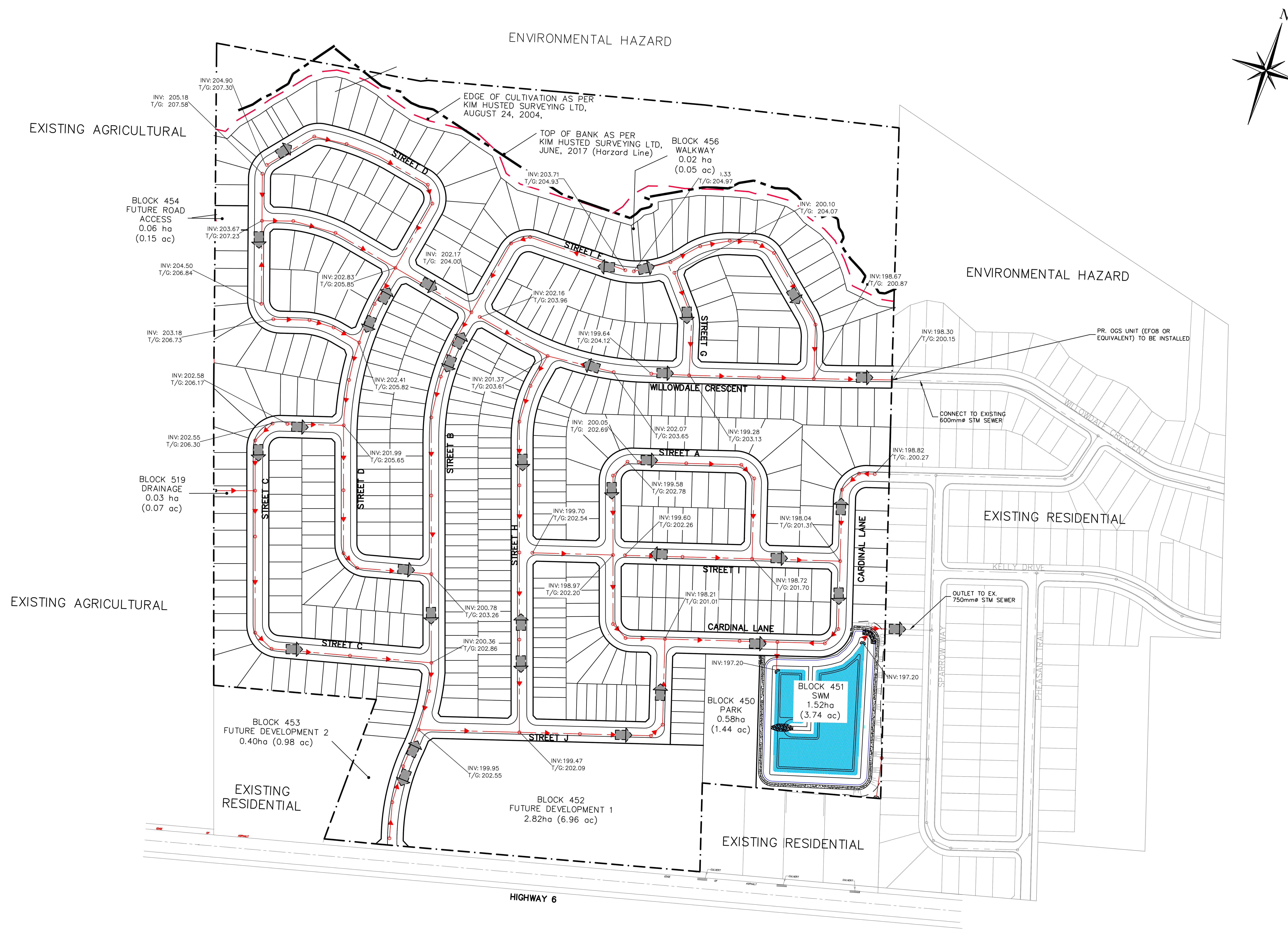
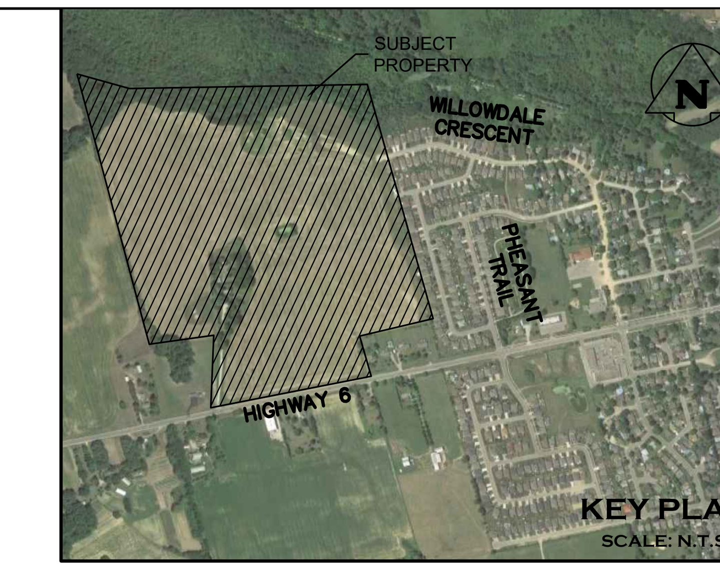
Project: LYNN RIVER HEIGHTS PHASE II
NORFOLK COUNTY

Drawing: PRELIMINARY GRADING PLAN

CROZIER
CONSULTING ENGINEERS

Drawn By R.D.M./H.R.	Design By B.P./J.K.	Project 2604-6978
Check By B.W.	Check By J.K.	Drawing FIG 7





LEGEND

- PR. STORM SEWER & MANHOLE
- PROPERTY BOUNDARY
- EX. STORM SEWER & MANHOLE
- PROPOSED OVERLAND FLOW ROUTE
- PROPOSED HEADWALL

50 0m 50 100 150
SCALE: 1:2000

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Engineer

Engineer

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Project

LYNN RIVER HEIGHTS PHASE II
NORFOLK COUNTY

Drawing

PRELIMINARY STORM SERVICING PLAN

CROZIER
CONSULTING ENGINEERS

Drawn By	Design By	Project
R.D.M./H.R.	B.P./J.K.	2604-6978
Check By B.W.	Check By J.K.	Drawing FIG 8

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Project: LYNN RIVER HEIGHTS PHASE II
NORFOLK COUNTY

Drawing: PRELIMINARY STORMWATER MANAGEMENT FACILITY

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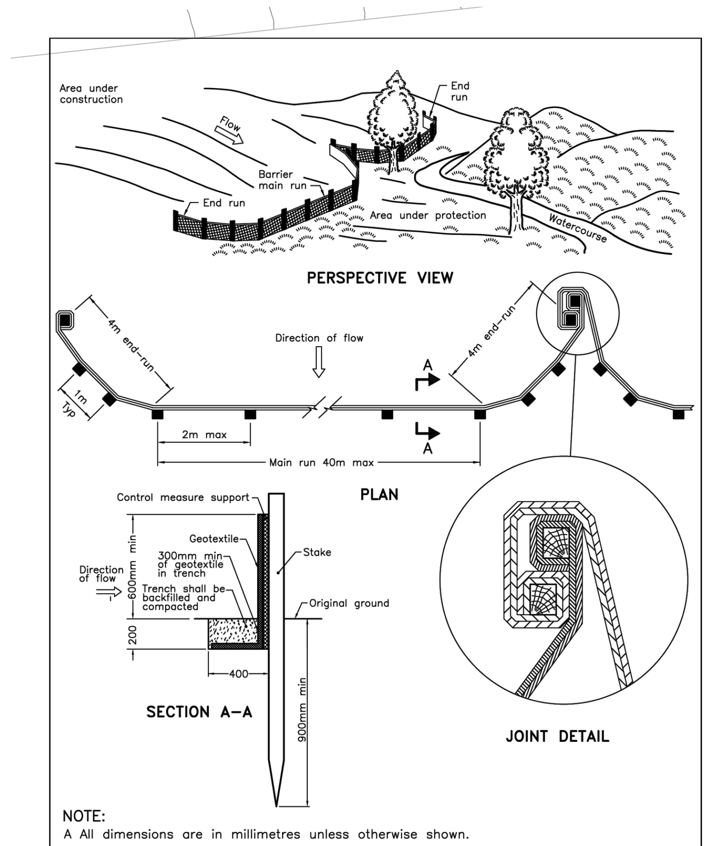
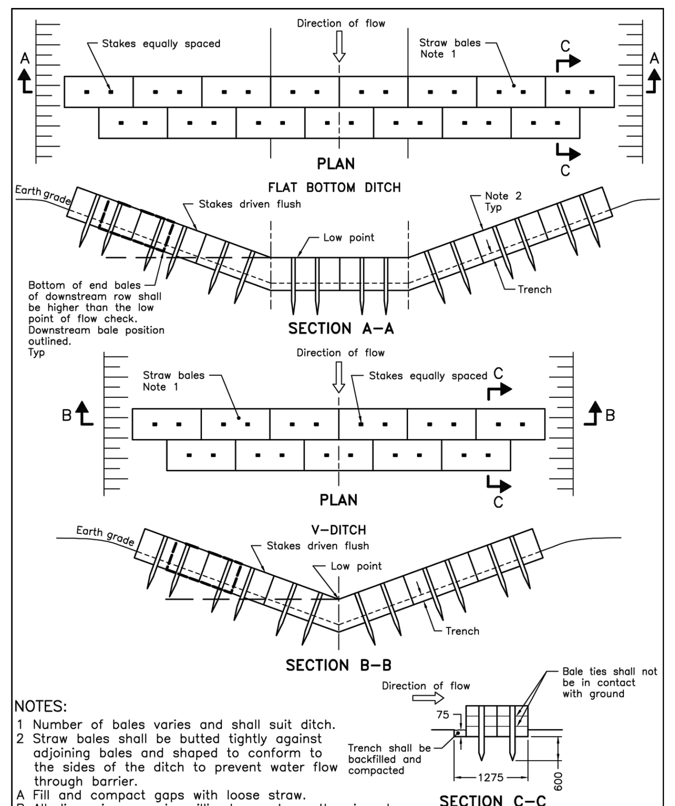
Drawn By	R.D.M./H.R.	Design By	B.P./J.K.	Project	2604-6978
Check By	B.W.	Check By	J.K.	Drawing	FIG 9



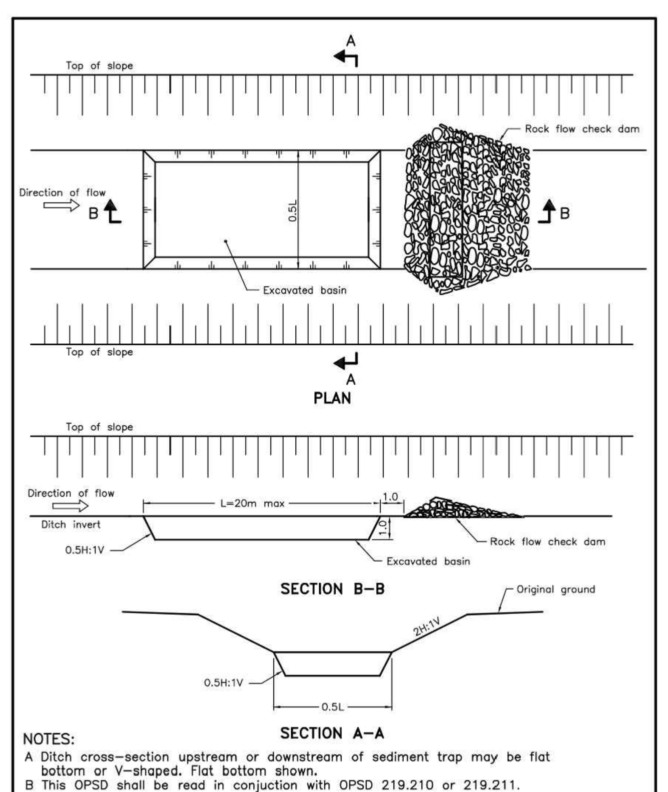
ONTARIO PROVINCIAL STANDARD DRAWING — Nov 2021 — Rev 3

HEAVY-DUTY SILT FENCE BARRIER — OPSD 219.130



ONTARIO PROVINCIAL STANDARD DRAWING — Nov 2021 — Rev 3

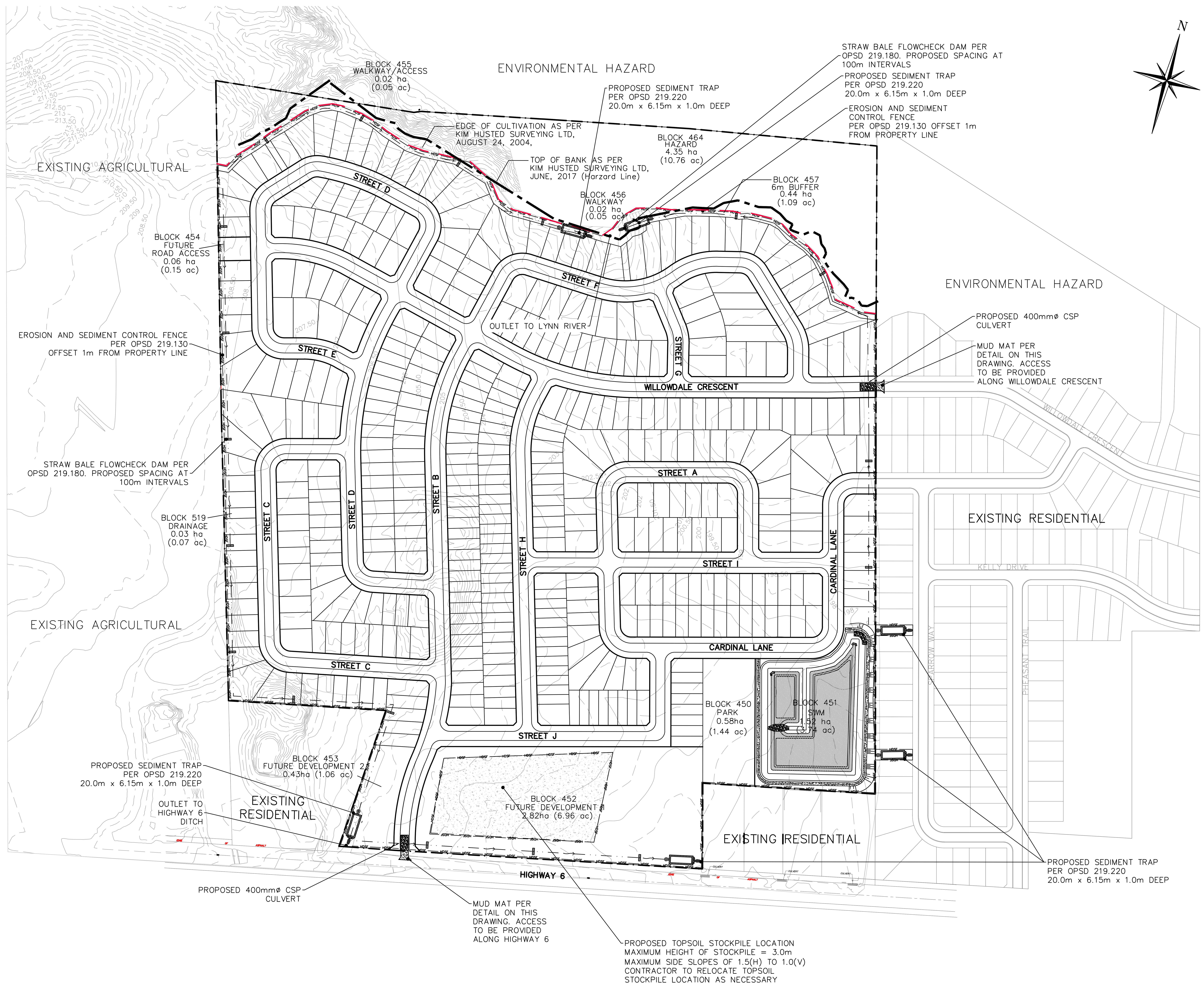
STRAW BALE FLOW CHECK DAM — OPSD 219.180

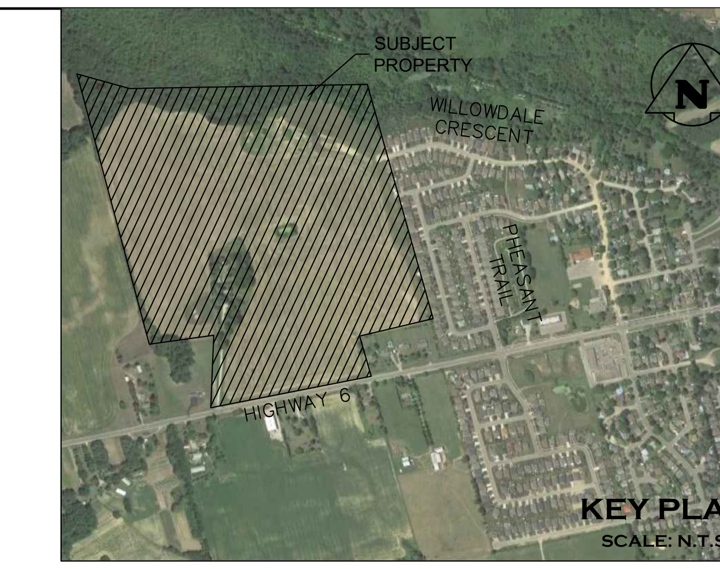


ONTARIO PROVINCIAL STANDARD DRAWING — Nov 2015 — Rev 2

SEDIMENT TRAP IN DITCH — OPSD 219.220

SCALE: 1:125





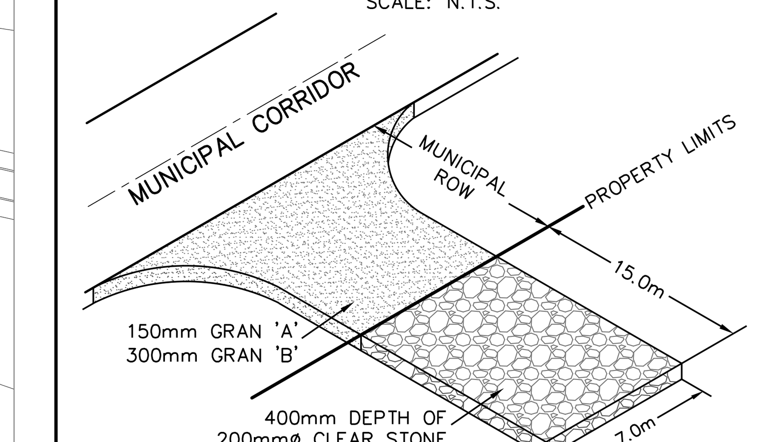
KEY PLAN
SCALE: N.T.S.

LEGEND

XXX.X	EX. CONTOUR
	PR. PROPERTY LIMITS
X.X%	PR. SWALE & SLOPE
HDSF	PR. HEAVY DUTY SILT FENCE
	PR. STRAW BALE CHECK FLOW
	PR. MUD MAT
	PR. SEDIMENT TRAP
	PR. TOPSOIL STOCKPILE AREA

MUD MAT DETAIL

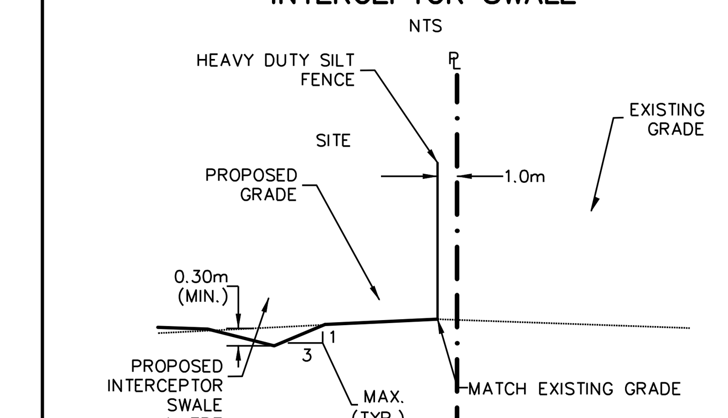
SCALE: N.T.S.



NOTE:
GEOTEXTILE (TERRAFIX 270R OR APPROVED EQUAL) TO BE PLACED AS SEPARATION BARRIER BETWEEN EXISTING GROUND AND CLEAR STONE.

TYPICAL INTERCEPTOR SWALE

NTS



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Project: LYNN RIVER HEIGHTS PHASE II
NORFOLK COUNTY

Drawing: SITE ALTERATION/EROSION AND SEDIMENT CONTROL PLAN

CROZIER
CONSULTING ENGINEERS

Drawn By	Design By	Project
R.D.M./H.R.	B.P./J.K.	2604–6978
Check By	**Check By**	**Drawing**
B.W.	J.K.	FIG 10

nextrans.ca

Transportation Impact Study

LYNN RIVER HEIGHTS PHASE 2

Port Dover, Norfolk County

April 16, 2024
County File No. 28TPL2017317, ZNPL2017318
Project No: NT-23-233

nexTrans
Consulting Engineers
A Division of NextEng Consulting Group Inc.

April 16, 2024

Democrat Port Dover Limited
1555 Romina Drive
Concord, ON L4K 4Z9

Attention: Mr. Graz Palumbo

Re: Transportation Impact Study
Lynn River Heights Phase 2
Port Dover, Norfolk County
County File No. 28TPL2017317, ZNPL2017318
Project No. NT-23-233

Nextrans Consulting Engineers (a Division of NextEng Consulting Group Inc.) is pleased to present the enclosed Transportation Impact Study in support of the Draft Plan of Subdivision and Zoning By-law Amendment application(s) for the proposed Lynn River Heights Phase 2 development (the "subject site").

The subject site is located on Highway 6, west of Pheasant Trail / Blue Lake Avenue, in Port Dover, Norfolk County, and is currently vacant. According to the Draft Plan of Subdivision dated March 14, 2024, the site is proposed to have 449 residential dwelling units (393 single-detached units and 56 semi-detached units) and two (2) medium-density future development blocks (Block 452 and Block 453) projected to provide 260 dwelling units. Access to the site will be provided from Highway 6 through an intersection with a new municipal street, Street B, and through extensions of Willowdale Crescent and Cardinal Lane from the east.

We trust the enclosed sufficiently addresses your needs. Should you have any questions, please do not hesitate to contact the undersigned.

Yours truly,

NEXTRANS CONSULTING ENGINEERS
Prepared by:

Janus Mora, B.Eng.
Transportation Analyst
Approved by:

Richard Pernicky, MITE
Principal

EXECUTIVE SUMMARY

Nextrans Consulting Engineers (A Division of NextEng Consulting Group Inc.) was retained through Democrat Port Dover Limited (the 'Client') to prepare the Transportation Impact Study in support of the Draft Plan of Subdivision and Zoning By-law Amendment application(s) for the proposed Lynn River Heights Phase 2 development (the "subject site"). This Transportation Impact Study was prepared in accordance with the Terms of Reference approved by Norfolk County, dated December 20, 2023

Development Proposal

According to the Draft Plan of Subdivision dated March 14, 2024, the site is proposed to have 449 residential dwelling units (393 single-detached units and 56 semi-detached units) and two (2) mixed-use future development blocks (Block 452 and Block 453) projected to provide 260 dwelling units. Access to the site will be provided from Highway 6 through an intersection with a new municipal street, Street B, and through extensions of Willowdale Crescent and Cardinal Lane from the east.

Capacity Analysis

Under the interim condition (2029), the 393 single-detached dwelling units 56 semi-detached dwelling units are anticipated to generate 302 new two (2)-way vehicle trips (80 inbound and 222 outbound) in the AM peak hour and 401 new two (2)-way vehicle trips (2250inbound and 151 outbound) in the PM peak hour.

At full build-out, with the completion of the projected 260 units projected in Block 452 and Block 453, Lynn River Heights Phase 2 is expected to generate 4106two-way (105 inbound and 301 outbound) vehicle trips in the AM peak hour and 534 two-way (334 inbound and 200 outbound) vehicle trips in the PM peak hour.

With the introduction of the site generated traffic, the study area intersections are expected to continue to operate with overall acceptable levels of service ("LOS") during the AM and PM peak hours in the years 2029, 2034, and 2039, and during the AM peak hour in the year 2044.

During the PM peak hour in the year 2044, 10 years after full buildout, the southbound approach at the intersection of Highway 6 and Blueline Road operates at LOS F. However, the volume-to-capacity ratio ("v/c") remains below 0.90, with delays expected to remain below one (1) minute. The southbound approach at the intersection of Highway 6 and Street B also operates at LOS F. However, the v/c is 0.79, with delays expected to remain below one (1) minute. At unsignalized intersections of a minor road and a two (2)-lane highway, it is typical for vehicles at the minor street approach to experience delays of up to one (1) minute, as the intersection configuration prioritises traffic flow on the major road. This operation condition is acceptable, given that the v/c indicated that the approach operates with available capacity.

The intersection of Highway 6 and Street B was modelled as an unsignalized intersection with the southbound approach (Street B) stop-controlled, with no auxiliary turning lanes. While the southbound approach is expected to operate at LOS F during the 2044 PM peak hour under this configuration, the v/c and delay indicate that the impact of the site generated traffic is acceptable.

Intersection Control Alternatives

The intersection of Highway 6 and Street B was evaluated as a signalized intersection and as a roundabout. Under both signalized and roundabout configurations, the intersection operates with excellent LOS with traffic signals providing better performance on Highway 6 and a roundabout providing better performance on Street B. However, the operational benefits of providing a roundabout are not significant enough that they justify the land requirement to implement.

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LIST OF FIGURES

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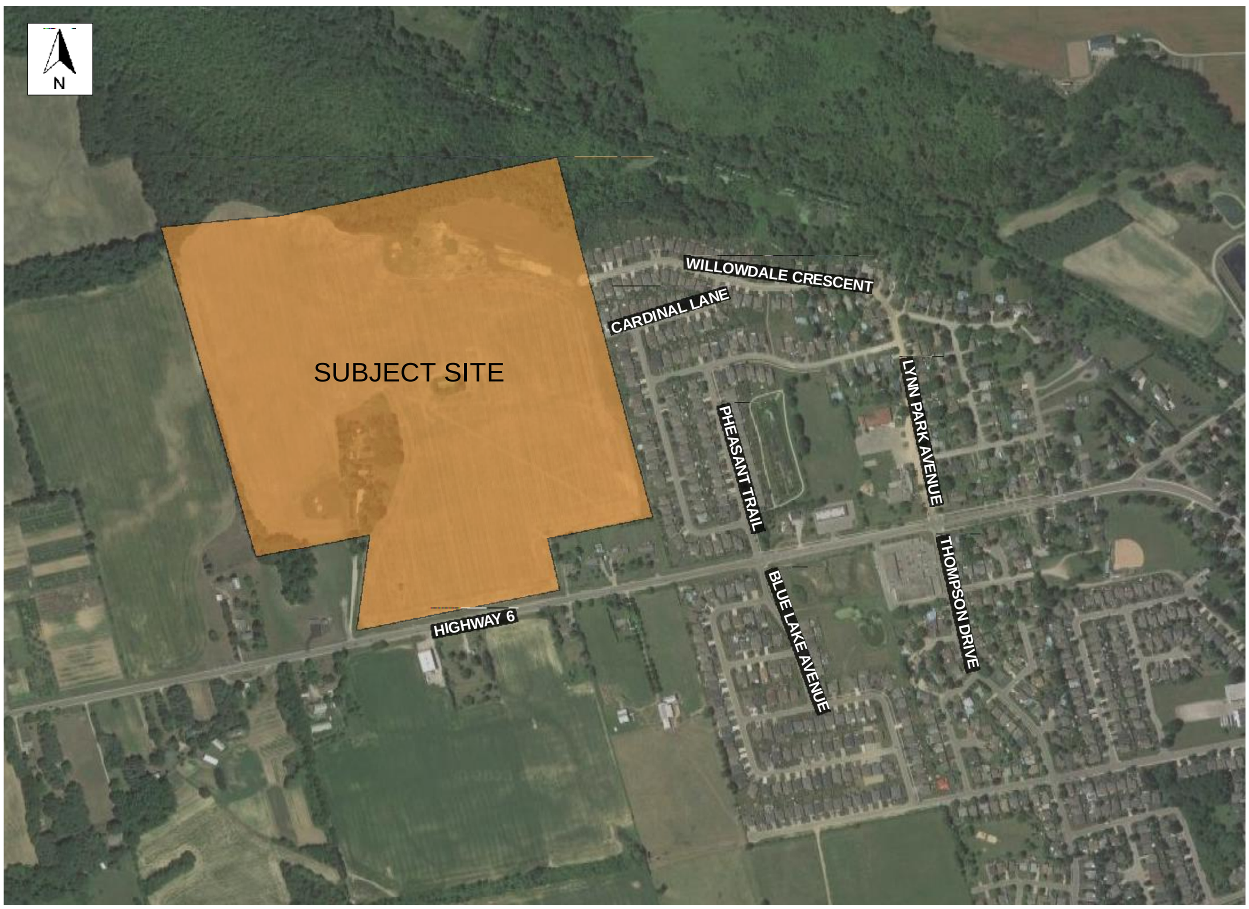
APPENDICES

1.0 INTRODUCTION

Nextrans Consulting Engineers (A Division of NextEng Consulting Group Inc.) was retained through Democrat Port Dover Limited (the 'Client') to undertake a Transportation Impact Study (TIS) in support of the Draft Plan of Subdivision and Zoning By-law Amendment application(s) for the proposed Lynn River Heights Phase 2 development (the "subject site"). The subject lands are located on the north side of Highway 6, in Port Dover, Norfolk County (The 'County'). This TIS was prepared in accordance with the Terms of Reference approved by the County dated December 20, 2023.

The location of the subject site is illustrated in **Figure 1-1**.

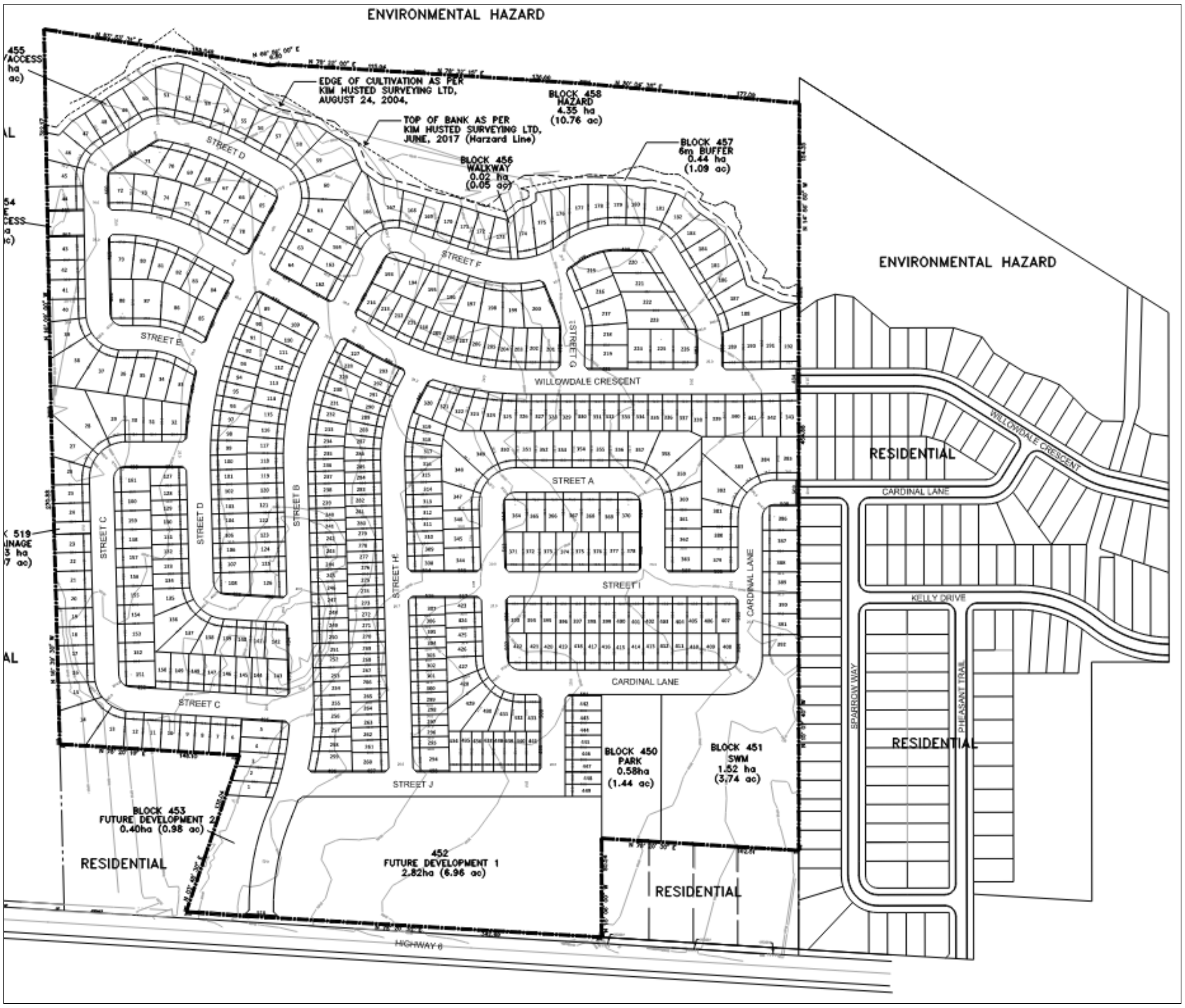
Figure 1-1 – Site Location



According to the Draft Plan of Subdivision dated March 14, 2024, the subject site is proposed to have 449 residential dwelling units (393 single-detached units and 56 semi-detached units) and two (2) mixed-use future development blocks (Block 452 and Block 453) projected to provide 260 dwelling units. Access to the site will be provided from Highway 6 through an intersection with a new municipal street, Street B, and through extensions of Willowdale Crescent and Cardinal Lane from the east.

The proposed Draft Plan of Subdivision is shown in **Figure 1-2** and provided in **Appendix A**.

Figure 1-2 – Proposed Draft Plan of Subdivision



Not to scale

2.0 EXISTING TRAFFIC CONDITIONS

2.1. Existing Road Network

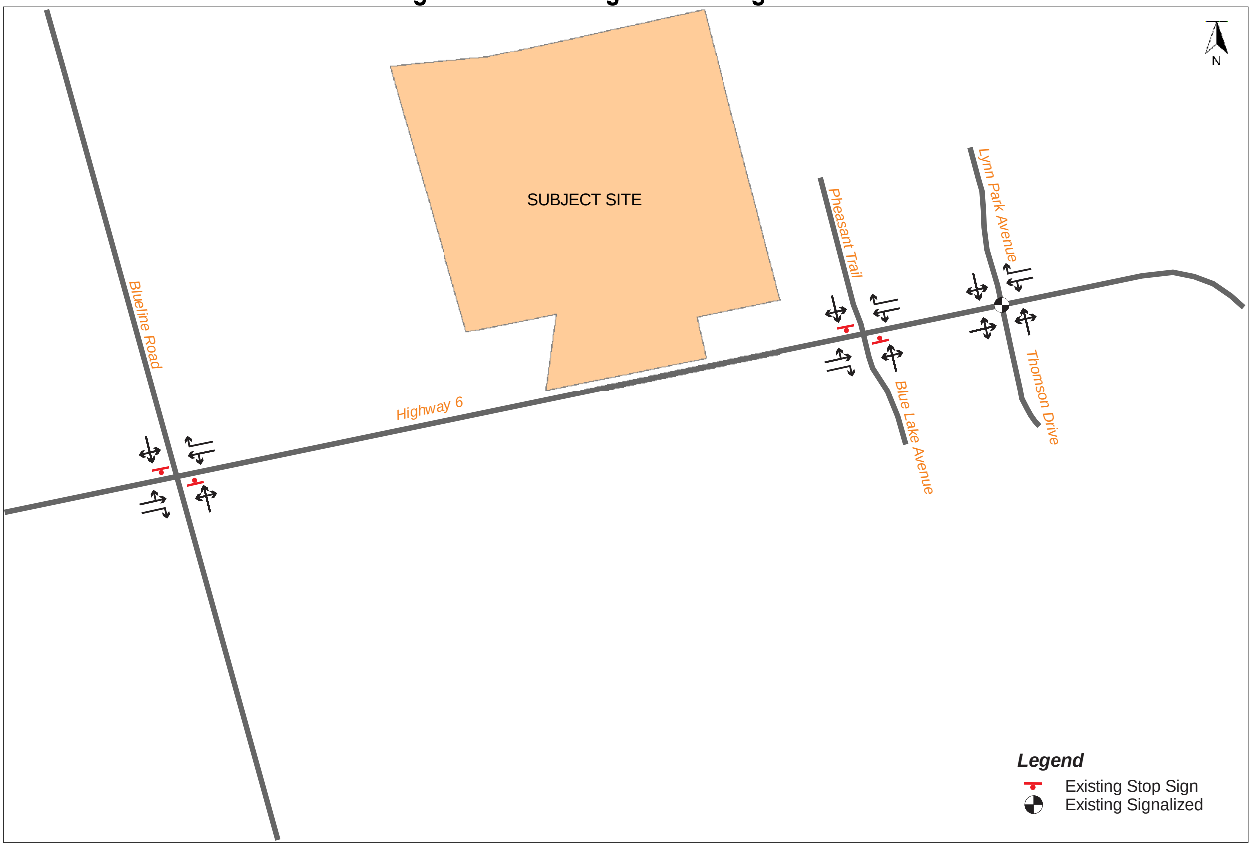
The existing road network in the study area is described below:

- **Highway 6:** An east-west arterial road under the jurisdiction of the County, as designated in the Norfolk County Official Plan. Highway 6 has a two (2) lane cross-section (one (1) lane1 per travel direction). There is a posted speed limit of 50 km/h in the aera of the subject site.
- **Blueline Road:** A north-south local road maintained by the County. Blueline Road has a two (2)-lane cross-section (one (1) lane per direction) There is a posted speed limit of 50 km/h near the subject site.
- **Pheasant Trail / Blue Lake Avenue:** North-south local roads under the jurisdiction of the County which form a four (4)-legged unsignalized intersection with Highway 6. Pheasant Trail and Blue Lake Avenue have two (2) lane cross-sections (one (1) lane per travel direction). There is an unposted speed limit of 50 km/h in the area of the subject site.

- **Lynn Park Avenue / Thompson Drive:** North-south local roads under the jurisdiction of the County which form a four (4)-legged signalized intersection with Highway 6. Pheasant Trail and Blue Lake Avenue have two (2) lane cross-sections (one (1) lane per travel direction). There is an unposted speed limit of 50 km/h in the area of the subject site.

Existing road network lane configurations are illustrated in **Figure 2-1**.

Figure 2-1 –Existing Lane Configurations



2.2. Existing Active Transportation Network

Sidewalks

Currently, public pedestrian sidewalks are available as follows:

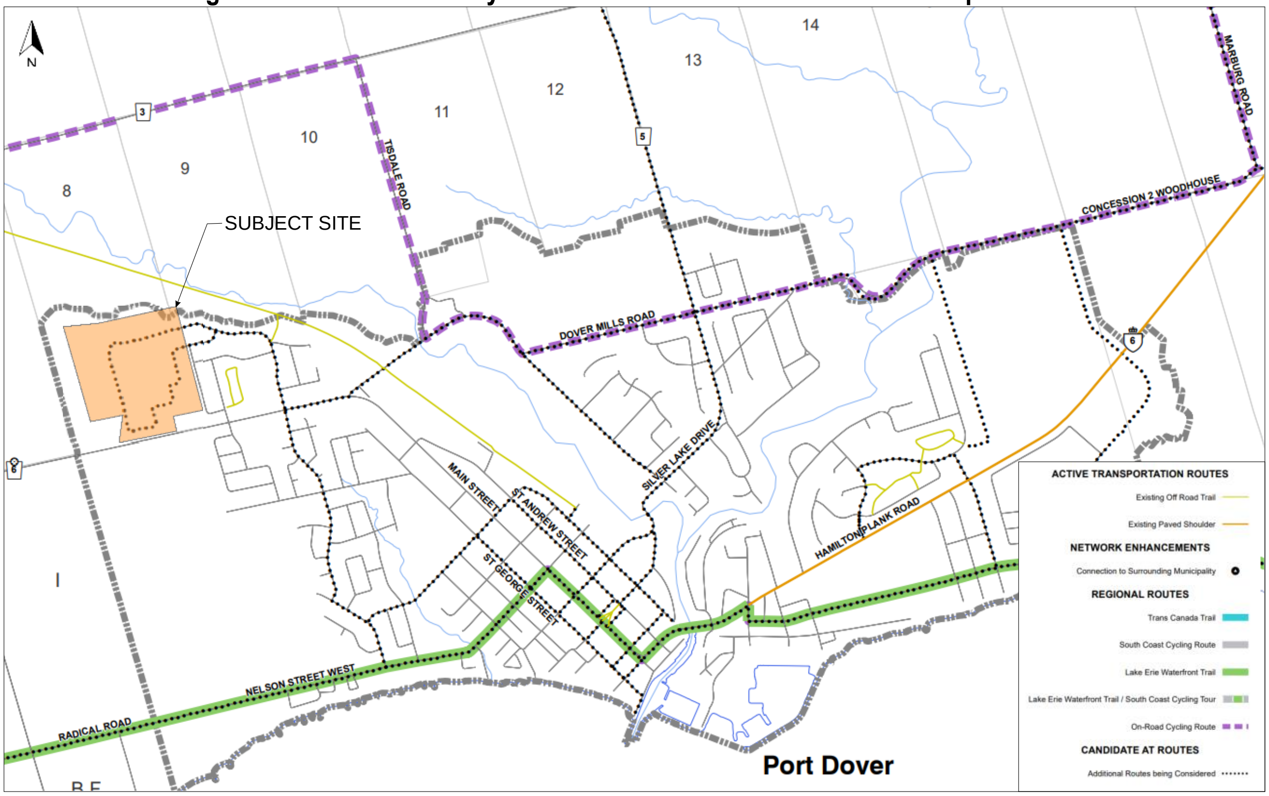
- On the east side of Pheasant trails and Blue Lake Avenue
- On the north side of Highway 6 between Pheasant Lake Trail and Lynn Park Avenue
- On both sides of Highway 6 east of Lynn Park Avenue / Thompson Drive
- On the west side of Lynn Park Avenue and Thompson Drive

Cycling

A paved multi-use pathway is provided on the south side of Highway 6 between Blue Lake Avenue and Thompson drive.

According to the County Official Plan Schedule I-3, Lynn Park Avenue / Thompson Drive, Willowdale Crescent, and the subject site are designated as candidates for County active transportation routes. The active transportation facilities in Port Dover, in accordance with the Official Plan, are shown below in **Figure 2-2**.

Figure 2-2 – Norfolk County Official Plan Schedule I-3 – Active Transportation



2.3. Existing Traffic Volumes

To capture adjacent peak hour traffic volumes under existing conditions, turning movement counts (TMC) were undertaken at the study area intersections through Spectrum Traffic Inc. TMC were conducted on Tuesday, January 16, 2024, during the weekday AM (7:00 AM to 10:00 AM) and PM peak periods. Existing traffic data including TMC data and signal timing plans are enclosed in **Appendix B**.

2.4. Existing Traffic Assessment

2.4.1. Capacity Analysis – Existing Traffic conditions

2024 existing traffic volumes are illustrated in **Figure 2-3**. Capacity analysis was conducted using model in Synchro 10, in accordance with the methodology outlined in the Highway Capacity Manual (HCM 2000) published by the Transportation Research Board. The detailed results are provided in **Appendix C** and summarized in **Table 2.1**.

Table 2.1 – Capacity Analysis Summary – Existing Traffic Conditions

Intersection	Movement	AM Peak Hour					PM Peak Hour				
		v/c	Delay (s)	LOS	Queue		v/c	Delay (s)	LOS	Queue	
					50th	95th				50th	95th
Signalized											
Highway 6 and Lynn Park Avenue / Thompson Drive	**Overall**	**0.30**	**10.2**	**B**	--	--	**0.28**	**8.3**	**A**	--	--
	EBLTR	0.23	4.3	A	11.1	20.4	0.23	3.7	A	10.2	22.3
	WBLT	0.27	4.5	A	13.1	23.5	0.28	4.1	A	11.8	25.7
	WBR	0.03	3.3	A	0.0	2.4	0.02	2.9	A	0.0	1.4
	NBLTR	0.49	28.0	C	9.8	19.0	0.33	28.3	C	5.4	17.2
	SBLTR	0.38	26.9	C	7.4	15.7	0.18	27.2	C	3.2	10.2
Unsignalized											
Highway 6 and Blueline Road	EBLT	<0.01	0.2	A	--	0.1	--	--	--	--	--
	WBLT	<0.01	0.2	A	--	0.1	<0.01	0.2	A	--	0.1
	NBLTR	0.07	12.3	B	--	1.9	0.06	12.0	B	--	1.5
	SBLTR	0.22	13.3	B	--	6.7	0.32	13.6	B	--	10.8
Highway 6 and Pheasant Trail / Blue Lake Avenue	WBLT	0.01	0.3	A	--	0.2	0.01	0.4	A	--	0.2
	EBLT	0.01	0.3	A	--	0.2	0.01	0.4	A	--	0.2
	NBLTR	0.10	13.7	B	--	2.5	0.05	13.5	B	--	1.2
	SBLTR	0.07	13.3	B	--	1.7	0.04	13.8	B	--	1.0

Under existing conditions, the study area intersections operate at excellent levels of service (LOS) during AM and PM peak hours, with no intersection movements operation at an LOS worse that 'C'. No volume-to-capacity (v/c) ratios approach 1.00, indicating that all approaches have reserve capacity, and queueing and delays are at a minimum.

3.0 FUTURE BACKGROUND CONDITIONS

3.1. Analysis Years

For all future background and future total analyses, the following analysis years and scenarios were considered:

2029: The proposed 393 single-family dwelling units and 56 semi-detached dwelling units are completed.

2034: Full build out of Lynn River heights Phase 2, the projected 260 units in the Block 452 and Block 453 are completed.

2039: Five (5) year-horizon from full buildout.

2044: 10-year horizon from full buildout.

3.2. Corridor Traffic Growth

For the purpose of this study, general future corridor traffic growth was forecast in consideration of future land development in the area. Traffic growth along Highway 6 and Blueline Road was forecast using a conservative growth rate of 2% per annum.

3.3. Future Background 2029

2029 future background traffic volumes are illustrated in **Figure 3-1**. The capacity analysis results are provided in **Appendix D** and summarized in **Table 3.1.**

Table 3.1 – Capacity Analysis Summary – 2029 Future Background

Intersection	Movement	AM Peak Hour					PM Peak Hour				
		v/c	Delay (s)	LOS	Queue		v/c	Delay (s)	LOS	Queue	
					50th	95th				50th	95th
Signalized											
Highway 6 and Lynn Park Avenue / Thompson Drive	**Overall**	**0.32**	**9.9**	**A**	--	--	**0.30**	**8.2**	**A**	--	--
	EBLTR	0.26	4.4	A	12.3	22.4	0.25	3.8	A	11.4	24.4
	WBLT	0.29	4.6	A	14.5	25.8	0.29	4.2	A	12.9	27.9
	WBR	0.03	3.3	A	0.0	2.4	0.02	2.9	A	0.0	1.4
	NBLTR	0.49	28.0	C	9.8	19.0	0.33	28.3	C	5.4	17.2
	SBLTR	0.38	26.9	C	7.4	15.7	0.18	27.2	C	3.2	10.2
Unsignalized											
Highway 6 and Blueline Road	EBLT	<0.01	0.2	A	--	0.1	--	--	--	--	--
	WBLT	<0.01	0.2	A	--	0.1	<0.01	0.2	A	--	0.1
	NBLTR	0.09	12.9	B	--	2.3	0.07	12.4	B	--	1.7
	SBLTR	0.26	14.3	B	--	8.2	0.37	14.7	B	--	13.4
Highway 6 and Pheasant Trail / Blue Lake Avenue	WBLT	0.01	0.3	A	--	0.2	0.01	0.3	A	--	0.2
	EBLT	0.01	0.3	A	--	0.2	0.01	0.4	A	--	0.2
	NBLTR	0.10	14.6	B	--	2.8	0.05	14.3	B	--	1.3
	SBLTR	0.07	14.0	B	--	1.9	0.04	14.6	B	--	1.1

Under 2029 future background conditions, intersection operations are minimally impacted by the background traffic growth and are expected to continue to operate with excellent LOS during the AM and PM peak hours.

3.4. Future Background 2034

2034 future background traffic volumes are illustrated in **Figure 3-2**. The capacity analysis results are provided in **Appendix E** and summarized in **Table 3.2.**

Table 3.2 – Capacity Analysis Summary –2034 Future Background

Intersection	Movement	AM Peak Hour					PM Peak Hour				
		v/c	Delay (s)	LOS	Queue		v/c	Delay (s)	LOS	Queue	
					50th	95th				50th	95th
Signalized											
Highway 6 and Lynn Park Avenue / Thompson Drive	**Overall**	**0.35**	**9.7**	**A**	--	--	**0.32**	**8.0**	**A**	--	--
	EBLTR	0.28	4.5	A	13.7	24.5	0.27	4.0	A	12.7	27.0
	WBLT	0.32	4.8	A	16.3	28.5	0.32	4.3	A	14.2	30.3
	WBR	0.03	3.3	A	0.0	2.4	0.02	2.9	A	0.0	1.4
	NBLTR	0.49	28.0	C	9.8	19.0	0.33	28.3	C	5.4	17.2
	SBLTR	0.38	26.9	C	7.4	15.7	0.18	27.2	C	3.2	10.2

Unsignalized											
Highway 6 and Blueline Road	EBLT	0.01	0.3	A	--	0.1	--	--	--	--	--
	WBLT	<0.01	0.2	A	--	0.1	<0.01	0.2	A	--	0.1
	NBLTR	0.11	13.6	B	--	2.8	0.08	13.0	B	--	2.0
	SBLTR	0.31	15.9	C	--	10.6	0.43	16.4	C	--	17.3
Highway 6 and Pheasant Trail / Blue Lake Avenue	WBLT	0.01	0.3	A	--	0.2	0.01	0.3	A	--	0.2
	EBLT	0.01	0.3	A	--	0.2	0.01	0.3	A	--	0.2
	NBLTR	0.12	15.6	C	--	3.1	0.06	15.2	C	--	1.4
	SBLTR	0.08	15.0	B	--	2.1	0.05	15.6	C	--	1.2

Under 2034 future background conditions, intersection operations are minimally impacted by the background traffic growth and are expected to continue to operate with excellent LOS during the AM and PM peak hours.

3.5. Future Background 2039

2039 future background traffic volumes are illustrated in **Figure 3-3**. The capacity analysis results are provided in **Appendix F** and summarized in **Table 3.3.**

Table 3.3 – Capacity Analysis Summary – 2039 Future Background

Intersection	Movement	AM Peak Hour					PM Peak Hour				
		v/c	Delay (s)	LOS	Queue		v/c	Delay (s)	LOS	Queue	
					50th	95th				50th	95th
Signalized											
Highway 6 and Lynn Park Avenue / Thompson Drive	**Overall**	**0.37**	**9.5**	**A**	**--**	**--**	**0.34**	**7.9**	**A**	**--**	**--**
	EBLTR	0.30	4.7	A	15.4	27.0	0.29	4.1	A	14.3	29.8
	WBLT	0.35	5.0	A	18.2	31.5	0.34	4.5	A	15.6	33.2
	WBR	0.03	3.3	A	0.0	2.4	0.02	2.9	A	0.0	1.4
	NBLTR	0.49	28.0	C	9.8	19.0	0.33	28.3	C	5.4	17.2
	SBLTR	0.38	26.9	C	7.4	15.7	0.18	27.2	C	3.2	10.2
Unsignalized											
Highway 6 and Blueline Road	EBLT	0.01	0.3	A	--	0.1	-	-	-	-	-
	WBLT	<0.01	0.2	A	--	0.1	<0.01	0.2	A	--	0.1
	NBLTR	0.12	14.5	B	--	3.3	0.09	13.6	B	--	2.5
	SBLTR	0.37	17.9	C	--	13.6	0.51	19.1	C	--	23.0
Highway 6 and Pheasant Trail / Blue Lake Avenue	WBLT	0.01	0.3	A	--	0.2	0.01	0.3	A	--	0.2
	EBLT	0.01	0.3	A	--	0.2	0.01	0.3	A	--	0.2
	NBLTR	0.13	17.0	C	--	3.5	0.06	16.4	C	--	1.6
	SBLTR	0.09	16.1	C	--	2.3	0.05	16.9	C	--	1.3

Under 2039 future background conditions, intersection operations are minimally impacted by the background traffic growth and are expected to continue to operate with excellent LOS during the AM and PM peak hours.

3.6. Future Background 2044

2044 future background traffic volumes are illustrated in **Figure 3-4**. The capacity analysis results are provided in **Appendix G** and summarized in **Table 3.4.**

Table 3.4 – Capacity Analysis Summary – 2044 Future Background

Intersection	Movement	AM Peak Hour					PM Peak Hour				
		v/c	Delay (s)	LOS	Queue 50th	Queue 95th	v/c	Delay (s)	LOS	Queue 50th	Queue 95th
Signalized											
Highway 6 and Lynn Park Avenue / Thompson Drive	**Overall**	**0.40**	**9.4**	**A**	--	--	**0.36**	**7.8**	**A**	--	--
	EBLTR	0.33	4.9	A	17.2	29.8	0.32	4.2	A	16.0	33.2
	WBLT	0.38	5.2	A	20.6	34.9	0.37	4.7	A	17.3	36.6
	WBR	0.03	3.3	A	0.0	2.4	0.02	2.9	A	0.0	1.4
	NBLTR	0.49	28.0	C	9.8	19.0	0.33	28.3	C	5.4	17.2
	SBLTR	0.38	26.9	C	7.4	15.7	0.18	27.2	C	3.2	10.2
Unsignalized											
Highway 6 and Blueline Road	EBLT	0.01	0.2	A	--	0.1	--	--	--	--	--
	WBLT	0.01	0.3	A	--	0.1	<0.01	0.2	A	--	0.1
	NBLTR	0.15	15.8	C	--	4.1	0.11	14.5	B	--	2.9
	SBLTR	0.45	21.1	C	--	18.4	0.61	23.6	C	--	31.7
Highway 6 and Pheasant Trail / Blue Lake Avenue	WBLT	0.01	0.3	A	--	0.2	0.01	0.3	A	--	0.2
	EBLT	0.01	0.3	A	--	0.2	0.01	0.3	A	--	0.2
	NBLTR	0.14	18.8	C	--	4.0	0.07	17.8	C	--	1.8
	SBLTR	0.10	17.7	C	--	2.6	0.06	18.4	C	--	1.5

Under 2044 future background conditions, intersection operations are minimally impacted by the background traffic growth and are expected to continue to operate with excellent LOS during the AM and PM peak hours.

3.7. Future Background Summary

When considering background corridor traffic growth, intersection operations are inevitably impacted. However, all study area intersections are expected to continue to operate at acceptable LOS until the year 2044 under future background conditions. All intersection movements are expected to operate at LOS 'C' or better. Queueing and delays are at acceptable levels with all approaches having available capacity.

4.0 SITE TRAFFIC

4.1. Trip Generation

Anticipated trip rates and trips generated by the proposed residential subdivision were determined using the *Trip Generation Manual, 11th Edition* published by the Institute of Transportation Engineers (ITE). The trip generation summary is shown in **Table 4.1**.

Future new vehicle trips from the 393 single-detached dwelling units were estimated using ITE Land Use Code (LUC) 210 "Single-Family Detached Housing" and LUC 215 "Single-Family Attached Housing was applied to the 56 demi-detached dwelling units. Block 452 and Block 453 are proposed to have medium density residential use. As such, LUC 220 "Multifamily Housing (Low-Rise)", which is applicable to residential uses such as stacked townhouses and low-rise apartments and condominiums, was used.

Table 4.1 – Site Traffic Trip Generation (ITE)

ITE Land Use	Parameter	Morning Peak Hour			Afternoon Peak Hour		
		In	Out	Total	In	Out	Total
Single-Family Detached Housing LUC 210 *393 units*	New Trips **(A)**	72	203	275	232	137	369
	Gross Trip Rate	0.18	0.52	0.70	0.59	0.35	0.94
Single-Family Attached Housing LUC 215 *56 units*	New Trips **(B)**	8	19	27	18	14	32
	Gross Trip Rate	0.14	0.34	0.48	0.32	0.25	0.57
2029 Interim Condition Total Trips (A+B)		**80**	**222**	**302**	**250**	**151**	**401**
Multifamily Housing (Low-Rise) LUC 220 *260 units*	New Trips **(C)**	25	79	104	84	49	133
	Gross Trip Rate	0.10	0.30	0.40	0.32	0.19	0.51
Total New Trips at Full Buildout (A+B+C)		**105**	**301**	**406**	**334**	**200**	**534**

Under the interim condition (2029), the 393 single-detached dwelling units 56 semi-detached dwelling units are anticipated to generate 302 new two (2)-way vehicle trips (80 inbound and 222 outbound) in the AM peak hour and 401 new two (2)-way vehicle trips (2250inbound and 151 outbound) in the PM peak hour.

At full build-out, with the completion of the projected 260 units in Block 452 and Block 453, Lynn River Heights Phase 2 is expected to generate 406 two-way (105 inbound and 301 outbound) vehicle trips in the AM peak hour and 534 two-way (334 inbound and 200 outbound) vehicle trips in the PM peak hour.

4.2. Trip Distribution

The distribution of site-generated traffic was estimated by assessing the directional distribution exhibited in the TMC collected under existing conditions, as well as assumptions based on existing road configuration and routes that travelers would be likely to take when accessing the subject site. Trip distribution is detailed in **Table 4.2**.

Table 4.2 – Site Traffic Trip Distribution

Corridor	To / From	AM Peak Hour		PM Peak Hour	
		In	Out	In	Out
Blueline Road	North	11%	22%	17%	13%
	South	1%	1%	0%	0%
Highway 6	East	62%	47%	61%	65%
	West	23%	29%	20%	20%
Blue Lake Avenue	South	1%	1%	1%	1%
Thompson Drive	South	2%	2%	1%	0%
Total		100%	100%	100%	100%

The site traffic trip distribution is illustrated in **Figure 4-1**. The 2029 site-generated traffic volumes are illustrated in **Figure 4-2**. The site generated traffic volumes at full buildout are illustrated in **Figure 4-3**.

5.0 FUTURE TOTAL ANALYSIS

The forecasted future total traffic volumes were determined as the summation of the distributed site-generated traffic and future background traffic volumes.

5.1. Intersection of Highway 6 and Street B

For the future total analysis, the intersection of Highway 6 and Street B was assessed as an unsignalized intersection with stop-control at the minor approach with no turning lanes for all analysis years (2029, 2034, 2039, 2044).

5.2. Future Total 2029

The forecasted 2029 future total traffic volumes under proposed conditions were determined as the summation of the new site-generated trips and future background traffic volumes. Future total traffic volumes are illustrated in **Figure 5-1**. Capacity analysis is summarized in **Table 5.1**. and detailed results are provided in **Appendix H**.

Table 5.1 – Capacity Analysis Summary – 2029 Future Total

Intersection	Movement	AM Peak Hour					PM Peak Hour				
		v/c	Delay (s)	LOS	Queue		v/c	Delay (s)	LOS	Queue	
					50th	95th				50th	95th
Signalized											
Highway 6 and Lynn Park Avenue / Thompson Drive	**Overall**	**0.38**	**9.8**	**A**	--	--	**0.41**	**8.0**	**A**	--	--
	EBLTR	0.36	5.1	A	19.5	33.0	0.33	4.4	A	16.7	34.9
	WBLT	0.35	5.1	A	18.2	31.3	0.42	5.1	A	20.8	44.1
	WBR	0.03	3.4	A	0.0	2.5	0.02	2.9	A	0.0	2.3
	NBLTR	0.49	27.8	C	10.1	19.4	0.34	28.1	C	5.5	17.7
	SBLTR	0.48	27.6	C	9.7	18.8	0.23	27.2	C	4.1	12.3
Unsignalized											
Highway 6 and Blueline Road	EBLT	<0.01	0.2	A	--	0.1	--	--	--	--	--
	WBLT	0.01	0.3	A	--	0.1	<0.01	0.2	A	--	0.1
	NBLTR	0.11	14.6	B	--	2.9	0.08	13.6	B	--	2.0
	SBLTR	0.34	17.5	C	--	11.7	0.51	19.3	C	--	22.9
Highway 6 and Pheasant Trail / Blue Lake Avenue	WBLT	0.01	0.4	A	--	0.3	0.02	0.5	A	--	0.4
	EBLT	0.01	0.3	A	--	0.2	0.01	0.3	A	--	0.2
	NBLTR	0.14	18.5	C	--	4.0	0.08	19.4	C	--	2.1
	SBLTR	0.16	17.6	C	--	4.5	0.12	20.4	C	--	3.3
Highway 6 and Street B	EBLT	0.02	0.9	A	--	0.5	0.08	2.3	A	--	2.0
	SBLR	0.40	16.6	C	--	15.2	0.39	21.1	C	--	14.2

Under 2029 future total conditions, with the introduction of the trips generated by the 393 single-detached dwelling units and 56 semi-detached dwelling units, the study area intersections are expected to continue operating with excellent LOS. Intersection movements operate with LOS C or better with acceptable levels of delay and vehicle queueing.

5.3. Future Total 2034

The forecasted 2034 future total traffic volumes under the full buildout condition were determined as the summation of the new site-generated trips and future background traffic volumes. Future total traffic volumes are illustrated in **Figure 5-2**. Capacity analysis is summarized in **Table 5.2**. and detailed results are provided in **Appendix I**.

Table 5.2 – Capacity Analysis Summary – 2034 Future Total

Intersection	Movement	AM Peak Hour					PM Peak Hour				
		v/c	Delay (s)	LOS	Queue		v/c	Delay (s)	LOS	Queue	
					50th	95th				50th	95th
Signalized											
Highway 6 and Lynn Park Avenue / Thompson Drive	**Overall**	**0.44**	**9.9**	**A**	--	--	**0.46**	**8.2**	**A**	--	--
	EBLTR	0.42	5.7	A	24.3	40.6	0.38	4.8	A	20.1	41.7
	WBLT	0.39	5.5	A	21.4	36.6	0.48	5.8	A	25.6	54.5
	WBR	0.03	3.4	A	0.0	2.5	0.03	3.0	A	0.0	2.7
	NBLTR	0.49	27.6	C	10.1	19.4	0.34	27.9	C	5.6	17.8
	SBLTR	0.50	27.7	C	10.6	20.0	0.25	27.1	C	4.3	13.0
Unsignalized											
Highway 6 and Blueline Road	EBLT	0.01	0.1	A	--	0.1	--	--	--	--	--
	WBLT	0.01	0.2	A	--	0.2	<0.01	0.2	A	--	0.1
	NBLTR	0.14	3.8	C	--	3.8	0.10	14.6	B	--	2.5
	SBLTR	0.44	17.2	C	--	17.2	0.65	26.7	D	--	36.7
Highway 6 and Pheasant Trail / Blue Lake Avenue	WBLT	0.01	0.3	A	--	0.3	0.02	0.6	A	--	0.6
	EBLT	0.01	0.2	A	--	0.2	0.01	0.3	A	--	0.2
	NBLTR	0.18	5.1	C	--	5.1	0.11	24.0	C	--	3.0
	SBLTR	0.22	6.7	C	--	6.7	0.18	26.2	D	--	5.0
Highway 6 and Street B	EBLT	0.03	0.7	A	--	0.7	0.11	3.0	A	--	3.0
	SBLR	0.60	30.5	C	--	30.5	0.63	36.1	E	--	31.6

Under 2034 future total conditions, at full buildout with the addition of the projected 260 dwelling units on Block 452 and Block 453, the study area intersections are expected to continue operating with excellent LOS. Intersection movements operate with LOS C or better with acceptable levels of delay and vehicle queueing.

5.4. Future Total 2039

The forecasted 2039 future total traffic volumes under proposed conditions were determined as the summation of the new site-generated trips and future background traffic volumes. Future total traffic volumes are illustrated in **Figure 5-3**. Capacity analysis is summarized in **Table 5.3**. and detailed results are provided in **Appendix J**.

Table 5.3 – Capacity Analysis Summary – 2039 Future Background

Intersection	Movement	AM Peak Hour					PM Peak Hour				
		v/c	Delay (s)	LOS	Queue		v/c	Delay (s)	LOS	Queue	
					50th	95th				50th	95th
Signalized											
Highway 6 and Lynn Park Avenue / Thompson Drive	**Overall**	**0.46**	**9.8**	**A**	--	--	**0.48**	**8.2**	**A**	--	--
	EBLTR	0.45	6.0	A	26.4	43.9	0.40	5.0	A	22.0	45.6
	WBLT	0.42	5.8	A	23.8	40.0	0.50	6.0	A	27.7	58.6
	WBR	0.03	3.4	A	0.0	2.5	0.03	3.0	A	0.0	2.7
	NBLTR	0.49	27.6	C	10.1	19.4	0.34	27.9	C	5.6	17.8
	SBLTR	0.50	27.7	C	10.6	20.0	0.25	27.1	C	4.3	13.0
Unsignalized											
Highway 6 and Blueline Road	EBLT	0.01	0.3	A	--	0.2	--	--	--	--	--
	WBLT	0.01	0.3	A	--	0.2	<0.01	0.2	A	--	0.1
	NBLTR	0.16	17.7	C	--	4.5	0.11	15.5	C	--	3.1
	SBLTR	0.52	25.9	D	--	22.6	0.76	35.6	E	--	50.2
Highway 6 and Pheasant Trail / Blue Lake Avenue	WBLT	0.01	0.4	A	--	0.3	0.02	0.6	A	--	0.6
	EBLT	0.01	0.3	A	--	0.3	0.01	0.3	D	--	0.2
	NBLTR	0.20	25.4	D	--	5.9	0.13	26.7	D	--	3.4
	SBLTR	0.25	24.3	C	--	7.8	0.20	29.5	A	--	5.7
Highway 6 and Street B	EBLT	0.03	1.1	A	--	0.8	0.11	3.0	A	--	36.8
	SBLR	0.64	27.0	D	--	35.1	0.69	43.7	E	--	35.1

Under 2039 future total conditions, five years after full buildout, the study area intersections are expected to continue operating with acceptable LOS. The southbound approach (SBLTR) of the intersection of Highway 6 and Blueline Road and the eastbound southbound approach (SBLR) of the intersection of Highway 6 and Street B operate at LOS E during the PM peak hour. However, the SBLTR and EBLT approaches experience v/c of 0.76 and 0.64, respectively, which indicate that there is available capacity at these approaches.

5.5. Future Total 2044

The forecasted 2044 future total traffic volumes under proposed conditions were determined as the summation of the new site-generated trips and future background traffic volumes. Future total traffic volumes are illustrated in **Figure 5-4**. Capacity analysis is summarized in **Table 5.4**. and detailed results are provided in **Appendix K**.

Table 5.4 – Capacity Analysis Summary –2044 Future Total

Intersection	Movement	AM Peak Hour					PM Peak Hour				
		v/c	Delay (s)	LOS	Queue		v/c	Delay (s)	LOS	Queue	
					50th	95th				50th	95th
Signalized											
Highway 6 and Lynn Park Avenue / Thompson Drive	**Overall**	**0.48**	**9.9**	**A**	--	--	**0.51**	**8.3**	**A**	--	--
	EBLTR	0.48	6.2	A	28.9	47.4	0.43	5.2	A	24.1	49.7
	WBLT	0.46	6.1	A	26.5	44.0	0.53	6.4	A	30.1	63.8
	WBR	0.03	3.4	A	0.0	2.5	0.03	3.0	A	0.0	2.7
	NBLTR	0.49	27.6	C	10.1	19.4	0.34	27.9	C	5.6	17.8
	SBLTR	0.50	27.7	C	10.6	20.0	0.25	27.1	C	4.3	13.0
Unsignalized											
Highway 6 and Blueline Road	EBLT	0.01	0.3	A	--	0.2	--	--	--	--	--
	WBLT	0.01	0.3	A	--	0.2	0.01	0.3	A	--	0.1
	NBLTR	0.19	19.7	C	--	5.7	0.13	16.6	C	--	3.6
	SBLTR	0.63	34.1	D	--	31.9	0.89	54.8	F	--	72.0
Highway 6 and Pheasant Trail / Blue Lake Avenue	WBLT	0.01	0.4	A	--	0.4	0.02	0.7	A	--	0.6
	EBLT	0.01	0.3	A	--	0.3	0.01	0.3	A	--	0.3
	NBLTR	0.24	29.5	D	--	7.0	0.15	30.5	D	--	4.0
	SBLTR	0.29	28.3	D	--	9.3	0.23	34.2	D	--	6.7
Highway 6 and Street B	EBLT	0.03	1.1	A	--	0.8	0.12	3.0	A	--	3.2
	SBLR	0.70	32.2	D	--	41.0	0.76	55.9	F	--	43.8

Under 2044 future total conditions, 10 years after full buildout, the study area intersections are expected to continue operating with acceptable LOS, with the following exceptions:

- The southbound approach (SBLTR) of the intersection of Highway 6 and Blueline Road operates at LOS F during the PM peak hour. The intersection experiences large southbound left turning traffic at the intersection, which largely consists of inbound traffic generated by the subject site. It should be noted, however, that the v/c is 0.89. Generally, a v./c 0f 0.90 would be considered critical. Under the current intersection control configuration at Highway 6 and Blueline Road, only the northbound and southbound approaches are stop controlled. As a result, northbound and southbound vehicles are required to wait a longer time to find a suitable gap, which is shown by the control delay of 54.8 s.
- The southbound approach (EBLT) approach of the intersection of Highway 6 and Street B operate at LOS F during the PM peak hour. However, the v/c is 0.79 and does not approach 0.90, indicating that there is available capacity at this approach. The F LOS is largely due to the delay experienced by vehicle turning onto Highway 6, which is 55.9 s. This is typical for intersections of a highway and a minor road, where the minor road is stop controlled.

5.6. Future Total Summary

With the introduction of the site generated traffic, the study area intersections are expected to continue to operate with overall acceptable LOS during the AM and PM peak hours in the years 2029, 2034, and 2039, and during the AM peak hour in the year 2044.

During the PM peak hour in the year 2044, 10 years after full buildout, the southbound approach at the intersection of Highway 6 and Blueline Road operates at LOS F. However, the v/c remains below 0.90, with delays expected to remain below one (1) minute. The southbound approach at the intersection of Highway 6 and Street B also operates at LOS F. However, the v/c is 0.79, with delays expected to remain below one (1) minute. At unsignalized intersections of a minor road and a two (2)-lane highway, it is typical for vehicles at the minor street approach to experience delays of up to one (1) minute, as the intersection configuration prioritises traffic flow on the major road. This operation condition is acceptable, given that the v/c indicated that the approach operates with available capacity.

The intersection of Highway 6 and Street B was modelled as an unsignalized intersection with the southbound approach (Street B) stop-controlled, with no auxiliary turning lanes. While the southbound approach is expected to operate at LOS F during the 2044 PM peak hour under this configuration, the v/c and delay indicate that the impact of the site generated traffic is acceptable.

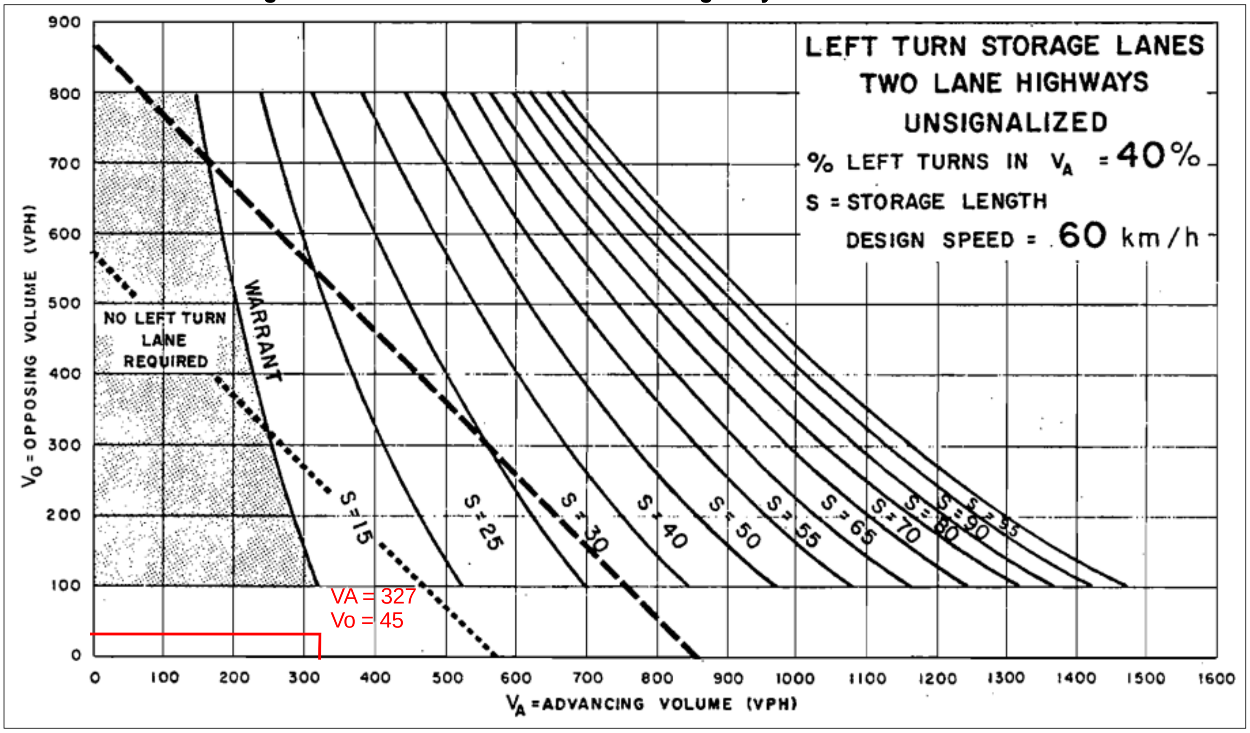
5.7. Improvements for Intersection of Highway 6 and Blueline Road

During the PM peak hour in the year 2044, the southbound approach of the intersection of Highway 6 and Blueline Road experiences operational issues due to the large southbound left turning volumes. A left turn lane warrant was assessed to determine the need to provide a left turn lane on the southbound approach of the intersection for vehicles turning left onto Highway 6, in accordance with Ontario Ministry of Transportation (MTO) Geometric Design Standards for Ontario Highways. The volume warrant was conducted using 2044 PM peak hour traffic volumes. The design parameters used in assessing the warrant are described below:

Design Speed = 60 km/h, the posted speed limit plus 10 km/h.
Advancing Volume, V_A = 327
Opposing Volume, V_O = 45
Left Turning Traffic Volume, V_L = 274
Percentage of Left-Turning Traffic = $(V_L / V_A) \times 100$ = 83%

The left turn warrant nomograph is shown in **Figure 5-5**.

Figure 5-5 – Left Turn Lane Warrant – Highway 6 and Blueline Road



The MTO Geometric Design Standards for Ontario Highways, left turn warrant nomographs are provided for left-turning percentages up to only 40%. The percentage of left-turning traffic at the intersection Highway 6 and Blueline Road during the 2044 PM peak hour is 83%. As shown in **Figure 5-5**, the point of intersection of the lines projected from the V_A and V_O values is outside the area of the warrant. Therefore, the MTO warrant is inconclusive.

To verify the implementation of a left turn lane, capacity analysis was conducted for the 2044 PM peak hour with a left turn lane providing a 25 m storage and 45 m taper. Capacity analysis is summarized in **Table 5.5**. Capacity analysis results are provided in **Appendix L**.

Table 5.5 – Capacity Analysis Summary –Highway 6 and Blueline Road with Southbound Left Turn Lane

Intersection	Movement	2044 PM Peak Hour			
		v/c	Delay (s)	LOS	95th Queue (m)
Highway 6 and Blueline Road	WBLT	0.01	0.3	A	0.1
	NBLTR	0.13	16.6	C	3.6
	SBL	0.76	39.0	E	49.7
	SBTR	0.13	14.3	B	3.4

As shown in **Table 5.5**, with a left-turn lane, the intersection of Highway 6 and Blueline Road operates with acceptable LOS at all approaches and v/c below 0.90. It is recommended that a left turn lane at the southbound approach be considered.

6.0 Highway 6 and Street B Intersection Control Alternatives

6.1. Description of Alternatives and Design Considerations

A high-level assessment of two (2) intersection control alternatives under the future total scenarios was undertaken. Scenario 1 considers the intersection as signalized, and Scenario 2 assesses the intersection as a roundabout.

6.1.1. Scenario 1 – Traffic Signals

In Scenario 1, the intersection of Highway 6 and Street B operates with signalized traffic control. The need for signalization was determined in accordance with the Ontario Traffic Manual (OTM) Book 12 Justification 7 under the conditions of a future intersection with forecast traffic volumes, where the warrant must meet the 150% requirement to justify signalization. Signal warrants were undertaken in the future total scenarios in the years 2029, 2034, 2039, and 2044. Signal warrants are summarized in **Table 6.1**. Signal warrant analysis sheets are provided in **Appendix M**.

Table 6.1– Signal Warrant Analysis

Scenario	Signal Warrant	Required	Signalization Warranted
Future Total 2029	Warrant 1: minimum vehicular volumes -1A: 94% 1B: 44% Warrant 2: delay to cross traffic – A: 75% B: 86%	150%	NO
Future Total 2034	Warrant 1: minimum vehicular volumes -1A: 109% 1B: 59% Warrant 2: delay to cross traffic – A: 87% B: 114%	150%	NO
Future Total 2039	Warrant 1: minimum vehicular volumes -1A: 115% 1B: 59% Warrant 2: delay to cross traffic – A: 93% B: 114%	150%	NO
Future Total 2044	Warrant 1: minimum vehicular volumes -1A: 123% 1B: 59% Warrant 2: delay to cross traffic – A: 100% B: 114%	150%	NO

Based on the forecast traffic volumes, signalization is not technically warranted in accordance with OTM Book 12 Justification 7 in all future total scenarios.

While the warrant for signalization is not met, for the purpose of evaluation of the intersection control alternatives the intersection was analyzed as signalized intersection. The signal timing was configured to use similar timing parameters as the existing signalized intersection of Highway 6 and Lynn Park Avenue / Thompson Drive. The signal timing parameters are detailed in **Table 6.2**.

Table 6.2 – Proposed Signal Timings

Phase	Parameter	Timing (s) (AM and PM)
Phase 2 & 6 EB-WB	Green Amber All Red Walk FDW	40 4 2 7 7
Phase 4 SB	Green Amber All Red Walk FDW	24 4 2 12 12

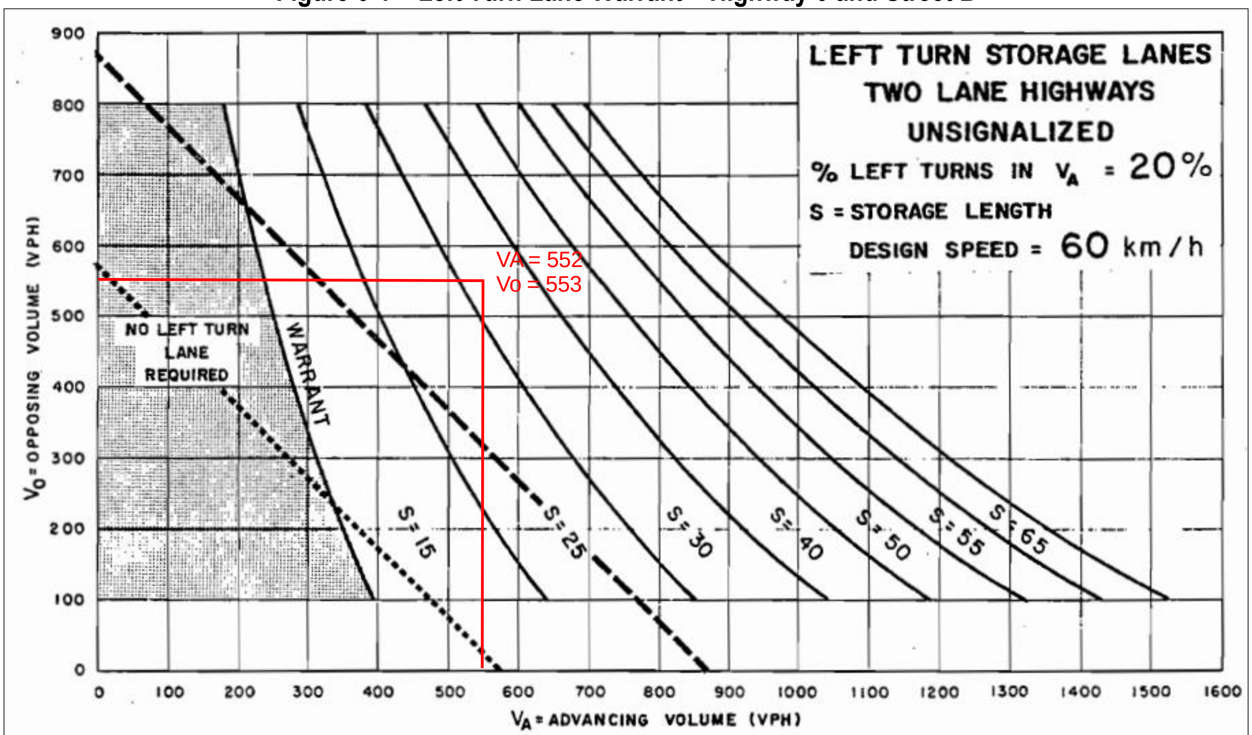
6.1.1.1 Auxiliary Turning Lanes

A left turn lane warrant was assessed to determine the need to provide a left turn lane on Highway 6 for vehicles turning left into Street B, in accordance with Ontario Ministry of Transportation (MTO) Geometric Design Standards for Ontario Highways. The volume warrant was conducted using 2044 PM peak hour traffic volumes. The design parameters used in assessing the warrant are described below:

Design Speed = 60 km/h, the posted speed limit plus 10 km/h.
Advancing Volume, V_A = 552
Opposing Volume, V_O = 553
Left Turning Traffic Volume, V_L = 109
Percentage of Left-Turning Traffic = (V_L / V_A) x 100 = 20%

The left turn warrant nomograph is shown in **Figure 6-1**.

Figure 6-1 – Left Turn Lane Warrant – Highway 6 and Street B



As shown in **Figure 6,1** based on the 2044 PM peak hour traffic volumes, a left turn lane is warranted. Based on the point of intersection of the lines projected from the V_A and V_O values, a storage of 30 m would be warranted. The proposed left turn lane was designed to have a 3.5 m width, 30 m storage length and a 55 m taper (15:1 taper ratio based on 60 km/h design speed).

6.1.2. Scenario 2 – Roundabout Intersection Control

In Scenario 2, the intersection of Highway 6 and the site access is modelled as a three-legged, single-lane roundabout with an inscribed circle diameter of 45 m and a circulatory lane width of 6.0 m.

6.2. Evaluation Criteria

6.2.1. Collision History

A historical record of collisions at the intersections of Highway 6 and Pheasant Trail and Highway 6 and Lynn Park Avenue showed that since the year 2022, only 3 vehicle collisions had occurred at these intersections. Three (3) were property damage only and one (1) was non-fatal. Based on the collision history in the area, potential collisions and the associated costs would not be the critical factor in determining the need for intersection improvements. Roundabouts are generally considered as a measure to enhance vehicle safety for intersections where vehicle collisions have historically been major issue. However, based on the collision data the installation of a roundabout as a safety measure is not warranted.

6.2.2. Level of Service

The intersection control alternatives were assessed with Future total 2044 PM peak hour traffic volumes, which are the worst forecast traffic conditions. The unsignalized configuration was modelled with the left turn lane. Capacity analysis was conducted using model in Synchro 10, in accordance with the methodology outlined in the Highway Capacity Manual (HCM 2000) published by the Transportation Research Board. The roundabout option was assessed in accordance with the HCM 2010 methodology. The detailed results are provided in **Appendix N** and summarized in **Table 6.3**.

Table 6.3 – Traffic Control Alternatives – LOS Summary

Highway 6 and Site Access	Movement	LOS	v/c
Unsignalized	EBL	A	0.12
	SBLR	F	0.76
Signalized	**Overall**	**A**	**0.48**
	EBL	A	0.24
	EBT	A	0.39
	WBTR	A	0.47
	SBLR	C	0.53
Roundabout	**Overall**	**B**	**--**
	EBLT	B	0.598
	WBTR	B	0.578
	SBLR	A	0.241

Under the unsignalized configuration, the implementation of the eastbound left turn lane on Highway 6 greatly improves the level of service and v/c at the eastbound approach. The southbound approach continues to operate at LOS F.

The intersection of Highway 6 and Street B operates with excellent LOS at all approaches with both signalized and roundabout traffic control configurations. In comparing the two alternatives, under signalized traffic control, the eastbound and westbound approaches operate with more available capacity than with the roundabout. With the roundabout, the southbound approach (Street B) operates with more available capacity than with signalization. However, no v/c values are near 1.00. The v/c values indicate that with traffic signal control, the turning traffic to and from Street B has a smaller impact on Highway 6.

6.2.3. Pedestrian Safety

A three-legged signalized intersection is generally more accommodating of pedestrian traffic than a roundabout, as it can have a crosswalk that is continuous with the sidewalks and a pedestrian signal. Pedestrian facilities in a single-lane roundabout would typically consist of a paved crosswalk which crosses the entrance / exit lanes at each approach. Raised splitter islands at the approach would have a curb cut to provide an area at-grade for pedestrian refuge. As there is no pedestrian signal, this would require more vigilance from pedestrians and drivers, with pedestrians having to cross two (2) directions of traffic per crossing. The roundabout pedestrian crossing would be set further back from the intersection to minimize crossing distance but would increase the total distance needed to cross the intersection. When considering pedestrian safety, a signalized intersection with a pedestrian crosswalk is a more practical option considering the site conditions. A roundabout provides no significant benefit over a signalized intersection in this aspect.

6.2.4. Land Requirements

According to the Norfolk County Official Plan, Highway 6, which is classified as an Arterial Road, has a 30 m right-of-way (ROW). When considering land impacts, it is evident that a 45 m roundabout would occupy significantly more area than signalized intersection. The proposed signalized intersection lane configuration, with the left turn lane, can be accommodated in the 30 m ROW without requiring conveyance of land.

6.3. Recommendation

A roundabout requires significantly more land are to implement in comparison to a signalized intersection. As previously stated, a single-lane roundabout with an ICD of 45 m cannot be accommodated within the existing 30 m ROW. Based on the criteria of pedestrian safety and risk vehicle collision, using a roundabout as a measure to enforce safety is not warranted, as vehicle collisions have historically not been a major issue in the area. The capacity analysis showed that under both signalized and roundabout configurations, the intersection operates with excellent LOS with traffic signals providing better performance on Highway 6 and a roundabout providing better performance on Street B. However, the operational benefits of providing a roundabout are not significant enough that they justify the land requirement.

It is recommended that the intersection of Highway 6 and Street be implemented as an unsignalized stop controlled intersection with the left turn lane at the eastbound approach. The intersection should be protected for signalization, which would include the installation of electrical hand wells, which does not require land dedication. The intersection would be monitored by County until traffic volumes warrant the need for the installation of traffic signals. As determined in through the capacity analysis, the intersection of Highway 6 and Street B is anticipated to begin experiencing LOS issues in the year 2044.

7.0 Internal Road Network Geometric Design

The configuration of the proposed new streets within the development were assessed in accordance with the guidelines of the Transportation Association of Canada 2017 Geometric Design Guide for Canadian Roads (the "TAC Manual") and County Guidelines. The design criteria are as follows:

Intersection spacing:

For the proposed internal road network, the intersection spacing and angles of intersection (skew angle) of the new streets must be designed to ensure effective operation and level of service. According to Section 9.4.2.3 of the TAC Manual, for intersections of local roads, the minimum spacing for four-legged intersections and three-legged intersections are 60 m and 40 m, respectively. As shown in the Draft Plan of Subdivision, all intersections of the new local streets are greater than 60 m, between the centerlines of each road.

Intersection Angle:

According to the TAC Manual, the design domain for skew angle is 70° to 90°. While it is ideal for roads to intersect at a 90° angle, angles below 90° are feasible if adequate sightlines and traffic control are provided.

Sight Triangles:

According to Section 3.31 of the Zoning By-law of Norfolk County 1-Z-2014, sight triangles of 9 m measured along street lines must be provided.

Intersection Curb Radius:

Curb radius requirements at intersections vary depending on site conditions, such as road classifications and the types of vehicles using the roads. For Lynn River Heights Phase 2, the internal road network is intended to accommodate local traffic. Curb radii of 9.0 m to 11.0 m are provided for intersections within the internal road network, which were verified through vehicle turning analysis.

The road dimensions are shown in an Internal Functional Plan in **Figure 7-1**. To verify the proposed road dimensions, AutoTURN software was used to generate a vehicular turning template to confirm and demonstrate the accessibility of the proposed study area. The AutoTURN analysis demonstrates that an emergency vehicle (HSU TAC-2017) can maneuver through the site without conflict. The AutoTURN diagrams are provided in **Figure 7-2**.

8.0 CONCLUSION

The findings and conclusions of the analysis are as follows:

- The site is proposed to have 449 residential dwelling units (393 single-detached units and 56 semi-detached units) and two (2) medium-density mixed-use future development blocks (Block 452 and Block 453) projected to provide 260 dwelling units. Access to the site will be provided from Highway 6 through an intersection with a new municipal street, Street B, and through extensions of Willowdale Crescent and Cardinal Lane from the east.
- Under existing conditions, the study area intersections operate at excellent levels of service (LOS) during AM and PM peak hours, with no intersection movements operation at an LOS worse that 'C'. No volume-to-capacity (v/c) ratios reach 1.00, indicating that all approaches have reserve capacity, and queueing and delays are at a minimum.
- Under the interim condition (2029), the 393 single-detached dwelling units 56 semi-detached dwelling units are anticipated to generate 302 new two (2)-way vehicle trips (80 inbound and 222 outbound) in the AM peak hour and 401 new two (2)-way vehicle trips (2250inbound and 151 outbound) in the PM peak hour.
- At full build-out, with the completion of the projected 260 units in Block 452 and Block 453, Lynn River Heights Phase 2 is expected to generate 4106two-way (105 inbound and 301 outbound) vehicle trips in the AM peak hour and 534 two-way (334 inbound and 200 outbound) vehicle trips in the PM peak hour.

- With the introduction of the site generated traffic, the study area intersections are expected to continue to operate with overall acceptable LOS during the AM and PM peak hours in the years 2029, 2034, and 2039, and during the AM peak hour in the year 2044.
- During the PM peak hour in the year 2044, 10 years after full buildout, the southbound approach at the intersection of Highway 6 and Blueline Road is operates at LOS F. However, the v/c remains below 0.90, with delays expected to remain below one (1) minute. The southbound approach at the intersection of Highway 6 and Street B also operates at LOS F. However, the v/c is 0.79, with delays expected to remain below one (1) minute.
- The intersection of Highway 6 and Street B was modelled as an unsignalized intersection with the southbound approach (Street B) stop-controlled, with no auxiliary turning lanes. While the southbound approach is expected to operate at LOS F during the 2044 PM peak hour under this configuration, the v/c and delay indicate that the impact of the site generated traffic is acceptable.
- Based on the forecast traffic volumes, signalization is not technically warranted in accordance with OTM Book 12 Justification 7 in all future total scenarios.
- Based on the MTO Left Turn Lane Warrant, an eastbound left turn lane at the intersection of Highway 6 and Street B is warranted based on projected traffic volumes in the year 2044. It is recommended that a left turn lane with 30 m storage and a 55 m taper be provided.
- In 2044 future total PM peak hour, both Option 1 (traffic signals) and Option 2 (roundabout) are expected to operate with overall excellent intersection LOS. When considering the intersection control alternatives, LOS is not a critical factor, based on the capacity analysis.
- It is recommended that a left turn lane at the southbound approach be considered at the intersection of Highway 6 and Blueline Road based on projected traffic volumes in the year 2044.
- Under both signalized and roundabout configurations, the intersection operates with excellent LOS with traffic signals providing better performance on Highway 6 and a roundabout providing better performance on Street B. However, the operational benefits of providing a roundabout are not significant enough that they justify the land requirement to implement.
- The AutoTURN analysis demonstrates that an emergency vehicle (HSU TAC-2017) can maneuver through the site without conflict.

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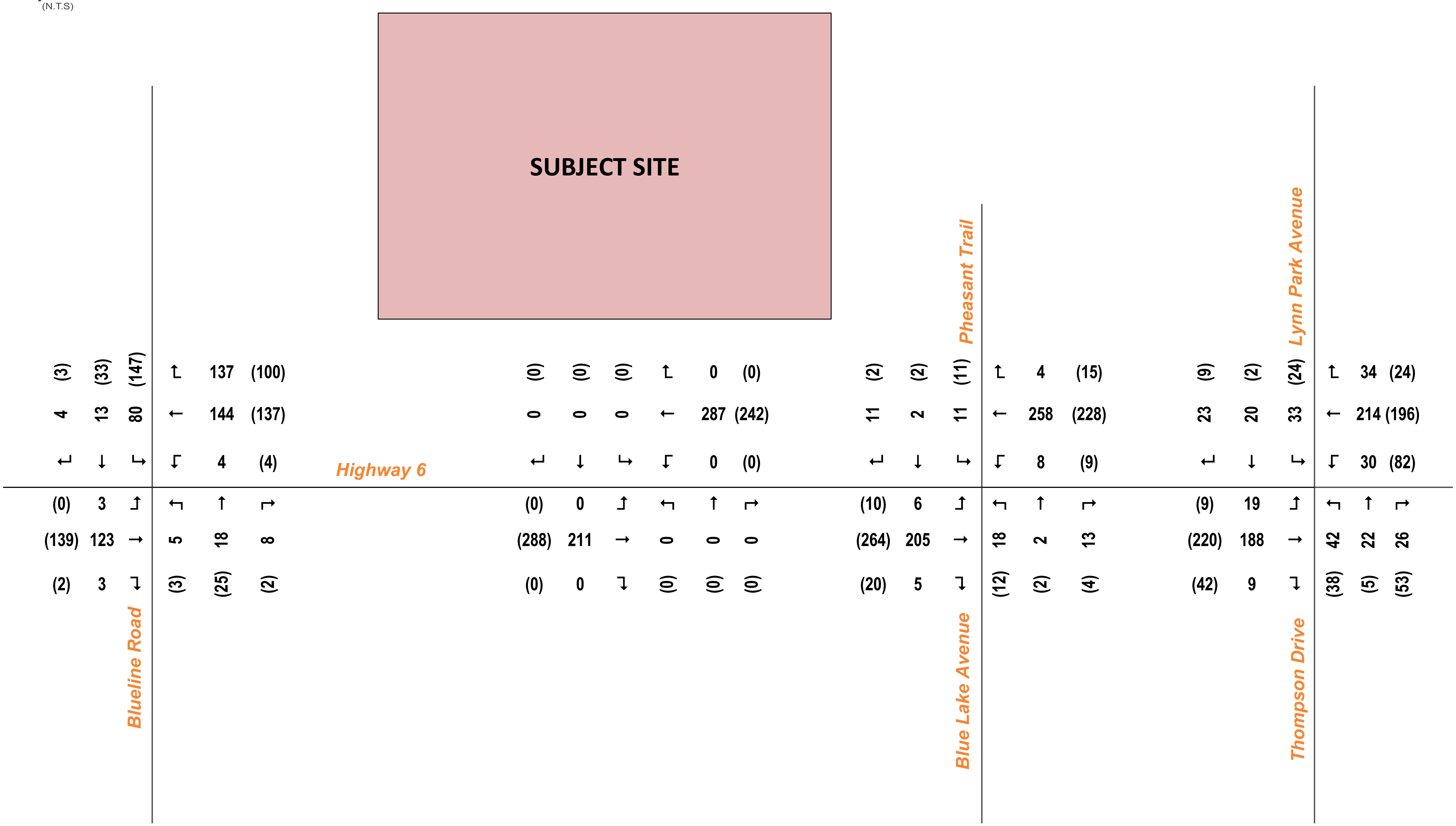
Project North
(N.T.S)



LEGEND

XX Weekday AM Peak Hour Volumes
(XX) Weekday PM Peak Hour Volumes

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Figure 2-3 - Existing Traffic Volumes

Lynn River Heights Phase 2
Noroflk County
Project No. NT-23-233
April 2024

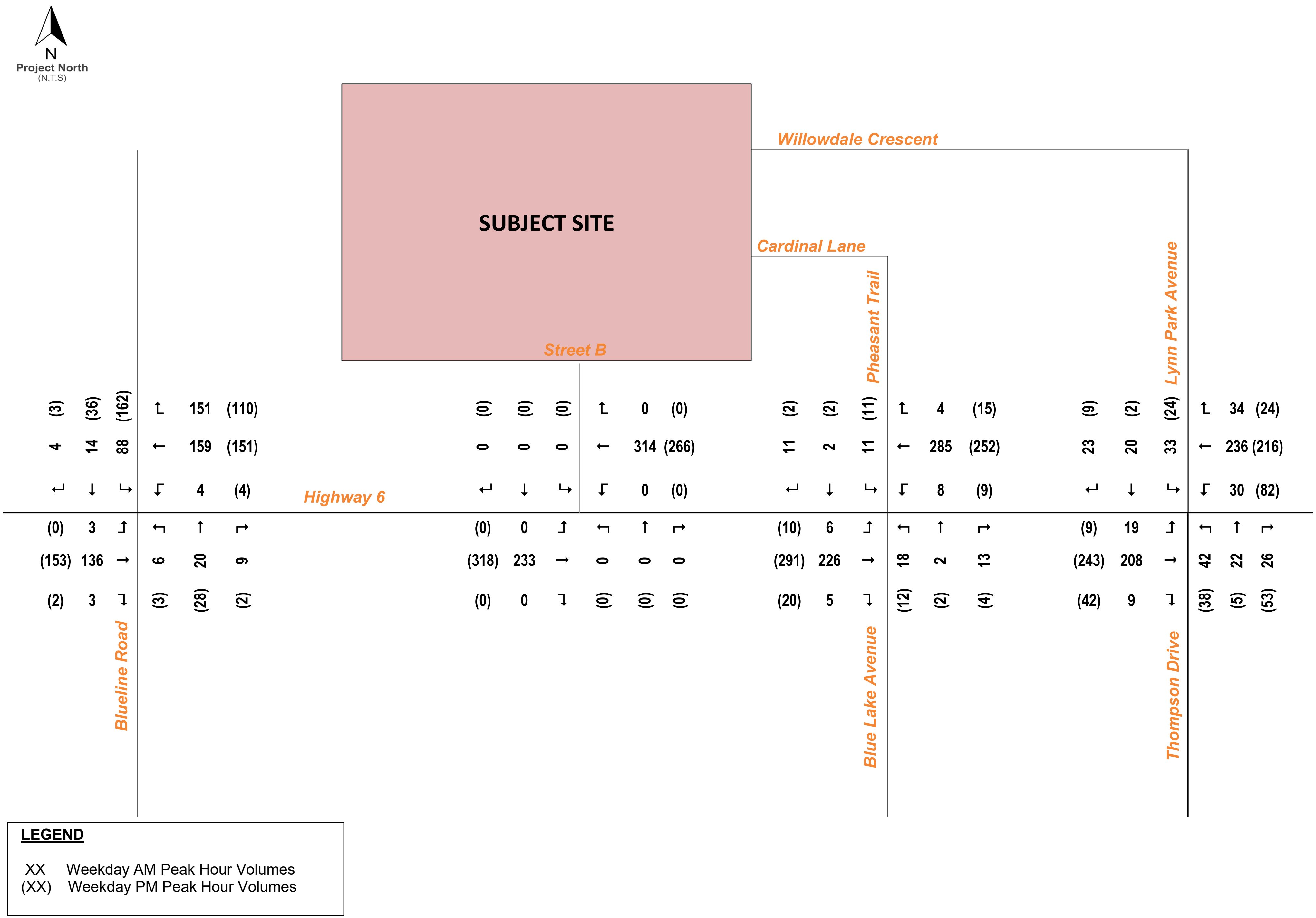

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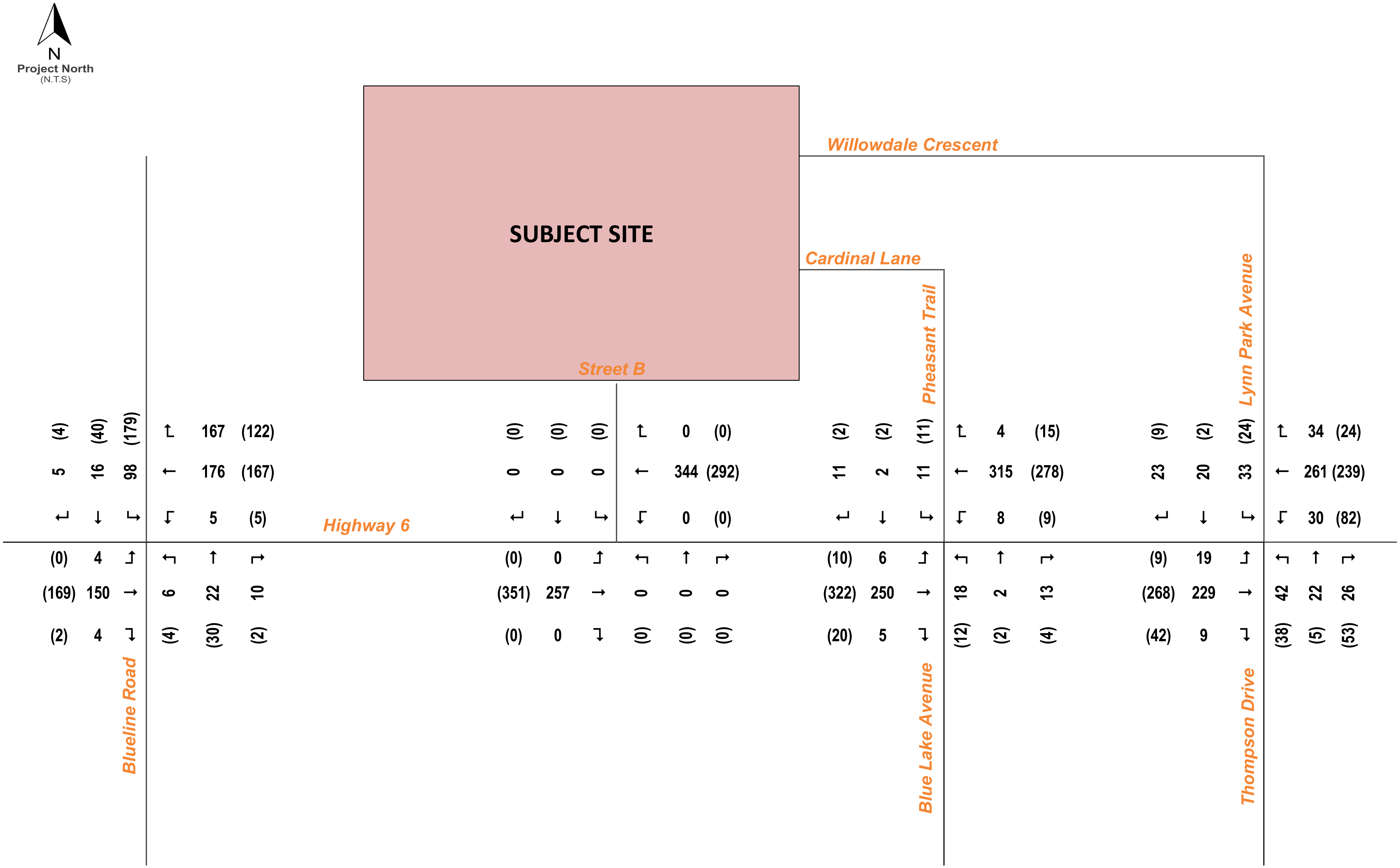
Figure 3-1 - 2029 Future Background Traffic Volumes

Lynn River Heights Phase 2
Noroflk County
Project No. NT-23-233
April 2024



LEGEND

XX Weekday AM Peak Hour Volumes
(XX) Weekday PM Peak Hour Volumes

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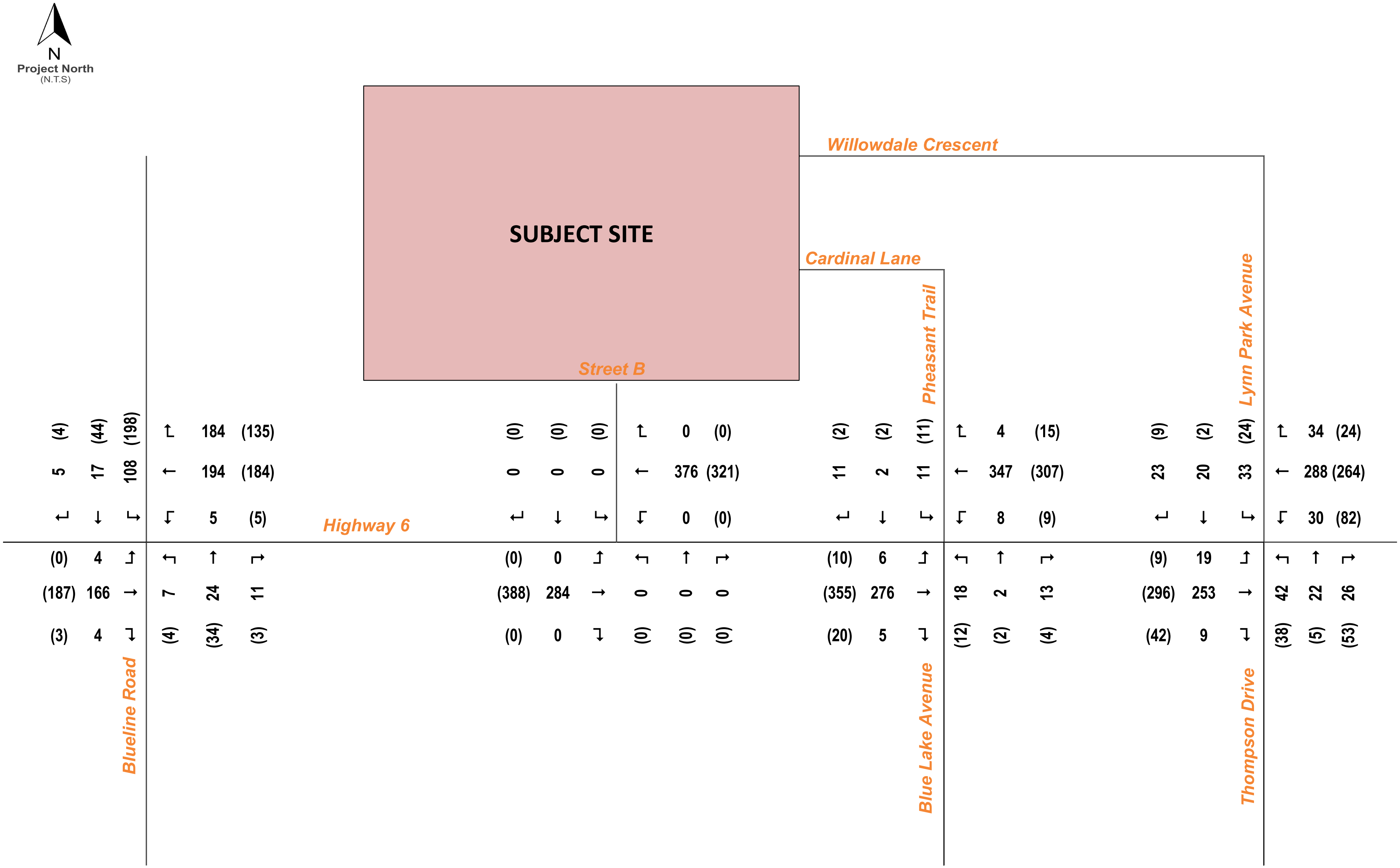
Figure 3-2 - 2034 Future Background Traffic Volumes

Lynn River Heights Phase 2
Noroflk County
Project No. NT-23-233
April 2024



LEGEND

XX Weekday AM Peak Hour Volumes
(XX) Weekday PM Peak Hour Volumes

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Figure 3-3 - 2039 Future Background Traffic Volumes

Lynn River Heights Phase 2
Noroflk County
Project No. NT-23-233
April 2024

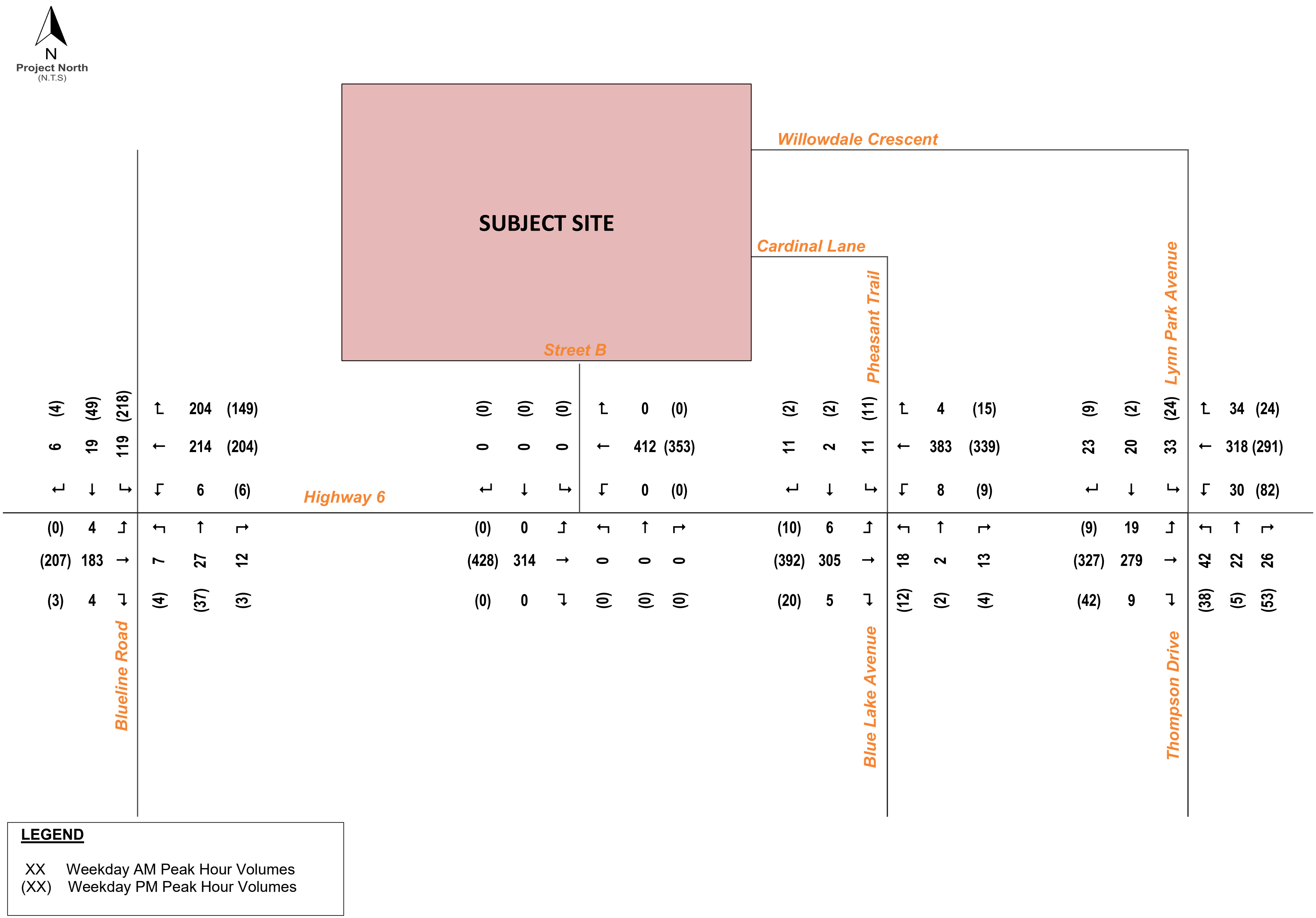

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Figure 3-4 - 2044 Future Background Traffic Volumes

Lynn River Heights Phase 2
Noroflk County
Project No. NT-23-233
April 2024

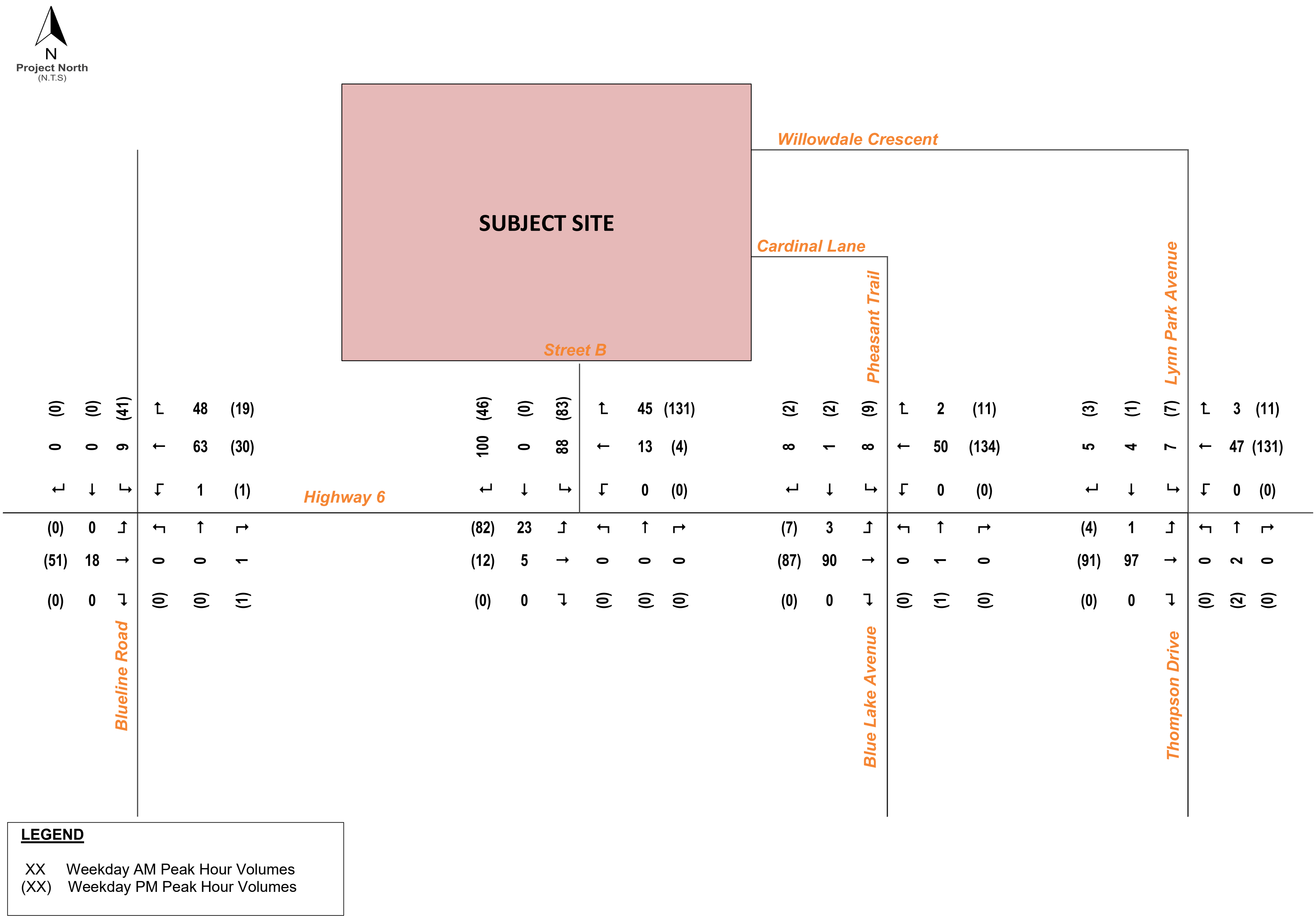

Figure 4-2 - 2029 Site GeneratedTraffic Volumes

Lynn River Heights Phase 2
Noroflk County
Project No. NT-23-233
April 2024

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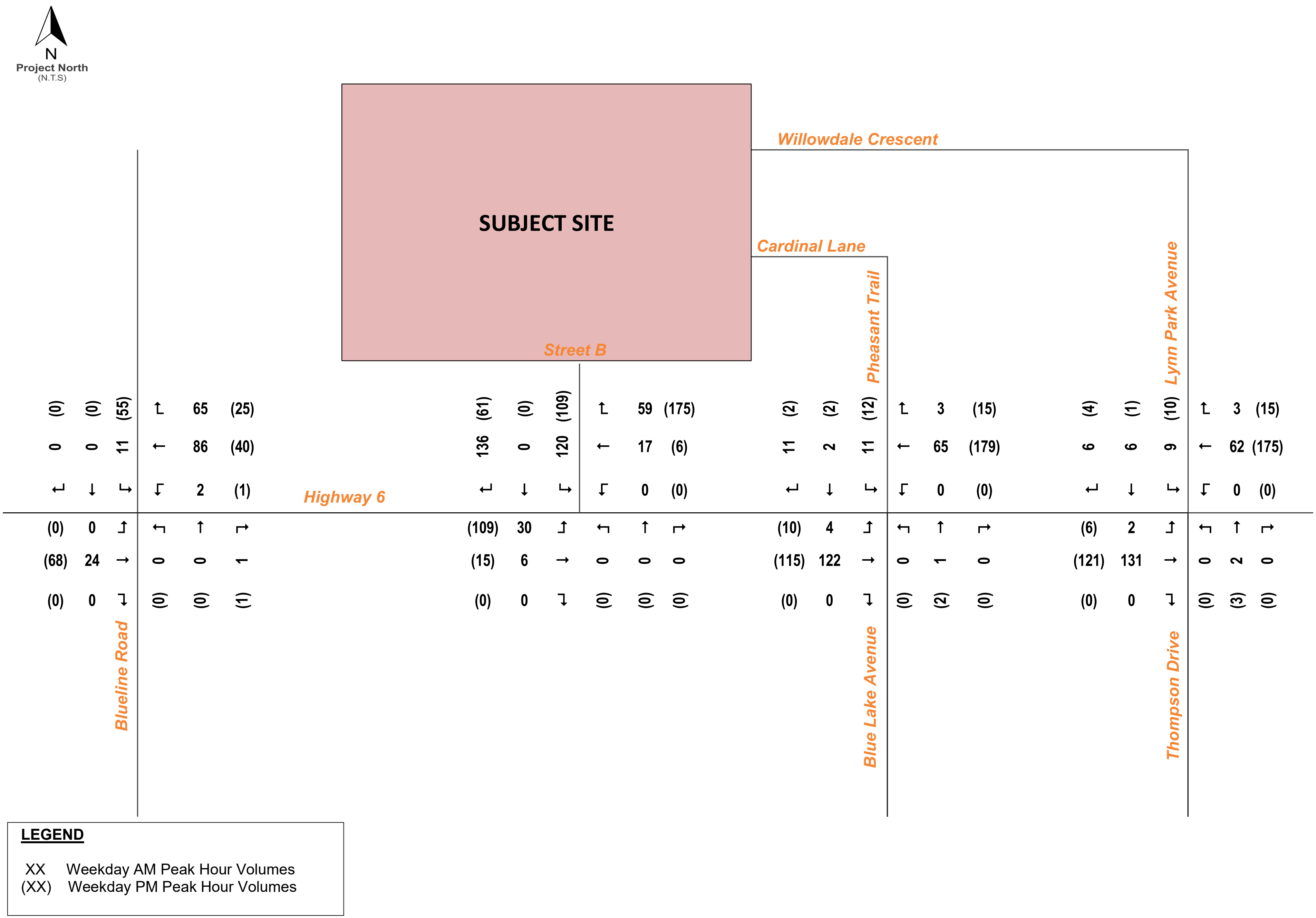

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Figure 4-3 - Site Generated Traffic Volumes (Full Buildout)

Lynn River Heights Phase 2
Noroflk County
Project No. NT-23-233
April 2024

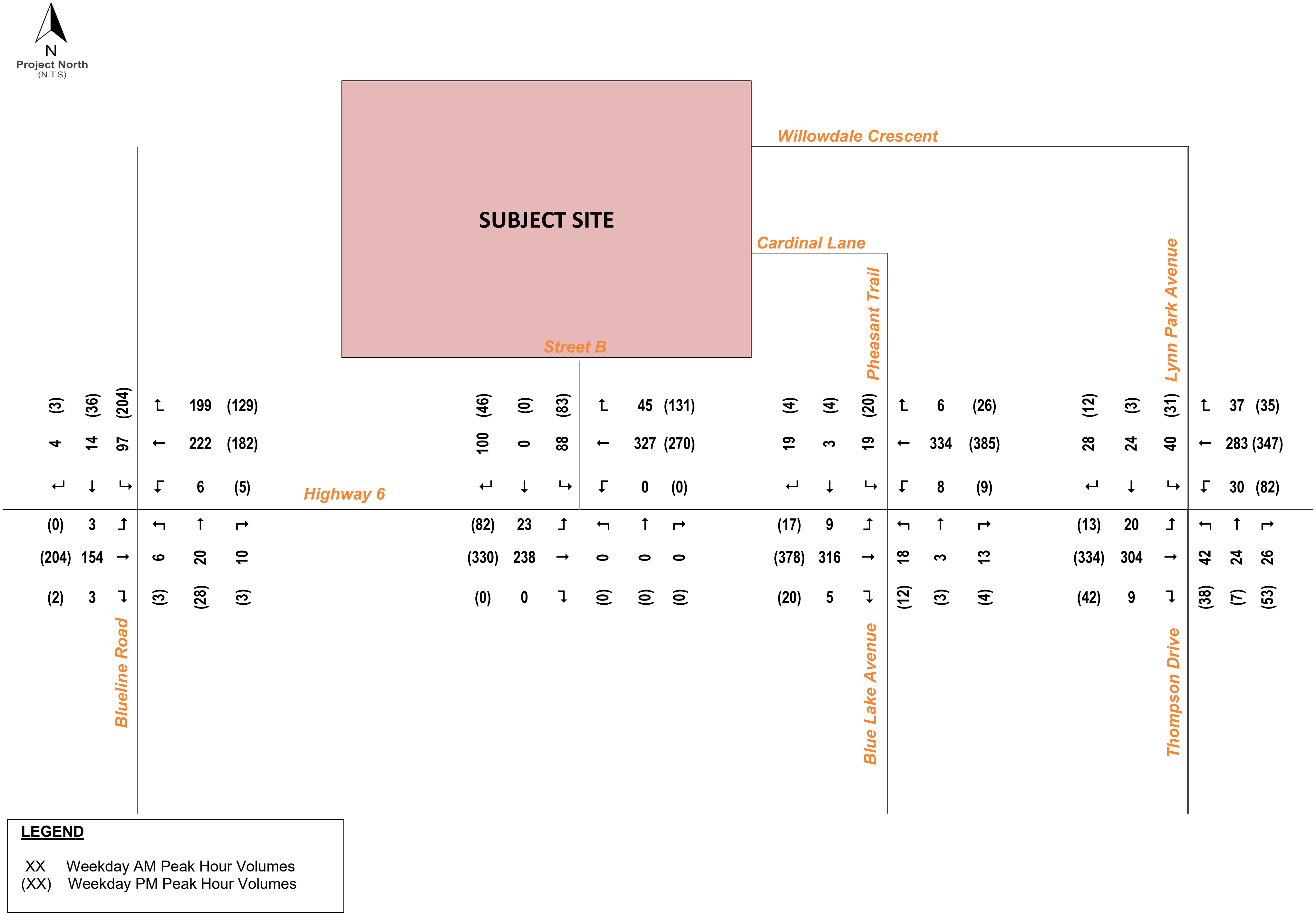

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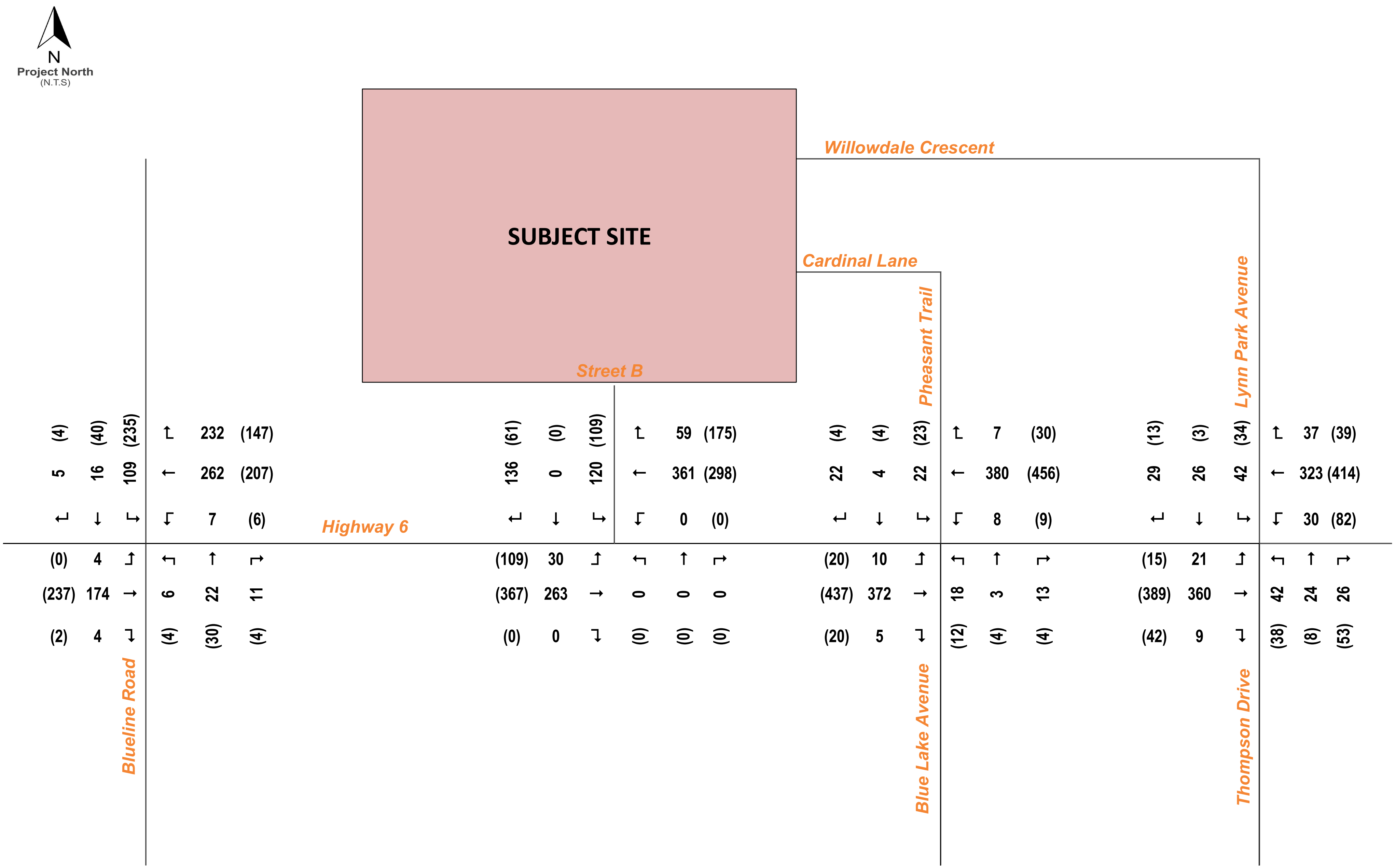
Figure 5-1 - 2029 Future Total Traffic Volumes

Lynn River Heights Phase 2
Noroflk County
Project No. NT-23-233
April 2024



LEGEND

XX Weekday AM Peak Hour Volumes
(XX) Weekday PM Peak Hour Volumes

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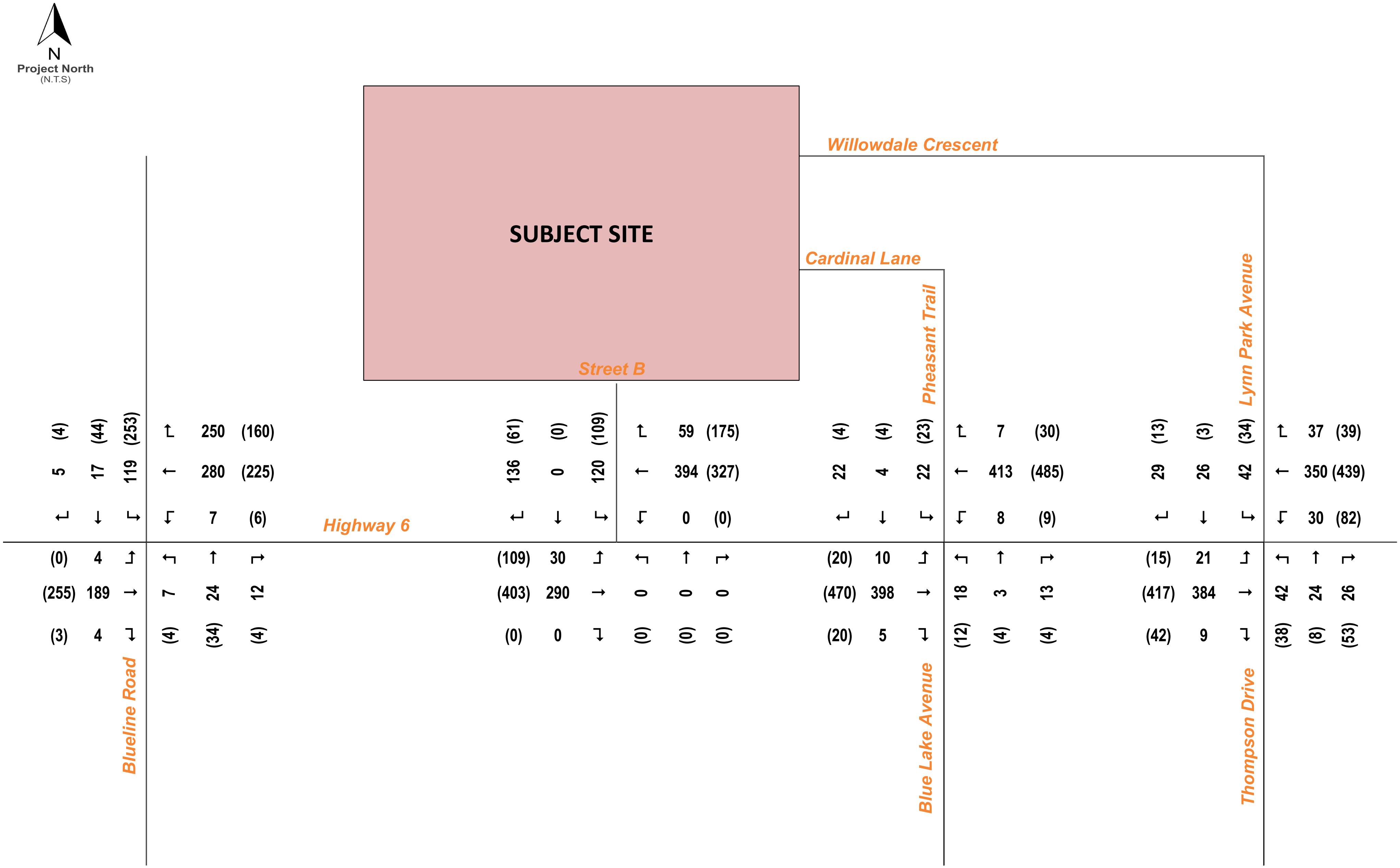
Figure 5-2 - 2034 Future Total Traffic Volumes

Lynn River Heights Phase 2
Noroflk County
Project No. NT-23-233
April 2024



LEGEND

XX Weekday AM Peak Hour Volumes
(XX) Weekday PM Peak Hour Volumes

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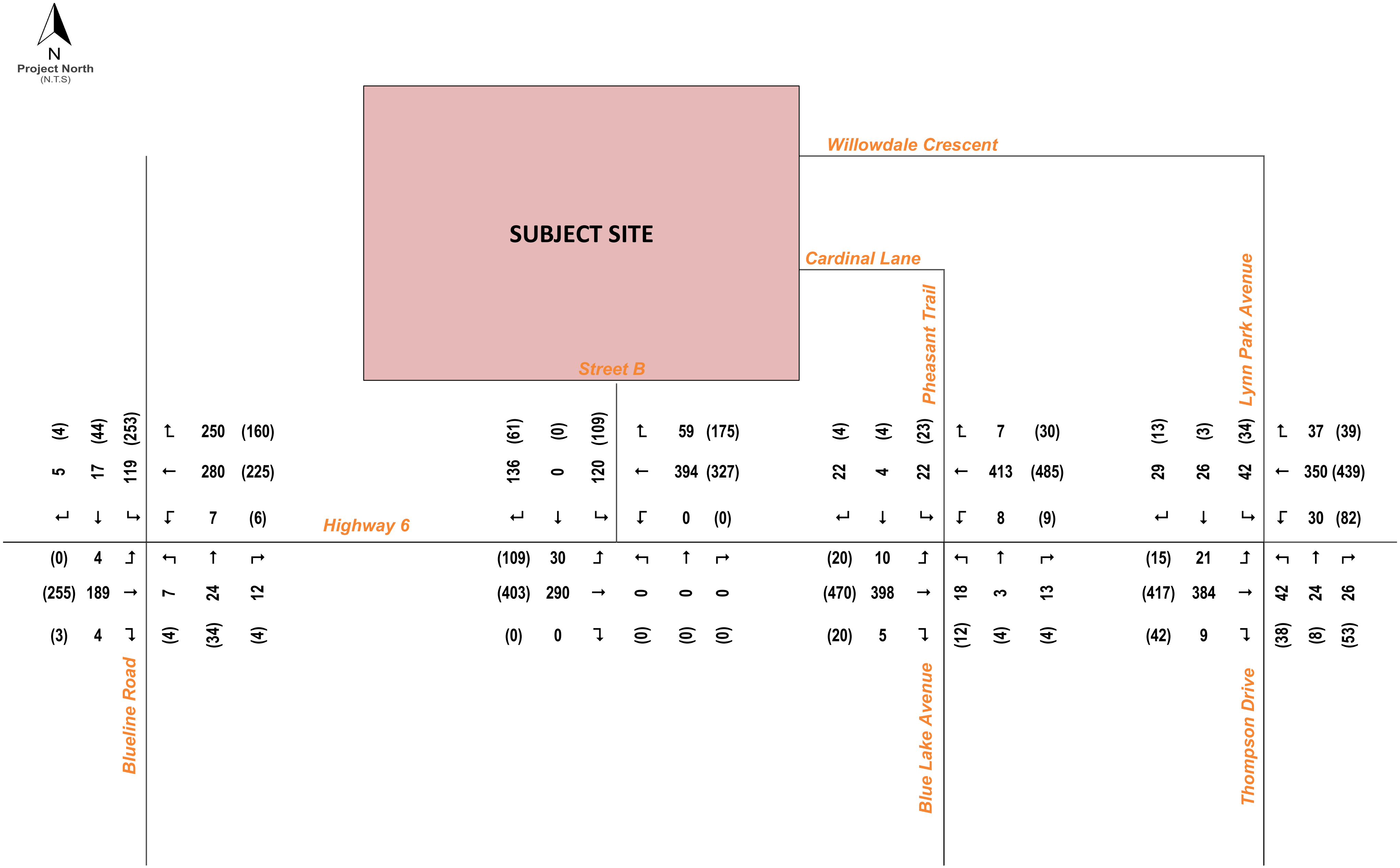
Figure 5-3 - 2039 Future TotalTraffic Volumes

Lynn River Heights Phase 2
Noroflk County
Project No. NT-23-233
April 2024



LEGEND

XX Weekday AM Peak Hour Volumes
(XX) Weekday PM Peak Hour Volumes

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Figure 5-4 - 2044 Future TotalTraffic Volumes

Lynn River Heights Phase 2
Noroflk County
Project No. NT-23-233
April 2024

KEY PLAN

BENCHMARK

REVISONS

NO	REVISION	DATE	BY

STAMP

nexTrans
CONSULTING ENGINEERS
Suite 201, 520 Industrial Parkway South
Aurora ON L4G 6W8
Tel: 905-503-2563
Web: www.nextrans.ca

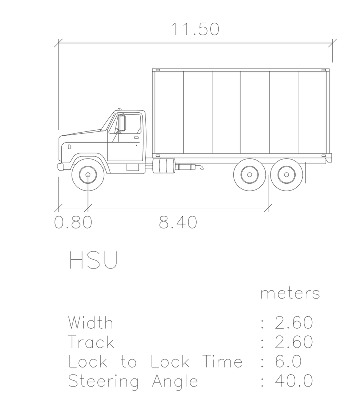
PROJECT NAME:
LYNN RIVER HEIGHTS PHASE 2
NORFOLK COUNTY

DRAWING TITLE:
INTERNAL FUNCTIONAL PLAN

DESIGN BY: K.A.	DATE: April 3, 2024
CHECKED BY: R.P.	PROJECT NO. NT-23-233
DRAWN BY: K.A.	
SCALE: 1:1500	DRAWING NO. Figure 7-1

KEY PLAN

Design Vehicle



REVISONS

NO.	REVISION	DATE	BY

STAMP

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Aurora ON L4G 6W8
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Web: www.nextrans.ca

PROJECT NAME:
LYNN RIVER HEIGHTS PHASE 2
NORFOLK COUNTY

DRAWING TITLE:
AUTOTURN ANALYSIS
HSU TAC-2017

DESIGN BY: K.A.	DATE: April 3, 2024
CHECKED BY: R.P.	PROJECT NO. NT-23-233
DRAWN BY: K.A.	
SCALE: 1:1500	DRAWING NO. Figure 7-2

Appendix A – Proposed Draft Plan of Subdivision

Legal Description

LYNN RIVER HEIGHTS PHASE 2
PART OF LOT 8, CONCESSION 2, GEOGRAPHIC
TOWNSHIP OF WOODHOUSE
NOW IN NORFOLK COUNTY

Owner's Certificate

I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.

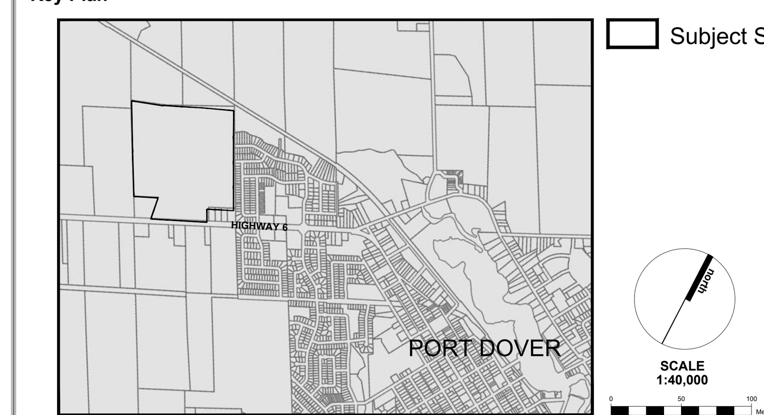
DATE: March 2024 — DEMOCRAT PORT DOVER LIMITED.

Surveyor's Certificate

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

DATE: JUNE 2017 — KIM S. HUSTED, - O.L.S.

Key Plan



Revision No.	Date	Issued / Revision	By

Additional Information Required Under Section 51(17) of the Planning Act R.S.O. 1990, c.P.13 as Amended

A. As Shown
B. As Shown
C. As Shown
D. Residential, Employment, Commercial, Park, Stormwater Management, Open Space
E. As Shown
F. As Shown
G. As Shown
H. Municipal Water Supply
I. Loam
J. As Shown
K. All Services As Required
L. As Shown

Description	Lots/Blocks	Units	Area
9.0m Semi Detached	260-307, 434-441	56	1.69ha/4.18ac
10m Single Detached	227-259,308-319,423-433, 442-449	64	2.17ha/5.38ac
12m Single Detached	1-9, 89-150, 201-214, 320-339,371-378, 393-422	139	5.74ha/14.19ac
15m Single Detached	10-88, 151-200, 215-226, 340-370,379-392	190	11.20ha/27.67ac
Total Residential	1-449	449	**20.83ha/51.45ac**
20m ROW	Street A-J, Cardinal Lane, Willowdale Crescent	N/A	8.78ha/21.69ac
Total Roadways			**8.77ha/21.69ac**
Walkway/Access	455,456	N/A	0.04ha/0.10ac
Parks & Open Space	450	N/A	0.58ha/1.44ac
SWM	451	N/A	1.52ha/3.74ac
6m Buffer	457	N/A	0.44ha/1.09ac
Hazard	458	N/A	4.35ha/10.76ac
Future Development	452, 453	N/A	3.21ha/7.95ac
Future Road Access	454	N/A	0.06ha/0.15ac
0.3 Reserves* (already included in lot area calculations)	459-518	N/A	0.05ha/0.12ac
Drainage	519	N/A	0.03ha/0.07ac
Total Other	69 (Blocks 450 - 519)		**10.28ha/25.42ac**

Total Draft Plan of Subdivision: 39.88ha/98.54ac

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
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Stamp	
Date	March 14, 2024
File No.	08103-B
Plan Scale	1:1500 (Arch D)
Drawn By	P.B.
Checked By	D.W.
Other	

Project

LYNN RIVER HEIGHTS PHASE 2

north

File Name DRAFT PLAN OF SUBDIVISION

Dwg No. 1 of 1

Scale Bar 0 2 4 Meters

N:\08103\B - Lynn River Heights Phase II, Port Dover\6 - Tech Production\1-Final Figures\DPOS\CAD

Appendix B – Existing Traffic Data

NexTrans
SUITE 204 15260 YONGE ST
AURORA ONTARIO, L4G 1N4
CANADA

Turning Movement Count (1 . HWY 6 & BLUELINE RD)

Start Time	Southbound BLUELINE RD						Westbound HWY 6						Northbound BLUELINE RD						Eastbound HWY 6						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
07:00:00	1	1	8	0	0	10	10	11	0	0	0	21	0	3	1	0	0	4	0	7	0	0	0	7	42	
07:15:00	0	1	8	0	0	9	13	16	0	0	0	29	0	2	0	0	0	2	0	11	0	0	0	11	51	
07:30:00	2	1	12	0	0	15	17	36	1	0	0	54	0	11	1	0	0	12	0	13	0	0	0	13	94	
07:45:00	1	2	14	0	0	17	17	23	0	0	0	40	0	3	0	0	0	3	0	19	0	0	0	19	79	266
08:00:00	0	3	24	0	0	27	15	26	0	0	0	41	2	2	0	0	0	4	2	14	1	0	0	17	89	313
08:15:00	1	5	14	0	0	20	26	41	0	0	0	67	1	4	1	0	0	6	1	18	1	0	0	20	113	375
08:30:00	1	1	21	0	0	23	31	41	1	0	0	73	3	4	0	0	0	7	1	27	1	0	0	29	132	413
08:45:00	2	3	25	0	0	30	42	38	3	0	0	83	2	2	2	0	0	6	0	51	1	0	0	52	171	505
09:00:00	0	4	20	0	0	24	38	24	0	0	0	62	2	8	2	0	0	12	1	27	0	0	0	28	126	542
09:15:00	1	6	13	0	0	20	20	20	1	0	0	41	0	3	0	0	0	3	0	31	1	0	2	32	96	525
09:30:00	0	3	16	0	0	19	20	26	0	0	0	46	1	3	1	0	0	5	0	13	1	0	2	14	84	477
09:45:00	0	1	16	0	0	17	14	24	1	0	0	39	2	0	1	0	0	3	0	35	0	0	0	35	94	400
BREAK																										
16:00:00	1	7	30	0	0	38	30	40	1	0	0	71	1	5	0	0	0	6	0	25	0	0	0	25	140	
16:15:00	1	14	34	0	0	49	20	27	1	0	0	48	0	9	3	0	0	12	1	33	0	0	0	34	143	
16:30:00	0	3	40	0	0	43	27	43	0	0	0	70	0	11	0	0	0	11	1	28	0	0	0	29	153	
16:45:00	1	9	43	0	0	53	23	27	2	0	0	52	1	0	0	0	0	1	0	53	0	0	0	53	159	595
17:00:00	1	4	28	0	0	33	25	31	3	0	0	59	0	4	0	0	0	4	0	31	1	0	0	32	128	583
17:15:00	1	10	41	0	0	52	18	16	1	0	0	35	3	6	1	0	0	10	0	50	0	0	0	50	147	587
17:30:00	0	5	22	0	0	27	22	22	1	0	0	45	0	3	1	0	0	4	0	28	0	0	0	28	104	538
17:45:00	1	1	19	0	0	21	19	18	0	0	0	37	2	2	0	0	0	4	1	27	0	0	0	28	90	469
18:00:00	1	5	16	0	0	22	18	25	1	0	0	44	0	1	0	0	0	1	1	29	0	0	0	30	97	438
18:15:00	0	1	27	0	0	28	16	31	0	0	0	47	0	2	1	0	0	3	1	27	0	0	0	28	106	397
18:30:00	1	1	14	0	0	16	14	21	0	0	0	35	0	3	1	0	0	4	0	9	0	0	0	9	64	357
18:45:00	1	3	15	0	0	19	15	13	0	0	0	28	0	0	0	0	0	0	0	18	0	0	0	18	65	332
Grand Total	18	94	520	0	0	632	510	640	17	0	0	1167	20	91	16	0	0	127	10	624	7	0	4	641	**2567**	-
Approach%	2.8%	14.9%	82.3%	0%		-	43.7%	54.8%	1.5%	0%		-	15.7%	71.7%	12.6%	0%		-	1.6%	97.3%	1.1%	0%		-	-	-
Totals %	0.7%	3.7%	20.3%	0%		24.6%	19.9%	24.9%	0.7%	0%		45.5%	0.8%	3.5%	0.6%	0%		4.9%	0.4%	24.3%	0.3%	0%		25%	-	-
Heavy	0	1	8	0		-	6	13	1	0		-	1	3	0	0		-	1	8	1	0		-	-	-
Heavy %	0%	1.1%	1.5%	0%		-	1.2%	2%	5.9%	0%		-	5%	3.3%	0%	0%		-	10%	1.3%	14.3%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-

Spectrum

Turning Movement Count
Location Name: HWY 6 & BLUELINE RD
Date: Tue, Jan 16, 2024 Deployment Lead: David Chu

NexTrans
SUITE 204 15260 YONGE ST
AURORA ONTARIO, L4G 1N4
CANADA

Peak Hour: 08:15 AM - 09:15 AM Weather: Light Snow (-10.37 °C)

Start Time	Southbound BLUELINE RD						Westbound HWY 6						Northbound BLUELINE RD						Eastbound HWY 6						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
08:15:00	1	5	14	0	0	20	26	41	0	0	0	67	1	4	1	0	0	6	1	18	1	0	0	20	113
08:30:00	1	1	21	0	0	23	31	41	1	0	0	73	3	4	0	0	0	7	1	27	1	0	0	29	132
08:45:00	2	3	25	0	0	30	42	38	3	0	0	83	2	2	2	0	0	6	0	51	1	0	0	52	171
09:00:00	0	4	20	0	0	24	38	24	0	0	0	62	2	8	2	0	0	12	1	27	0	0	0	28	126
Grand Total	4	13	80	0	0	97	137	144	4	0	0	285	8	18	5	0	0	31	3	123	3	0	0	129	**542**
Approach%	4.1%	13.4%	82.5%	0%		-	48.1%	50.5%	1.4%	0%		-	25.8%	58.1%	16.1%	0%		-	2.3%	95.3%	2.3%	0%		-	-
Totals %	0.7%	2.4%	14.8%	0%		17.9%	25.3%	26.6%	0.7%	0%		52.6%	1.5%	3.3%	0.9%	0%		5.7%	0.6%	22.7%	0.6%	0%		23.8%	-
PHF	0.5	0.65	0.8	0		0.81	0.82	0.88	0.33	0		0.86	0.67	0.56	0.63	0		0.65	0.75	0.6	0.75	0		0.62	-
Heavy	0	0	4	0		4	4	8	0	0		12	1	1	0	0		2	0	6	1	0		7	-
Heavy %	0%	0%	5%	0%		4.1%	2.9%	5.6%	0%	0%		4.2%	12.5%	5.6%	0%	0%		6.5%	0%	4.9%	33.3%	0%		5.4%	-
Lights	4	13	76	0		93	133	136	4	0		273	7	17	5	0		29	3	117	2	0		122	-
Lights %	100%	100%	95%	0%		95.9%	97.1%	94.4%	100%	0%		95.8%	87.5%	94.4%	100%	0%		93.5%	100%	95.1%	66.7%	0%		94.6%	-
Single-Unit Trucks	0	0	2	0		2	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Single-Unit Trucks %	0%	0%	2.5%	0%		2.1%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Buses	0	0	2	0		2	3	8	0	0		11	1	1	0	0		2	0	6	1	0		7	-
Buses %	0%	0%	2.5%	0%		2.1%	2.2%	5.6%	0%	0%		3.9%	12.5%	5.6%	0%	0%		6.5%	0%	4.9%	33.3%	0%		5.4%	-
Articulated Trucks	0	0	0	0		0	1	0	0	0		1	0	0	0	0		0	0	0	0	0		0	-
Articulated Trucks %	0%	0%	0%	0%		0%	0.7%	0%	0%	0%		0.4%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-

NexTrans
SUITE 204 15260 YONGE ST
AURORA ONTARIO, L4G 1N4
CANADA

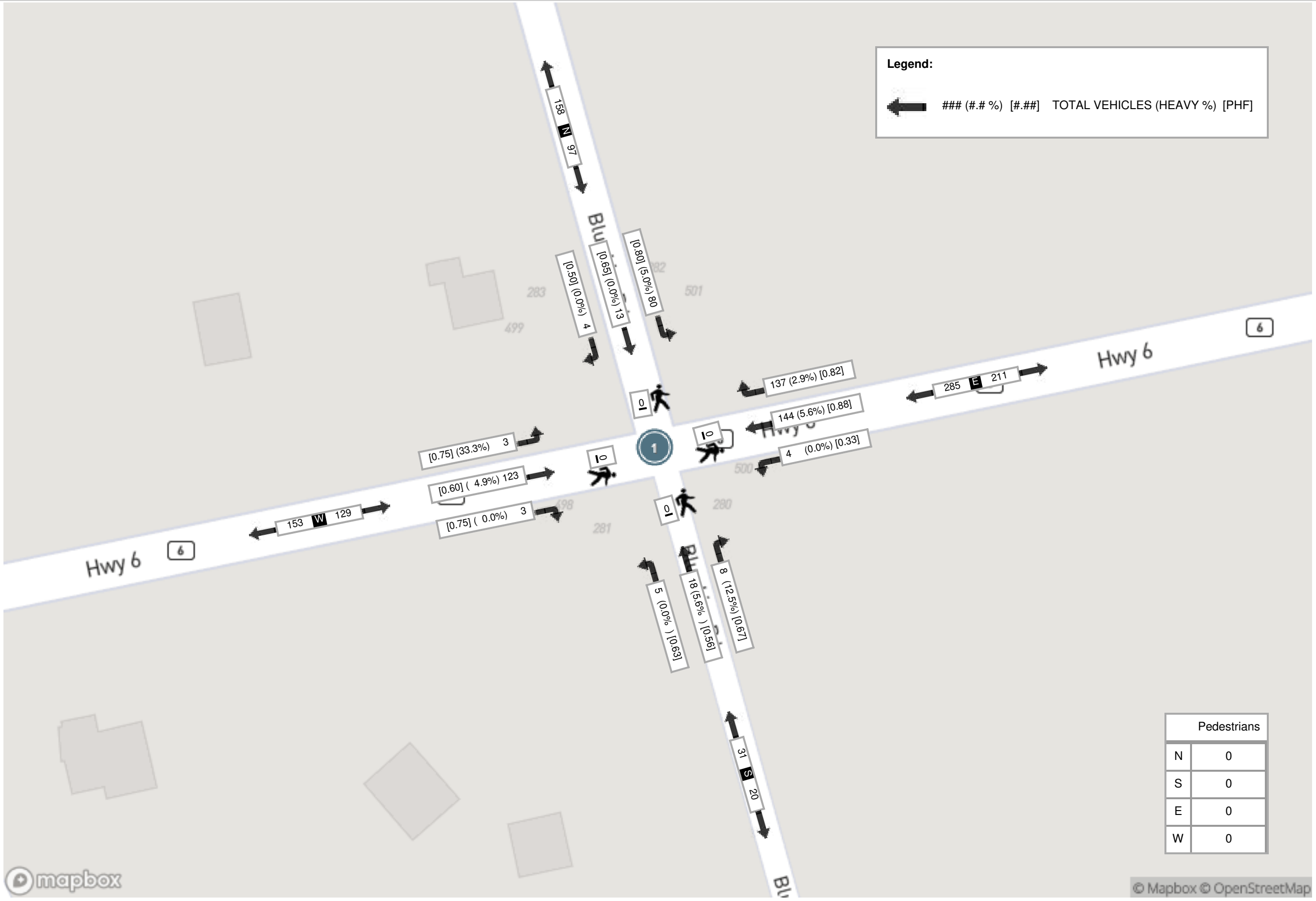
Peak Hour: 04:00 PM - 05:00 PM Weather: Overcast Clouds (-8.73 °C)

Start Time	Southbound BLUELINE RD						Westbound HWY 6						Northbound BLUELINE RD						Eastbound HWY 6						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:00:00	1	7	30	0	0	38	30	40	1	0	0	71	1	5	0	0	0	6	0	25	0	0	0	25	140
16:15:00	1	14	34	0	0	49	20	27	1	0	0	48	0	9	3	0	0	12	1	33	0	0	0	34	143
16:30:00	0	3	40	0	0	43	27	43	0	0	0	70	0	11	0	0	0	11	1	28	0	0	0	29	153
16:45:00	1	9	43	0	0	53	23	27	2	0	0	52	1	0	0	0	0	1	0	53	0	0	0	53	159
Grand Total	3	33	147	0	0	183	100	137	4	0	0	241	2	25	3	0	0	30	2	139	0	0	0	141	**595**
Approach%	1.6%	18%	80.3%	0%		-	41.5%	56.8%	1.7%	0%		-	6.7%	83.3%	10%	0%		-	1.4%	98.6%	0%	0%		-	-
Totals %	0.5%	5.5%	24.7%	0%		30.8%	16.8%	23%	0.7%	0%		40.5%	0.3%	4.2%	0.5%	0%		5%	0.3%	23.4%	0%	0%		23.7%	-
PHF	0.75	0.59	0.85	0		0.86	0.83	0.8	0.5	0		0.85	0.5	0.57	0.25	0		0.63	0.5	0.66	0	0		0.67	-
Heavy	0	1	0	0		1	2	0	0	0		2	0	1	0	0		1	0	2	0	0		2	-
Heavy %	0%	3%	0%	0%		0.5%	2%	0%	0%	0%		0.8%	0%	4%	0%	0%		3.3%	0%	1.4%	0%	0%		1.4%	-
Lights	3	32	147	0		182	98	137	4	0		239	2	24	3	0		29	2	137	0	0		139	-
Lights %	100%	97%	100%	0%		99.5%	98%	100%	100%	0%		99.2%	100%	96%	100%	0%		96.7%	100%	98.6%	0%	0%		98.6%	-
Single-Unit Trucks	0	0	0	0		0	2	0	0	0		2	0	0	0	0		0	0	1	0	0		1	-
Single-Unit Trucks %	0%	0%	0%	0%		0%	2%	0%	0%	0%		0.8%	0%	0%	0%	0%		0%	0%	0.7%	0%	0%		0.7%	-
Buses	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	-
Buses %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0.7%	0%	0%		0.7%	-
Articulated Trucks	0	1	0	0		1	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	-
Articulated Trucks %	0%	3%	0%	0%		0.5%	0%	0%	0%	0%		0%	0%	4%	0%	0%		3.3%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-

Turning Movement Count
Location Name: HWY 6 & BLUELINE RD
Date: Tue, Jan 16, 2024 Deployment Lead: David Chu

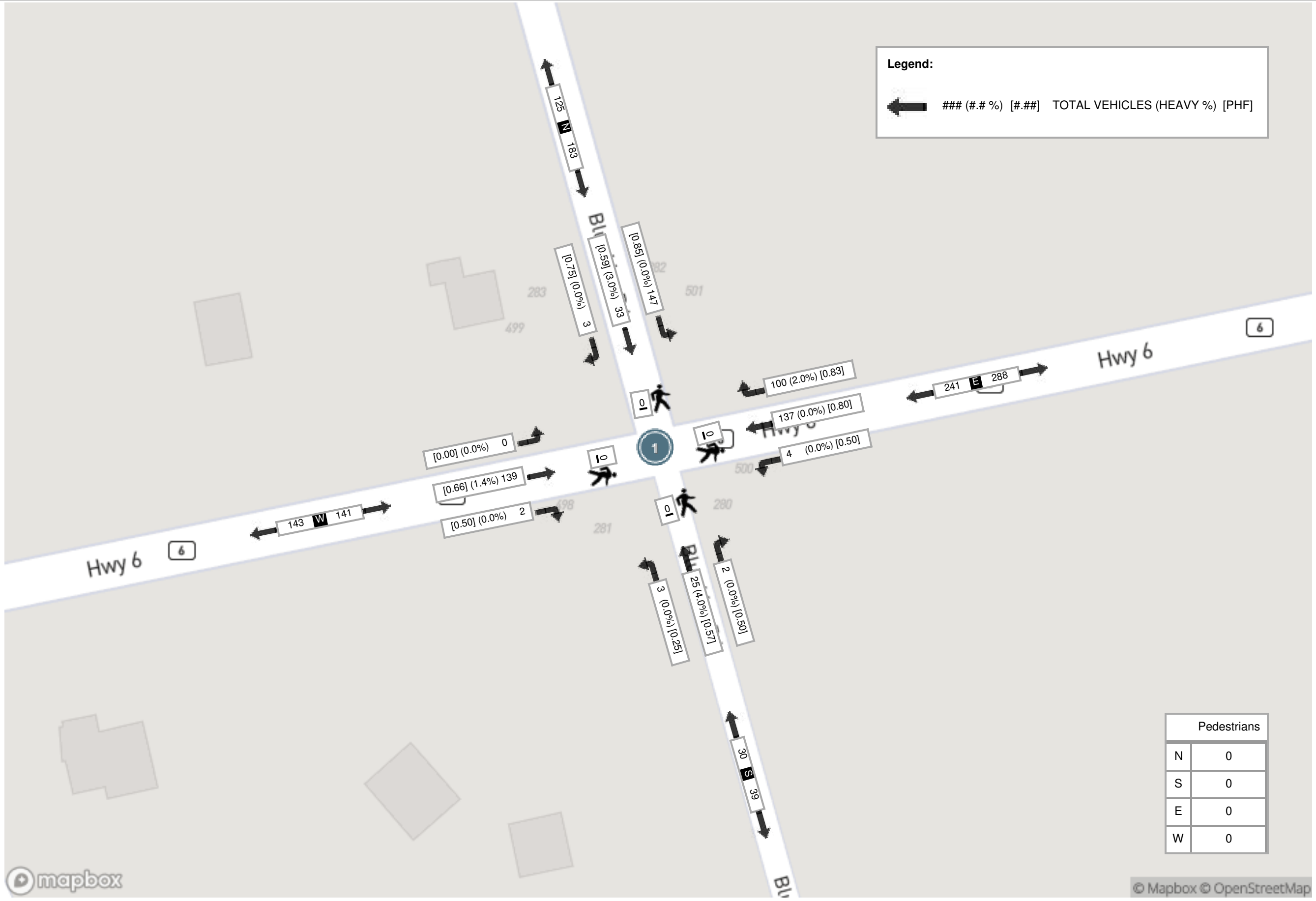
NexTrans
SUITE 204 15260 YONGE ST
AURORA ONTARIO, L4G 1N4
CANADA

Peak Hour: 08:15 AM - 09:15 AM Weather: Light Snow (-10.37 °C)



NexTrans
SUITE 204 15260 YONGE ST
AURORA ONTARIO, L4G 1N4
CANADA

Peak Hour: 04:00 PM - 05:00 PM Weather: Overcast Clouds (-8.73 °C)



NexTrans
SUITE 204 15260 YONGE ST
AURORA ONTARIO, L4G 1N4
CANADA

Turning Movement Count (3 . HWY 6 & LYNN PARK AVE / THOMPSON DR)

Start Time	Southbound LYNN PARK AVE						Westbound HWY 6						Northbound THOMPSON DR						Eastbound HWY 6						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
07:00:00	0	0	2	0	0	2	0	12	1	0	0	13	6	0	6	0	0	12	0	17	1	0	0	18	45	
07:15:00	0	0	5	0	1	5	1	23	3	0	0	27	6	0	7	0	0	13	1	17	1	0	0	19	64	
07:30:00	3	0	5	0	0	8	0	29	1	0	0	30	5	0	10	0	1	15	1	22	1	0	1	24	77	
07:45:00	4	1	3	0	0	8	1	35	4	0	0	40	2	0	10	0	0	12	0	30	2	0	0	32	92	278
08:00:00	1	0	7	0	0	8	0	28	4	0	0	32	6	2	8	0	0	16	3	36	0	0	1	39	95	328
08:15:00	2	1	4	0	2	7	5	49	10	0	0	64	11	2	8	0	0	21	1	29	5	0	3	35	127	391
08:30:00	7	11	9	0	0	27	16	58	3	0	0	77	2	14	14	0	0	30	3	34	11	0	4	48	182	496
08:45:00	11	7	18	0	0	36	10	63	7	0	0	80	5	4	8	0	0	17	2	78	2	0	1	82	215	619
09:00:00	3	1	2	0	0	6	3	44	10	0	0	57	8	2	12	0	0	22	3	47	1	0	0	51	136	660
09:15:00	2	1	4	0	0	7	4	37	6	0	0	47	5	0	3	0	0	8	3	39	0	0	0	42	104	637
09:30:00	2	0	5	0	0	7	3	37	4	0	0	44	9	1	4	0	0	14	2	23	1	0	1	26	91	546
09:45:00	1	2	2	0	0	5	11	28	10	0	0	49	9	1	9	0	0	19	5	45	1	0	0	51	124	455
BREAK																										
16:00:00	5	0	12	0	0	17	4	56	21	0	0	81	10	3	12	0	0	25	9	51	0	0	1	60	183	
16:15:00	4	1	5	0	0	10	4	34	25	0	0	63	19	0	9	0	1	28	10	51	0	0	1	61	162	
16:30:00	0	0	5	0	0	5	8	58	18	0	0	84	9	0	10	0	0	19	8	47	3	0	0	58	166	
16:45:00	0	1	2	0	0	3	8	48	18	0	0	74	15	2	7	0	2	24	15	71	6	0	0	92	193	704
17:00:00	1	0	7	0	0	8	10	48	20	0	0	78	13	1	6	0	1	20	8	44	4	0	0	56	162	683
17:15:00	1	1	2	0	0	4	6	32	14	0	0	52	10	0	2	0	1	12	24	55	7	0	0	86	154	675
17:30:00	1	0	2	0	0	3	3	30	11	0	0	44	11	1	6	0	0	18	11	43	0	0	0	54	119	628
17:45:00	1	5	1	0	0	7	2	34	7	0	0	43	12	0	4	0	0	16	8	34	1	0	0	43	109	544
18:00:00	2	0	3	0	0	5	4	33	10	0	0	47	5	1	5	0	0	11	11	36	5	0	0	52	115	497
18:15:00	2	0	4	0	0	6	7	31	9	0	0	47	3	0	7	0	0	10	8	31	4	0	0	43	106	449
18:30:00	0	2	2	0	0	4	3	32	8	0	0	43	7	1	2	0	0	10	4	30	0	0	0	34	91	421
18:45:00	0	1	7	0	0	8	9	18	2	0	0	29	10	1	4	0	1	15	0	28	1	0	1	29	81	393
Grand Total	53	35	118	0	3	206	122	897	226	0	0	1245	198	36	173	0	7	407	140	938	57	0	14	1135	**2993**	-
Approach%	25.7%	17%	57.3%	0%		-	9.8%	72%	18.2%	0%		-	48.6%	8.8%	42.5%	0%		-	12.3%	82.6%	5%	0%		-	-	-
Totals %	1.8%	1.2%	3.9%	0%		6.9%	4.1%	30%	7.6%	0%		41.6%	6.6%	1.2%	5.8%	0%		13.6%	4.7%	31.3%	1.9%	0%		37.9%	-	-
Heavy	1	0	2	0		-	3	18	2	0		-	3	1	3	0		-	0	15	1	0		-	-	-
Heavy %	1.9%	0%	1.7%	0%		-	2.5%	2%	0.9%	0%		-	1.5%	2.8%	1.7%	0%		-	0%	1.6%	1.8%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-

NexTrans
SUITE 204 15260 YONGE ST
AURORA ONTARIO, L4G 1N4
CANADA

Peak Hour: 08:15 AM - 09:15 AM Weather: Light Snow (-10.37 °C)

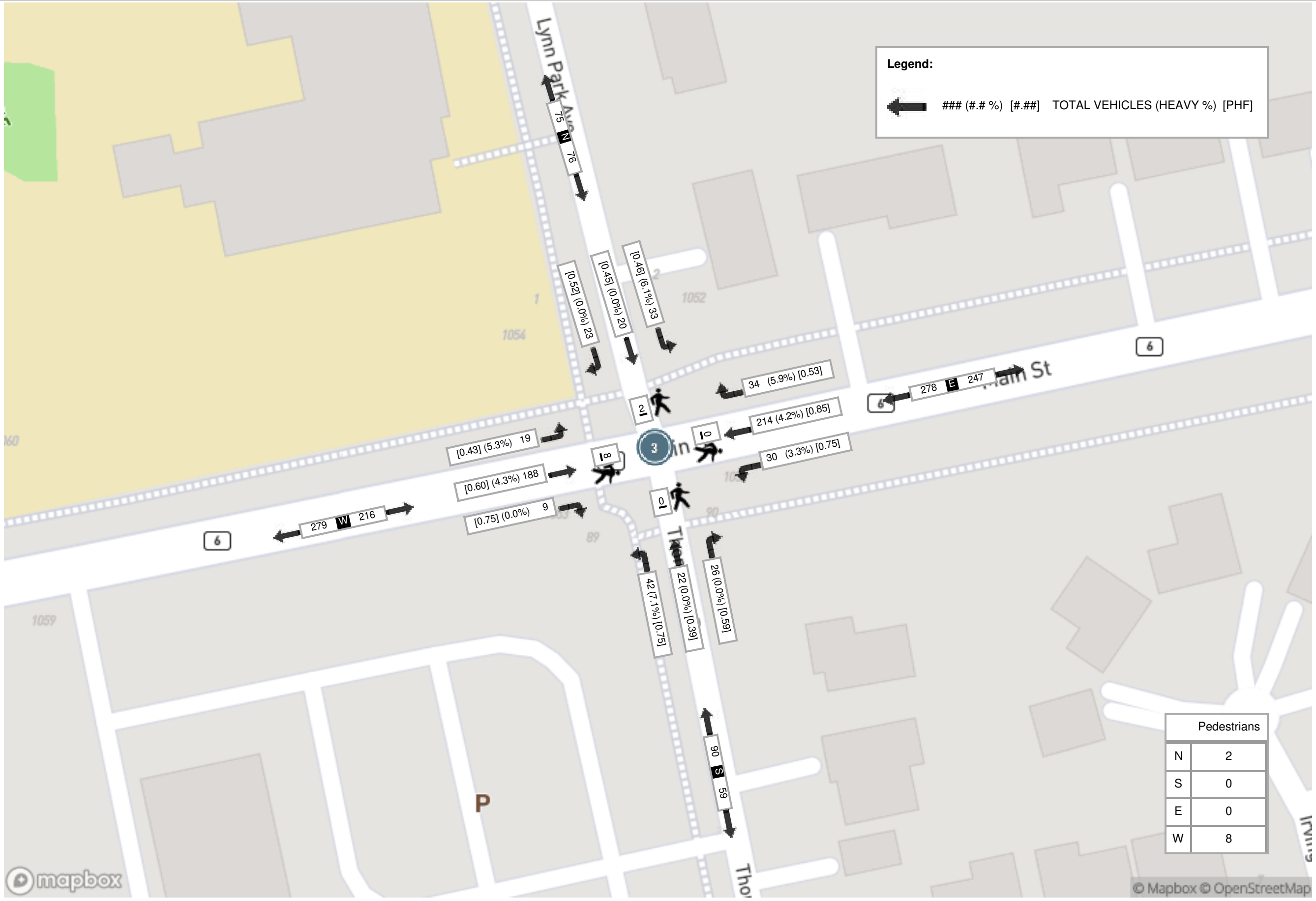
Start Time	Southbound LYNN PARK AVE						Westbound HWY 6						Northbound THOMPSON DR						Eastbound HWY 6						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
08:15:00	2	1	4	0	2	7	5	49	10	0	0	64	11	2	8	0	0	21	1	29	5	0	3	35	127
08:30:00	7	11	9	0	0	27	16	58	3	0	0	77	2	14	14	0	0	30	3	34	11	0	4	48	182
08:45:00	11	7	18	0	0	36	10	63	7	0	0	80	5	4	8	0	0	17	2	78	2	0	1	82	215
09:00:00	3	1	2	0	0	6	3	44	10	0	0	57	8	2	12	0	0	22	3	47	1	0	0	51	136
Grand Total	23	20	33	0	2	76	34	214	30	0	0	278	26	22	42	0	0	90	9	188	19	0	8	216	**660**
Approach%	30.3%	26.3%	43.4%	0%		-	12.2%	77%	10.8%	0%		-	28.9%	24.4%	46.7%	0%		-	4.2%	87%	8.8%	0%		-	-
Totals %	3.5%	3%	5%	0%		11.5%	5.2%	32.4%	4.5%	0%		42.1%	3.9%	3.3%	6.4%	0%		13.6%	1.4%	28.5%	2.9%	0%		32.7%	-
PHF	0.52	0.45	0.46	0		0.53	0.53	0.85	0.75	0		0.87	0.59	0.39	0.75	0		0.75	0.75	0.6	0.43	0		0.66	-
Heavy	0	0	2	0		2	2	9	1	0		12	0	0	3	0		3	0	8	1	0		9	-
Heavy %	0%	0%	6.1%	0%		2.6%	5.9%	4.2%	3.3%	0%		4.3%	0%	0%	7.1%	0%		3.3%	0%	4.3%	5.3%	0%		4.2%	-
Lights	23	20	31	0		74	32	205	29	0		266	26	22	39	0		87	9	180	18	0		207	-
Lights %	100%	100%	93.9%	0%		97.4%	94.1%	95.8%	96.7%	0%		95.7%	100%	100%	92.9%	0%		96.7%	100%	95.7%	94.7%	0%		95.8%	-
Single-Unit Trucks	0	0	0	0		0	0	0	1	0		1	0	0	0	0		0	0	3	0	0		3	-
Single-Unit Trucks %	0%	0%	0%	0%		0%	0%	0%	3.3%	0%		0.4%	0%	0%	0%	0%		0%	0%	1.6%	0%	0%		1.4%	-
Buses	0	0	2	0		2	2	8	0	0		10	0	0	2	0		2	0	5	1	0		6	-
Buses %	0%	0%	6.1%	0%		2.6%	5.9%	3.7%	0%	0%		3.6%	0%	0%	4.8%	0%		2.2%	0%	2.7%	5.3%	0%		2.8%	-
Articulated Trucks	0	0	0	0		0	0	1	0	0		1	0	0	1	0		1	0	0	0	0		0	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0.5%	0%	0%		0.4%	0%	0%	2.4%	0%		1.1%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	8	-	-
Pedestrians%	-	-	-	-	20%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	80%		-

NexTrans
SUITE 204 15260 YONGE ST
AURORA ONTARIO, L4G 1N4
CANADA

Peak Hour: 04:00 PM - 05:00 PM Weather: Overcast Clouds (-8.73 °C)

Start Time	Southbound LYNN PARK AVE						Westbound HWY 6						Northbound THOMPSON DR						Eastbound HWY 6						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:00:00	5	0	12	0	0	17	4	56	21	0	0	81	10	3	12	0	0	25	9	51	0	0	1	60	183
16:15:00	4	1	5	0	0	10	4	34	25	0	0	63	19	0	9	0	1	28	10	51	0	0	1	61	162
16:30:00	0	0	5	0	0	5	8	58	18	0	0	84	9	0	10	0	0	19	8	47	3	0	0	58	166
16:45:00	0	1	2	0	0	3	8	48	18	0	0	74	15	2	7	0	2	24	15	71	6	0	0	92	193
Grand Total	9	2	24	0	0	35	24	196	82	0	0	302	53	5	38	0	3	96	42	220	9	0	2	271	**704**
Approach%	25.7%	5.7%	68.6%	0%		-	7.9%	64.9%	27.2%	0%		-	55.2%	5.2%	39.6%	0%		-	15.5%	81.2%	3.3%	0%		-	-
Totals %	1.3%	0.3%	3.4%	0%		5%	3.4%	27.8%	11.6%	0%		42.9%	7.5%	0.7%	5.4%	0%		13.6%	6%	31.3%	1.3%	0%		38.5%	-
PHF	0.45	0.5	0.5	0		0.51	0.75	0.84	0.82	0		0.9	0.7	0.42	0.79	0		0.86	0.7	0.77	0.38	0		0.74	-
Heavy	0	0	0	0		0	0	2	0	0		2	0	0	0	0		0	0	2	0	0		2	-
Heavy %	0%	0%	0%	0%		0%	0%	1%	0%	0%		0.7%	0%	0%	0%	0%		0%	0%	0.9%	0%	0%		0.7%	-
Lights	9	2	24	0		35	24	194	82	0		300	53	5	38	0		96	42	218	9	0		269	-
Lights %	100%	100%	100%	0%		100%	100%	99%	100%	0%		99.3%	100%	100%	100%	0%		100%	100%	99.1%	100%	0%		99.3%	-
Single-Unit Trucks	0	0	0	0		0	0	2	0	0		2	0	0	0	0		0	0	1	0	0		1	-
Single-Unit Trucks %	0%	0%	0%	0%		0%	0%	1%	0%	0%		0.7%	0%	0%	0%	0%		0%	0%	0.5%	0%	0%		0.4%	-
Buses	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	-
Buses %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0.5%	0%	0%		0.4%	-
Articulated Trucks	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	3	-	-	-	-	-	2	-	-
Pedestrians%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	60%		-	-	-	-	40%		-

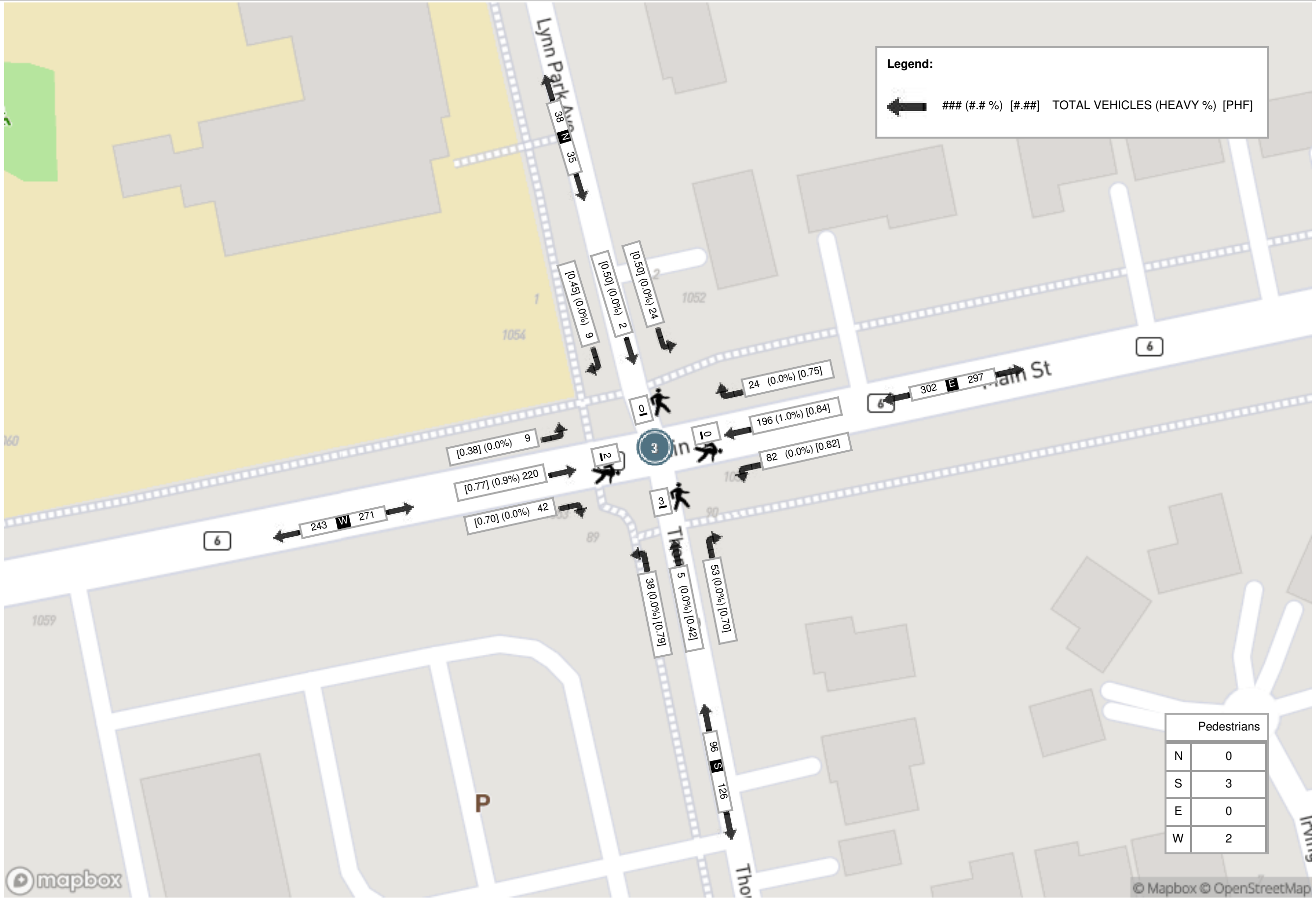
Peak Hour: 08:15 AM - 09:15 AM Weather: Light Snow (-10.37 °C)



Pedestrians	
N	2
S	0
E	0
W	8

NexTrans
SUITE 204 15260 YONGE ST
AURORA ONTARIO, L4G 1N4
CANADA

Peak Hour: 04:00 PM - 05:00 PM Weather: Overcast Clouds (-8.73 °C)



Pedestrians	
N	0
S	3
E	0
W	2

Turning Movement Count
Location Name: HWY 6 & PHEASANT TRAIL / BLUE LAKE AVE
Date: Tue, Jan 16, 2024 Deployment Lead: David Chu

NexTrans
SUITE 204 15260 YONGE ST
AURORA ONTARIO, L4G 1N4
CANADA

Turning Movement Count (2 . HWY 6 & PHEASANT TRAIL / BLUE LAKE AVE)

Start Time	Southbound PHEASANT TRAIL						Westbound HWY 6						Northbound BLUE LAKE AVE						Eastbound HWY 6						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
07:00:00	0	0	0	0	0	0	1	18	0	0	1	19	1	0	4	0	0	5	0	15	0	0	0	15	39	
07:15:00	1	0	1	0	0	2	0	29	0	0	0	29	4	0	8	0	0	12	3	17	1	0	0	21	64	
07:30:00	3	0	0	0	0	3	0	43	0	0	0	43	1	0	4	0	0	5	0	23	0	0	0	23	74	
07:45:00	0	0	2	0	0	2	1	40	2	0	0	43	1	0	3	0	0	4	1	32	1	0	0	34	83	260
08:00:00	5	0	2	0	0	7	2	35	0	0	0	37	2	1	4	0	0	7	1	39	2	0	0	42	93	314
08:15:00	1	1	3	0	0	5	1	56	1	0	0	58	2	0	8	0	0	10	2	34	1	0	0	37	110	360
08:30:00	4	1	2	0	0	7	1	70	3	0	0	74	5	2	4	0	0	11	0	44	1	0	0	45	137	423
08:45:00	5	0	5	0	0	10	0	78	3	0	1	81	4	0	4	0	0	8	2	74	3	0	0	79	178	518
09:00:00	1	0	1	0	0	2	2	54	1	0	0	57	2	0	2	0	0	4	1	53	1	0	0	55	118	543
09:15:00	1	0	6	0	0	7	2	36	1	0	0	39	3	0	2	0	0	5	2	38	2	0	0	42	93	526
09:30:00	2	0	1	0	0	3	2	44	1	0	0	47	0	1	2	0	0	3	3	27	1	0	0	31	84	473
09:45:00	1	1	2	0	0	4	1	33	0	0	0	34	0	0	3	0	0	3	2	52	2	0	0	56	97	392
BREAK																										
16:00:00	1	0	3	0	0	4	5	66	5	0	0	76	2	0	5	0	0	7	5	54	1	0	0	60	147	
16:15:00	0	0	4	0	0	4	3	43	2	0	0	48	2	0	6	0	0	8	7	52	3	0	0	62	122	
16:30:00	0	0	3	0	0	3	5	65	2	0	0	72	0	2	1	0	0	3	4	62	2	0	0	68	146	
16:45:00	1	2	1	0	0	4	2	54	0	0	0	56	0	0	0	0	0	0	4	96	4	0	0	104	164	579
17:00:00	2	0	1	0	0	3	5	56	6	0	0	67	1	1	1	0	0	3	1	54	1	0	0	56	129	561
17:15:00	2	0	3	0	0	5	5	33	0	0	0	38	2	0	1	0	0	3	7	80	5	0	0	92	138	577
17:30:00	4	0	2	0	0	6	2	40	0	0	0	42	2	0	2	0	0	4	6	51	0	0	0	57	109	540
17:45:00	1	0	1	0	0	2	4	32	6	0	2	42	1	0	2	0	0	3	5	41	2	0	0	48	95	471
18:00:00	1	0	4	0	0	5	2	42	2	0	0	46	1	0	5	0	0	6	4	40	0	0	0	44	101	443
18:15:00	1	1	2	0	0	4	1	44	0	0	0	45	2	2	3	0	0	7	4	44	4	0	0	52	108	413
18:30:00	0	0	5	0	0	5	0	32	5	0	0	37	4	0	3	0	0	7	2	27	0	0	0	29	78	382
18:45:00	1	0	0	0	0	1	1	26	0	0	0	27	1	0	0	0	0	1	2	29	1	0	0	32	61	348
Grand Total	38	6	54	0	0	98	48	1069	40	0	4	1157	43	9	77	0	0	129	68	1078	38	0	0	1184	**2568**	-
Approach%	38.8%	6.1%	55.1%	0%		-	4.1%	92.4%	3.5%	0%		-	33.3%	7%	59.7%	0%		-	5.7%	91%	3.2%	0%		-	-	-
Totals %	1.5%	0.2%	2.1%	0%		3.8%	1.9%	41.6%	1.6%	0%		45.1%	1.7%	0.4%	3%	0%		5%	2.6%	42%	1.5%	0%		46.1%	-	-
Heavy	1	0	0	0		-	0	18	2	0		-	1	0	1	0		-	2	14	1	0		-	-	-
Heavy %	2.6%	0%	0%	0%		-	0%	1.7%	5%	0%		-	2.3%	0%	1.3%	0%		-	2.9%	1.3%	2.6%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-

NexTrans
SUITE 204 15260 YONGE ST
AURORA ONTARIO, L4G 1N4
CANADA

Peak Hour: 08:15 AM - 09:15 AM   Weather: Light Snow (-10.37 °C)

Start Time	Southbound PHEASANT TRAIL					
	Right	Thru	Left	UTurn	Peds	Approach Total
08:15:00	1	1	3	0	0	5
08:30:00	4	1	2	0	0	7
08:45:00	5	0	5	0	0	10
09:00:00	1	0	1	0	0	2
Grand Total	11	2	11	0	0	24
Approach%	45.8%	8.3%	45.8%	0%		-
Totals %	2%	0.4%	2%	0%		4.4%
PHF	0.55	0.5	0.55	0		0.6
Heavy	0	0	0	0		0
Heavy %	0%	0%	0%	0%		0%
Lights	11	2	11	0		24
Lights %	100%	100%	100%	0%		100%
Single-Unit Trucks	0	0	0	0		0
Single-Unit Trucks %	0%	0%	0%	0%		0%
Buses	0	0	0	0		0
Buses %	0%	0%	0%	0%		0%
Pedestrians	-	-	-	-	0	-
Pedestrians%	-	-	-	-	0%	

Start Time	Westbound HWY 6					
	Right	Thru	Left	UTurn	Peds	Approach Total
08:15:00	1	56	1	0	0	58
08:30:00	1	70	3	0	0	74
08:45:00	0	78	3	0	1	81
09:00:00	2	54	1	0	0	57
Grand Total	4	258	8	0	1	270
Approach%	1.5%	95.6%	3%	0%		-
Totals %	0.7%	47.5%	1.5%	0%		49.7%
PHF	0.5	0.83	0.67	0		0.83
Heavy	0	10	0	0		10
Heavy %	0%	3.9%	0%	0%		3.7%
Lights	4	248	8	0		260
Lights %	100%	96.1%	100%	0%		96.3%
Single-Unit Trucks	0	1	0	0		1
Single-Unit Trucks %	0%	0.4%	0%	0%		0.4%
Buses	0	9	0	0		9
Buses %	0%	3.5%	0%	0%		3.3%
Pedestrians	-	-	-	-	1	-
Pedestrians%	-	-	-	-	100%	

Start Time	Northbound BLUE LAKE AVE					
	Right	Thru	Left	UTurn	Peds	Approach Total
08:15:00	2	0	8	0	0	10
08:30:00	5	2	4	0	0	11
08:45:00	4	0	4	0	0	8
09:00:00	2	0	2	0	0	4
Grand Total	13	2	18	0	0	33
Approach%	39.4%	6.1%	54.5%	0%		-
Totals %	2.4%	0.4%	3.3%	0%		6.1%
PHF	0.65	0.25	0.56	0		0.75
Heavy	1	0	0	0		1
Heavy %	7.7%	0%	0%	0%		3%
Lights	12	2	18	0		32
Lights %	92.3%	100%	100%	0%		97%
Single-Unit Trucks	0	0	0	0		0
Single-Unit Trucks %	0%	0%	0%	0%		0%
Buses	1	0	0	0		1
Buses %	7.7%	0%	0%	0%		3%
Pedestrians	-	-	-	-	0	-
Pedestrians%	-	-	-	-	0%	

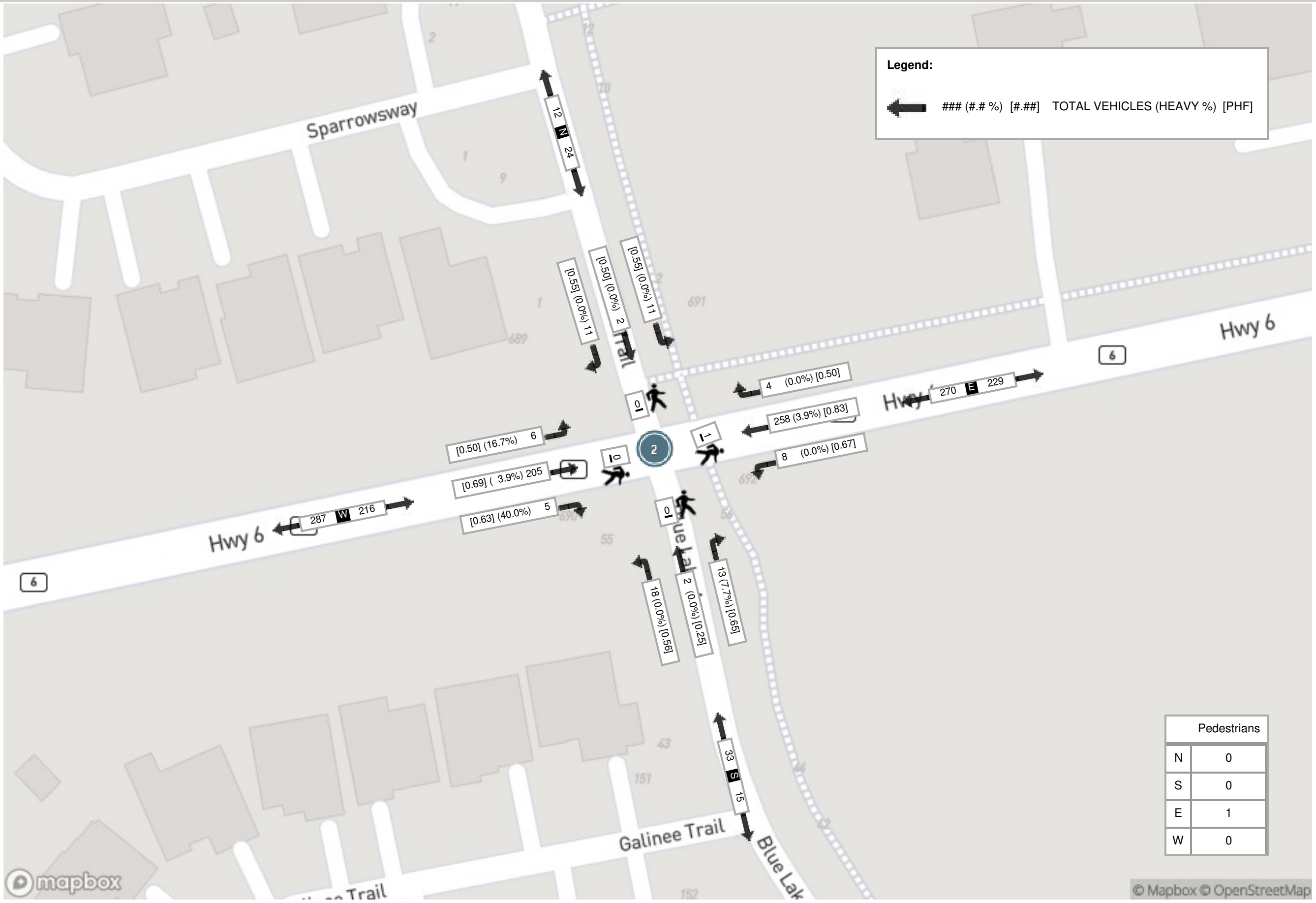
Start Time	Eastbound HWY 6						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	
08:15:00	2	34	1	0	0	37	110
08:30:00	0	44	1	0	0	45	137
08:45:00	2	74	3	0	0	79	178
09:00:00	1	53	1	0	0	55	118
Grand Total	5	205	6	0	0	216	**543**
Approach%	2.3%	94.9%	2.8%	0%		-	-
Totals %	0.9%	37.8%	1.1%	0%		39.8%	-
PHF	0.63	0.69	0.5	0		0.68	-
Heavy	2	8	1	0		11	-
Heavy %	40%	3.9%	16.7%	0%		5.1%	-
Lights	3	197	5	0		205	-
Lights %	60%	96.1%	83.3%	0%		94.9%	-
Single-Unit Trucks	0	3	0	0		3	-
Single-Unit Trucks %	0%	1.5%	0%	0%		1.4%	-
Buses	2	5	1	0		8	-
Buses %	40%	2.4%	16.7%	0%		3.7%	-
Pedestrians	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	0%		-

NexTrans
SUITE 204 15260 YONGE ST
AURORA ONTARIO, L4G 1N4
CANADA

Peak Hour: 04:00 PM - 05:00 PM Weather: Overcast Clouds (-8.73 °C)

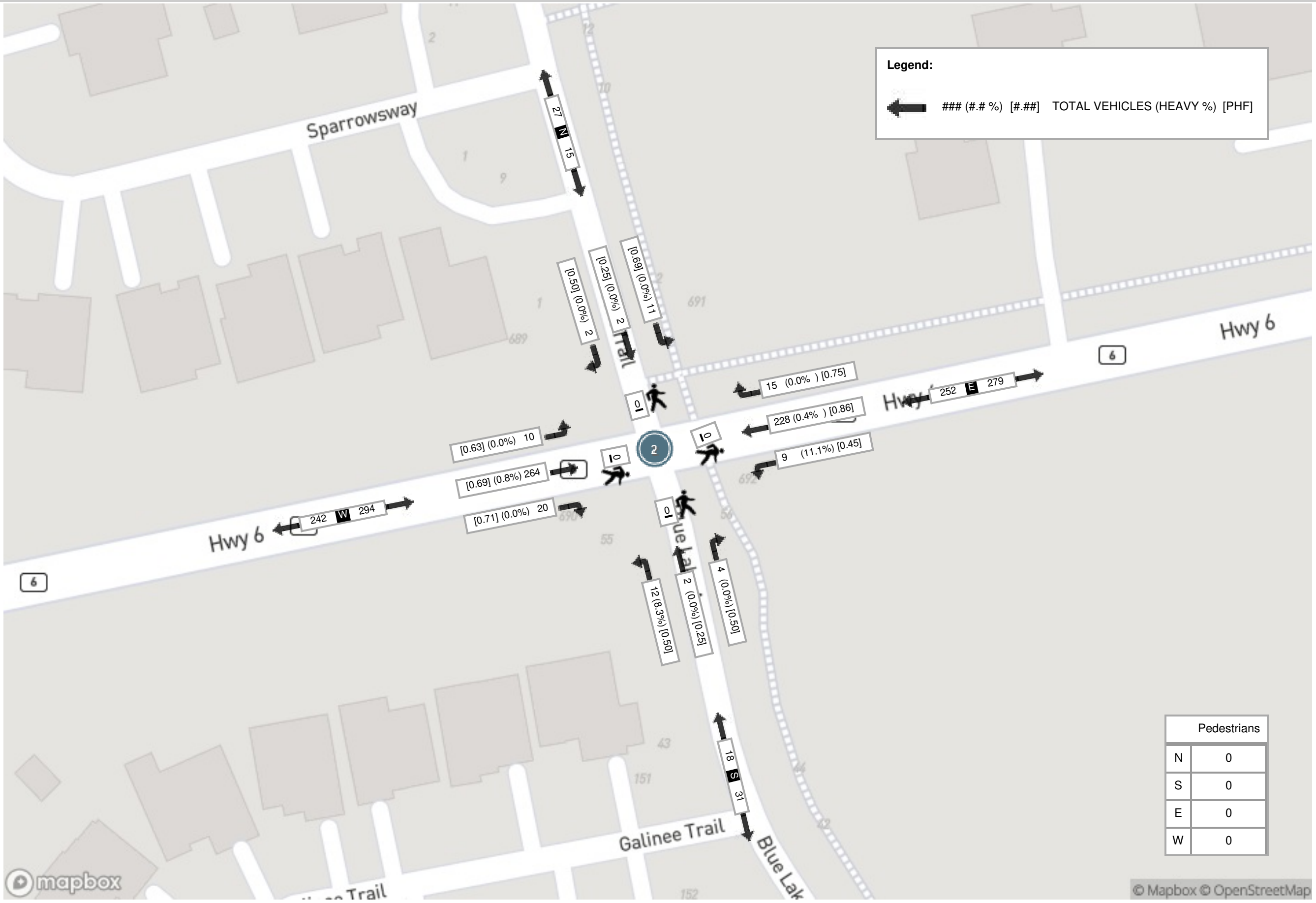
Start Time	Southbound PHEASANT TRAIL						Westbound HWY 6						Northbound BLUE LAKE AVE						Eastbound HWY 6						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:00:00	1	0	3	0	0	4	5	66	5	0	0	76	2	0	5	0	0	7	5	54	1	0	0	60	147
16:15:00	0	0	4	0	0	4	3	43	2	0	0	48	2	0	6	0	0	8	7	52	3	0	0	62	122
16:30:00	0	0	3	0	0	3	5	65	2	0	0	72	0	2	1	0	0	3	4	62	2	0	0	68	146
16:45:00	1	2	1	0	0	4	2	54	0	0	0	56	0	0	0	0	0	0	4	96	4	0	0	104	164
Grand Total	2	2	11	0	0	15	15	228	9	0	0	252	4	2	12	0	0	18	20	264	10	0	0	294	**579**
Approach%	13.3%	13.3%	73.3%	0%		-	6%	90.5%	3.6%	0%		-	22.2%	11.1%	66.7%	0%		-	6.8%	89.8%	3.4%	0%		-	-
Totals %	0.3%	0.3%	1.9%	0%		2.6%	2.6%	39.4%	1.6%	0%		43.5%	0.7%	0.3%	2.1%	0%		3.1%	3.5%	45.6%	1.7%	0%		50.8%	-
PHF	0.5	0.25	0.69	0		0.94	0.75	0.86	0.45	0		0.83	0.5	0.25	0.5	0		0.56	0.71	0.69	0.63	0		0.71	-
Heavy	0	0	0	0		0	0	1	1	0		2	0	0	1	0		1	0	2	0	0		2	-
Heavy %	0%	0%	0%	0%		0%	0%	0.4%	11.1%	0%		0.8%	0%	0%	8.3%	0%		5.6%	0%	0.8%	0%	0%		0.7%	-
Lights	2	2	11	0		15	15	227	8	0		250	4	2	11	0		17	20	262	10	0		292	-
Lights %	100%	100%	100%	0%		100%	100%	99.6%	88.9%	0%		99.2%	100%	100%	91.7%	0%		94.4%	100%	99.2%	100%	0%		99.3%	-
Single-Unit Trucks	0	0	0	0		0	0	1	1	0		2	0	0	1	0		1	0	1	0	0		1	-
Single-Unit Trucks %	0%	0%	0%	0%		0%	0%	0.4%	11.1%	0%		0.8%	0%	0%	8.3%	0%		5.6%	0%	0.4%	0%	0%		0.3%	-
Buses	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	-
Buses %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0.4%	0%	0%		0.3%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-

Peak Hour: 08:15 AM - 09:15 AM Weather: Light Snow (-10.37 °C)



NexTrans
SUITE 204 15260 YONGE ST
AURORA ONTARIO, L4G 1N4
CANADA

Peak Hour: 04:00 PM - 05:00 PM Weather: Overcast Clouds (-8.73 °C)



TIMING PLANS (Main & Thompson)

PLAN	1	2	3	4
TIME OF OPERATION	See Attached table			
EAST-WEST F2 & F6				
Green	40	40		
Amber	4	4		
All Red	2	2		
Walk	7	7		
Flashing Don't Walk	7	7		
NORTH-SOUTH F4 & F8				
Minimum Green	8	8		
Extension	2	2		
Maximum Green	24	19		
Amber	4	4		
All Red	2	2		
Walk	12	7		
Flashing Don't Walk	12	12		

* Minimum is initial plus one extension

TIMING PLAN SCHEDULE

PLAN	MONTH	DAY	TIME
1	Sept to June	Mon to Fri	7:55 am to 9:05 am
	Sept to June	Mon to Fri	11:20 am to 12:35 pm
	Sept to June	Mon to Fri	2:55 pm to 4:05 pm
2	Sept to June	Mon to Fri	12:00 am to 7:55 am
	Sept to June	Mon to Fri	9:05 am to 11:20 am
	Sept to June	Mon to Fri	12:35 pm to 2:55 pm
	Sept to June	Mon to Fri	4:05 pm to 12:00 am
	Sept to June	Sat & Sun	12:00 am to 12:00 am
	July & Aug	Mon to Sun	12:00 am to 12:00 am
3			

Appendix C – Capacity Analysis – Existing Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	123	3	4	144	137	5	18	8	80	13	4
Future Volume (Veh/h)	3	123	3	4	144	137	5	18	8	80	13	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	4	156	4	5	182	173	6	23	10	101	16	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	355			160			369	529	156	378	360	182
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	355			160			369	529	156	378	360	182
tC, single (s)	4.4			4.1			7.1	6.6	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.1	3.4	3.5	4.0	3.3
p0 queue free %	100			100			99	95	99	81	97	99
cM capacity (veh/h)	1051			1432			572	446	862	542	566	866

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	160	4	187	173	39	122
Volume Left	4	0	5	0	6	101
Volume Right	0	4	0	173	10	5
cSH	1051	1700	1432	1700	530	554
Volume to Capacity	0.00	0.00	0.00	0.10	0.07	0.22
Queue Length 95th (m)	0.1	0.0	0.1	0.0	1.9	6.7
Control Delay (s)	0.2	0.0	0.2	0.0	12.3	13.3
Lane LOS	A		A		B	B
Approach Delay (s)	0.2		0.1		12.3	13.3
Approach LOS					B	B

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	29.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	205	5	8	258	4	18	2	13	11	2	11
Future Volume (Veh/h)	6	205	5	8	258	4	18	2	13	11	2	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	8	270	7	11	339	5	24	3	17	14	3	14
Pedestrians					1							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					274							
pX, platoon unblocked												
vC, conflicting volume	344			277			662	652	271	666	654	339
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	344			277			662	652	271	666	654	339
tC, single (s)	4.3			4.1			7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.4			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	99			99			93	99	98	96	99	98
cM capacity (veh/h)	1136			1298			364	384	753	360	383	708

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	278	7	350	5	44	31
Volume Left	8	0	11	0	24	14
Volume Right	0	7	0	5	17	14
cSH	1136	1700	1298	1700	456	466
Volume to Capacity	0.01	0.00	0.01	0.00	0.10	0.07
Queue Length 95th (m)	0.2	0.0	0.2	0.0	2.5	1.7
Control Delay (s)	0.3	0.0	0.3	0.0	13.7	13.3
Lane LOS	A		A		B	B
Approach Delay (s)	0.3		0.3		13.7	13.3
Approach LOS					B	B

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	30.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	19	188	30	214	34	42	22	33	20
Future Volume (vph)	19	188	30	214	34	42	22	33	20
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		2		6			4		8
Permitted Phases	2		6		6	4		8	
Detector Phase	2	2	6	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	30.0	30.0	30.0	30.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	30.0	30.0	30.0	30.0
Total Split (%)	60.5%	60.5%	60.5%	60.5%	60.5%	39.5%	39.5%	39.5%	39.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0		6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		45.1		45.1	45.1		9.9		9.9
Actuated g/C Ratio		0.72		0.72	0.72		0.16		0.16
v/c Ratio		0.22		0.26	0.04		0.46		0.38
Control Delay		5.1		5.4	1.9		24.6		21.7
Queue Delay		0.0		0.0	0.0		0.0		0.0
Total Delay		5.1		5.4	1.9		24.6		21.7
LOS		A		A	A		C		C
Approach Delay		5.1		5.0			24.6		21.7
Approach LOS		A		A			C		C

Intersection Summary	
Cycle Length: 76	
Actuated Cycle Length: 62.8	
Natural Cycle: 55	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.46	
Intersection Signal Delay: 9.7	Intersection LOS: A
Intersection Capacity Utilization 46.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Thompson Drive/Lynn Park Avenue & Highway 6

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	281	317	44	118	99
v/c Ratio	0.22	0.26	0.04	0.46	0.38
Control Delay	5.1	5.4	1.9	24.6	21.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	5.1	5.4	1.9	24.6	21.7
Queue Length 50th (m)	11.1	13.1	0.0	9.8	7.4
Queue Length 95th (m)	20.4	23.5	2.4	19.0	15.7
Internal Link Dist (m)	250.4	238.2		251.5	265.0
Turn Bay Length (m)			43.0		
Base Capacity (vph)	1251	1233	1077	586	594
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.22	0.26	0.04	0.20	0.17

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	188	9	30	214	34	42	22	26	33	20	23
Future Volume (vph)	19	188	9	30	214	34	42	22	26	33	20	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0			6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frpb, ped/bikes		1.00			1.00	0.98		1.00			0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		0.99			1.00	0.85		0.96			0.96	
Flt Protected		1.00			0.99	1.00		0.98			0.98	
Satd. Flow (prot)		1809			1818	1486		1721			1722	
Flt Permitted		0.96			0.94	1.00		0.85			0.86	
Satd. Flow (perm)		1743			1720	1486		1492			1508	
Peak-hour factor, PHF	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	25	244	12	39	278	44	55	29	34	43	26	30
RTOR Reduction (vph)	0	1	0	0	0	14	0	24	0	0	26	0
Lane Group Flow (vph)	0	280	0	0	317	30	0	94	0	0	73	0
Confl. Peds. (#/hr)	2					2	8					8
Heavy Vehicles (%)	5%	4%	0%	3%	4%	6%	7%	0%	0%	6%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Actuated Green, G (s)		43.9			43.9	43.9		8.2			8.2	
Effective Green, g (s)		43.9			43.9	43.9		8.2			8.2	
Actuated g/C Ratio		0.68			0.68	0.68		0.13			0.13	
Clearance Time (s)		6.0			6.0	6.0		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		1193			1177	1017		190			192	
v/s Ratio Prot												
v/s Ratio Perm		0.16			c0.18	0.02		c0.06			0.05	
v/c Ratio		0.23			0.27	0.03		0.49			0.38	
Uniform Delay, d1		3.8			3.9	3.2		26.0			25.6	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		0.5			0.6	0.1		2.0			1.3	
Delay (s)		4.3			4.5	3.3		28.0			26.9	
Level of Service		A			A	A		C			C	
Approach Delay (s)		4.3			4.3			28.0			26.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	64.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	139	2	4	137	100	3	25	2	147	33	3
Future Volume (Veh/h)	0	139	2	4	137	100	3	25	2	147	33	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	148	2	4	146	106	3	27	2	156	35	3
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	252			150			322	408	148	318	304	146
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	252			150			322	408	148	318	304	146
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	95	100	74	94	100
cM capacity (veh/h)	1325			1444			603	528	904	612	606	906

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	148	2	150	106	32	194
Volume Left	0	0	4	0	3	156
Volume Right	0	2	0	106	2	3
cSH	1325	1700	1444	1700	549	614
Volume to Capacity	0.00	0.00	0.00	0.06	0.06	0.32
Queue Length 95th (m)	0.0	0.0	0.1	0.0	1.5	10.8
Control Delay (s)	0.0	0.0	0.2	0.0	12.0	13.6
Lane LOS			A		B	B
Approach Delay (s)	0.0		0.1		12.0	13.6
Approach LOS					B	B

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	33.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	264	20	9	228	15	12	2	4	11	2	2
Future Volume (Veh/h)	10	264	20	9	228	15	12	2	4	11	2	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	11	300	23	10	259	17	14	2	5	13	2	2
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					274							
pX, platoon unblocked												
vC, conflicting volume	276			323			604	618	300	607	624	259
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	276			323			604	618	300	607	624	259
tC, single (s)	4.1			4.2			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			96	100	99	97	99	100
cM capacity (veh/h)	1299			1188			394	401	744	402	398	785

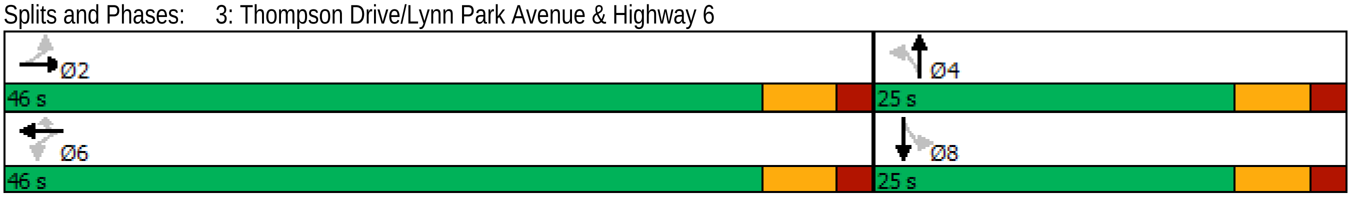
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	311	23	269	17	21	17
Volume Left	11	0	10	0	14	13
Volume Right	0	23	0	17	5	2
cSH	1299	1700	1188	1700	445	426
Volume to Capacity	0.01	0.01	0.01	0.01	0.05	0.04
Queue Length 95th (m)	0.2	0.0	0.2	0.0	1.2	1.0
Control Delay (s)	0.4	0.0	0.4	0.0	13.5	13.8
Lane LOS	A		A		B	B
Approach Delay (s)	0.3		0.4		13.5	13.8
Approach LOS					B	B

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	32.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	9	220	82	196	24	38	5	24	2
Future Volume (vph)	9	220	82	196	24	38	5	24	2
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		2		6			4		8
Permitted Phases	2		6		6	4		8	
Detector Phase	2	2	6	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	25.0	25.0	25.0	25.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	25.0	25.0	25.0	25.0
Total Split (%)	64.8%	64.8%	64.8%	64.8%	64.8%	35.2%	35.2%	35.2%	35.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0		6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		48.0		48.0	48.0		8.9		8.9
Actuated g/C Ratio		0.74		0.74	0.74		0.14		0.14
v/c Ratio		0.22		0.26	0.02		0.41		0.18
Control Delay		4.2		4.9	0.9		18.2		20.8
Queue Delay		0.0		0.0	0.0		0.0		0.0
Total Delay		4.2		4.9	0.9		18.2		20.8
LOS		A		A	A		B		C
Approach Delay		4.2		4.5			18.2		20.8
Approach LOS		A		A			B		C

Intersection Summary	
Cycle Length: 71	
Actuated Cycle Length: 64.7	
Natural Cycle: 50	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.41	
Intersection Signal Delay: 7.1	Intersection LOS: A
Intersection Capacity Utilization 51.8%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Thompson Drive/Lynn Park Avenue & Highway 6



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	298	305	26	105	38
v/c Ratio	0.22	0.26	0.02	0.41	0.18
Control Delay	4.2	4.9	0.9	18.2	20.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	4.2	4.9	0.9	18.2	20.8
Queue Length 50th (m)	10.2	11.8	0.0	5.4	3.2
Queue Length 95th (m)	22.3	25.7	1.4	17.2	10.2
Internal Link Dist (m)	250.4	238.2		251.5	265.0
Turn Bay Length (m)			43.0		
Base Capacity (vph)	1353	1162	1210	482	451
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.22	0.26	0.02	0.22	0.08

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	220	42	82	196	24	38	5	53	24	2	9
Future Volume (vph)	9	220	42	82	196	24	38	5	53	24	2	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0			6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frpb, ped/bikes		1.00			1.00	1.00		1.00			0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		0.98			1.00	0.85		0.93			0.96	
Flt Protected		1.00			0.99	1.00		0.98			0.97	
Satd. Flow (prot)		1835			1857	1615		1722			1761	
Flt Permitted		0.99			0.83	1.00		0.85			0.83	
Satd. Flow (perm)		1817			1566	1615		1497			1505	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	10	242	46	90	215	26	42	5	58	26	2	10
RTOR Reduction (vph)	0	6	0	0	0	8	0	52	0	0	9	0
Lane Group Flow (vph)	0	292	0	0	305	18	0	53	0	0	29	0
Confl. Peds. (#/hr)			3	3			2					2
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Actuated Green, G (s)		46.7			46.7	46.7		7.2			7.2	
Effective Green, g (s)		46.7			46.7	46.7		7.2			7.2	
Actuated g/C Ratio		0.71			0.71	0.71		0.11			0.11	
Clearance Time (s)		6.0			6.0	6.0		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		1287			1109	1144		163			164	
v/s Ratio Prot												
v/s Ratio Perm		0.16			c0.19	0.01		c0.04			0.02	
v/c Ratio		0.23			0.28	0.02		0.33			0.18	
Uniform Delay, d1		3.3			3.5	2.8		27.1			26.7	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		0.4			0.6	0.0		1.2			0.5	
Delay (s)		3.7			4.1	2.9		28.3			27.2	
Level of Service		A			A	A		C			C	
Approach Delay (s)		3.7			4.0			28.3			27.2	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	65.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	51.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Appendix D – Capacity Analysis – Future Background 2029

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	136	3	4	159	151	6	20	9	88	14	4
Future Volume (Veh/h)	3	136	3	4	159	151	6	20	9	88	14	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	4	172	4	5	201	191	8	25	11	111	18	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	392			176			405	582	172	414	395	201
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	392			176			405	582	172	414	395	201
tC, single (s)	4.4			4.1			7.1	6.6	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.1	3.4	3.5	4.0	3.3
p0 queue free %	100			100			99	94	99	78	97	99
cM capacity (veh/h)	1016			1412			539	416	844	508	541	845

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	176	4	206	191	44	134
Volume Left	4	0	5	0	8	111
Volume Right	0	4	0	191	11	5
cSH	1016	1700	1412	1700	500	520
Volume to Capacity	0.00	0.00	0.00	0.11	0.09	0.26
Queue Length 95th (m)	0.1	0.0	0.1	0.0	2.3	8.2
Control Delay (s)	0.2	0.0	0.2	0.0	12.9	14.3
Lane LOS	A		A		B	B
Approach Delay (s)	0.2		0.1		12.9	14.3
Approach LOS					B	B

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	30.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	226	5	8	285	4	18	2	13	11	2	11
Future Volume (Veh/h)	6	226	5	8	285	4	18	2	13	11	2	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	8	297	7	11	375	5	24	3	17	14	3	14
Pedestrians					1							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					274							
pX, platoon unblocked												
vC, conflicting volume	380			304			726	715	298	730	717	375
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	380			304			726	715	298	730	717	375
tC, single (s)	4.3			4.1			7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.4			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	99			99			93	99	98	96	99	98
cM capacity (veh/h)	1101			1268			329	353	727	326	352	676

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	305	7	386	5	44	31
Volume Left	8	0	11	0	24	14
Volume Right	0	7	0	5	17	14
cSH	1101	1700	1268	1700	420	430
Volume to Capacity	0.01	0.00	0.01	0.00	0.10	0.07
Queue Length 95th (m)	0.2	0.0	0.2	0.0	2.8	1.9
Control Delay (s)	0.3	0.0	0.3	0.0	14.6	14.0
Lane LOS	A		A		B	B
Approach Delay (s)	0.3		0.3		14.6	14.0
Approach LOS					B	B

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	32.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	19	208	30	236	34	42	22	33	20
Future Volume (vph)	19	208	30	236	34	42	22	33	20
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		2		6			4		8
Permitted Phases	2		6		6	4		8	
Detector Phase	2	2	6	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	30.0	30.0	30.0	30.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	30.0	30.0	30.0	30.0
Total Split (%)	60.5%	60.5%	60.5%	60.5%	60.5%	39.5%	39.5%	39.5%	39.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0		6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		45.1		45.1	45.1		9.9		9.9
Actuated g/C Ratio		0.72		0.72	0.72		0.16		0.16
v/c Ratio		0.24		0.28	0.04		0.46		0.38
Control Delay		5.3		5.6	1.9		24.6		21.7
Queue Delay		0.0		0.0	0.0		0.0		0.0
Total Delay		5.3		5.6	1.9		24.6		21.7
LOS		A		A	A		C		C
Approach Delay		5.3		5.1			24.6		21.7
Approach LOS		A		A			C		C

Intersection Summary

Cycle Length: 76
Actuated Cycle Length: 62.8
Natural Cycle: 55
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.46
Intersection Signal Delay: 9.5 Intersection LOS: A
Intersection Capacity Utilization 47.1% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Thompson Drive/Lynn Park Avenue & Highway 6

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	307	345	44	118	99
v/c Ratio	0.24	0.28	0.04	0.46	0.38
Control Delay	5.3	5.6	1.9	24.6	21.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	5.3	5.6	1.9	24.6	21.7
Queue Length 50th (m)	12.3	14.5	0.0	9.8	7.4
Queue Length 95th (m)	22.4	25.8	2.4	19.0	15.7
Internal Link Dist (m)	250.4	238.2		251.5	265.0
Turn Bay Length (m)			43.0		
Base Capacity (vph)	1254	1236	1077	586	594
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.24	0.28	0.04	0.20	0.17

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	208	9	30	236	34	42	22	26	33	20	23
Future Volume (vph)	19	208	9	30	236	34	42	22	26	33	20	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0			6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frpb, ped/bikes		1.00			1.00	0.98		1.00			0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		0.99			1.00	0.85		0.96			0.96	
Flt Protected		1.00			0.99	1.00		0.98			0.98	
Satd. Flow (prot)		1811			1819	1486		1721			1722	
Flt Permitted		0.96			0.94	1.00		0.85			0.86	
Satd. Flow (perm)		1746			1723	1486		1492			1508	
Peak-hour factor, PHF	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	25	270	12	39	306	44	55	29	34	43	26	30
RTOR Reduction (vph)	0	1	0	0	0	14	0	24	0	0	26	0
Lane Group Flow (vph)	0	306	0	0	345	30	0	94	0	0	73	0
Confl. Peds. (#/hr)	2					2	8					8
Heavy Vehicles (%)	5%	4%	0%	3%	4%	6%	7%	0%	0%	6%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Actuated Green, G (s)		43.9			43.9	43.9		8.2			8.2	
Effective Green, g (s)		43.9			43.9	43.9		8.2			8.2	
Actuated g/C Ratio		0.68			0.68	0.68		0.13			0.13	
Clearance Time (s)		6.0			6.0	6.0		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		1195			1180	1017		190			192	
v/s Ratio Prot												
v/s Ratio Perm		0.18			c0.20	0.02		c0.06			0.05	
v/c Ratio		0.26			0.29	0.03		0.49			0.38	
Uniform Delay, d1		3.9			4.0	3.2		26.0			25.6	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		0.5			0.6	0.1		2.0			1.3	
Delay (s)		4.4			4.6	3.3		28.0			26.9	
Level of Service		A			A	A		C			C	
Approach Delay (s)		4.4			4.5			28.0			26.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	64.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	47.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	153	2	4	151	110	3	28	2	162	36	3
Future Volume (Veh/h)	0	153	2	4	151	110	3	28	2	162	36	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	163	2	4	161	117	3	30	2	172	38	3
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	278			165			354	449	163	349	334	161
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	278			165			354	449	163	349	334	161
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	94	100	70	93	100
cM capacity (veh/h)	1296			1426			572	501	887	579	583	889

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	163	2	165	117	35	213
Volume Left	0	0	4	0	3	172
Volume Right	0	2	0	117	2	3
cSH	1296	1700	1426	1700	519	583
Volume to Capacity	0.00	0.00	0.00	0.07	0.07	0.37
Queue Length 95th (m)	0.0	0.0	0.1	0.0	1.7	13.4
Control Delay (s)	0.0	0.0	0.2	0.0	12.4	14.7
Lane LOS			A		B	B
Approach Delay (s)	0.0		0.1		12.4	14.7
Approach LOS					B	B

Intersection Summary			
Average Delay	5.2		
Intersection Capacity Utilization	35.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	291	20	9	252	15	12	2	4	11	2	2
Future Volume (Veh/h)	10	291	20	9	252	15	12	2	4	11	2	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	11	331	23	10	286	17	14	2	5	13	2	2
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					274							
pX, platoon unblocked												
vC, conflicting volume	303			354			662	676	331	665	682	286
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	303			354			662	676	331	665	682	286
tC, single (s)	4.1			4.2			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			96	99	99	96	99	100
cM capacity (veh/h)	1269			1156			360	371	715	367	368	758

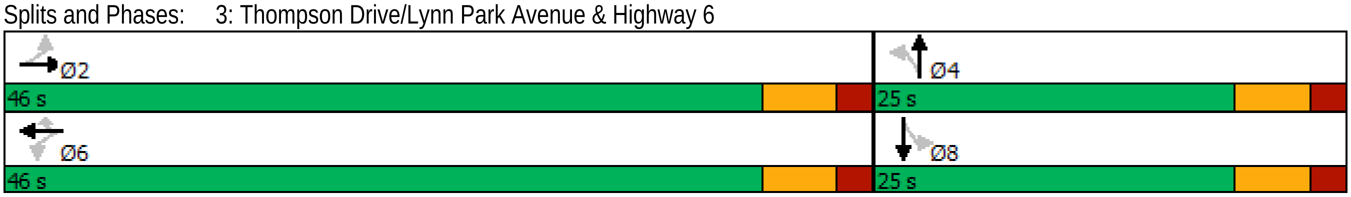
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	342	23	296	17	21	17
Volume Left	11	0	10	0	14	13
Volume Right	0	23	0	17	5	2
cSH	1269	1700	1156	1700	409	391
Volume to Capacity	0.01	0.01	0.01	0.01	0.05	0.04
Queue Length 95th (m)	0.2	0.0	0.2	0.0	1.3	1.1
Control Delay (s)	0.3	0.0	0.4	0.0	14.3	14.6
Lane LOS	A		A		B	B
Approach Delay (s)	0.3		0.3		14.3	14.6
Approach LOS					B	B

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	33.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	9	243	82	216	24	38	5	24	2
Future Volume (vph)	9	243	82	216	24	38	5	24	2
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		2		6			4		8
Permitted Phases	2		6		6	4		8	
Detector Phase	2	2	6	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	25.0	25.0	25.0	25.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	25.0	25.0	25.0	25.0
Total Split (%)	64.8%	64.8%	64.8%	64.8%	64.8%	35.2%	35.2%	35.2%	35.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0		6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		48.0		48.0	48.0		8.9		8.9
Actuated g/C Ratio		0.74		0.74	0.74		0.14		0.14
v/c Ratio		0.24		0.28	0.02		0.41		0.18
Control Delay		4.3		5.0	0.9		18.2		20.8
Queue Delay		0.0		0.0	0.0		0.0		0.0
Total Delay		4.3		5.0	0.9		18.2		20.8
LOS		A		A	A		B		C
Approach Delay		4.3		4.7			18.2		20.8
Approach LOS		A		A			B		C

Intersection Summary	
Cycle Length: 71	
Actuated Cycle Length: 64.7	
Natural Cycle: 50	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.41	
Intersection Signal Delay: 7.0	Intersection LOS: A
Intersection Capacity Utilization 54.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Thompson Drive/Lynn Park Avenue & Highway 6



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	323	327	26	105	38
v/c Ratio	0.24	0.28	0.02	0.41	0.18
Control Delay	4.3	5.0	0.9	18.2	20.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	4.3	5.0	0.9	18.2	20.8
Queue Length 50th (m)	11.4	12.9	0.0	5.4	3.2
Queue Length 95th (m)	24.4	27.9	1.4	17.2	10.2
Internal Link Dist (m)	250.4	238.2		251.5	265.0
Turn Bay Length (m)			43.0		
Base Capacity (vph)	1356	1164	1210	482	451
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.24	0.28	0.02	0.22	0.08

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	243	42	82	216	24	38	5	53	24	2	9
Future Volume (vph)	9	243	42	82	216	24	38	5	53	24	2	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0			6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frpb, ped/bikes		1.00			1.00	1.00		1.00			0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		0.98			1.00	0.85		0.93			0.96	
Flt Protected		1.00			0.99	1.00		0.98			0.97	
Satd. Flow (prot)		1838			1858	1615		1722			1761	
Flt Permitted		0.99			0.83	1.00		0.85			0.83	
Satd. Flow (perm)		1821			1570	1615		1497			1505	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	10	267	46	90	237	26	42	5	58	26	2	10
RTOR Reduction (vph)	0	6	0	0	0	8	0	52	0	0	9	0
Lane Group Flow (vph)	0	317	0	0	327	18	0	53	0	0	29	0
Confl. Peds. (#/hr)			3	3			2					2
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Actuated Green, G (s)		46.7			46.7	46.7		7.2			7.2	
Effective Green, g (s)		46.7			46.7	46.7		7.2			7.2	
Actuated g/C Ratio		0.71			0.71	0.71		0.11			0.11	
Clearance Time (s)		6.0			6.0	6.0		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		1290			1112	1144		163			164	
v/s Ratio Prot												
v/s Ratio Perm		0.17			c0.21	0.01		c0.04			0.02	
v/c Ratio		0.25			0.29	0.02		0.33			0.18	
Uniform Delay, d1		3.4			3.5	2.8		27.1			26.7	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		0.5			0.7	0.0		1.2			0.5	
Delay (s)		3.8			4.2	2.9		28.3			27.2	
Level of Service		A			A	A		C			C	
Approach Delay (s)		3.8			4.1			28.3			27.2	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	65.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Appendix E – Capacity Analysis – Future Background 2034

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	150	4	5	176	167	6	22	10	98	16	5
Future Volume (Veh/h)	4	150	4	5	176	167	6	22	10	98	16	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	5	190	5	6	223	211	8	28	13	124	20	6
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	434			195			451	646	190	462	440	223
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	434			195			451	646	190	462	440	223
tC, single (s)	4.4			4.1			7.1	6.6	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.1	3.4	3.5	4.0	3.3
p0 queue free %	99			100			98	93	98	73	96	99
cM capacity (veh/h)	979			1390			499	382	824	466	509	822

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	195	5	229	211	49	150
Volume Left	5	0	6	0	8	124
Volume Right	0	5	0	211	13	6
cSH	979	1700	1390	1700	466	480
Volume to Capacity	0.01	0.00	0.00	0.12	0.11	0.31
Queue Length 95th (m)	0.1	0.0	0.1	0.0	2.8	10.6
Control Delay (s)	0.3	0.0	0.2	0.0	13.6	15.9
Lane LOS	A		A		B	C
Approach Delay (s)	0.3		0.1		13.6	15.9
Approach LOS					B	C

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	250	5	8	315	4	18	2	13	11	2	11
Future Volume (Veh/h)	6	250	5	8	315	4	18	2	13	11	2	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	8	329	7	11	414	5	24	3	17	14	3	14
Pedestrians					1							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					274							
pX, platoon unblocked												
vC, conflicting volume	419			336			796	786	330	800	788	414
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	419			336			796	786	330	800	788	414
tC, single (s)	4.3			4.1			7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.4			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	99			99			92	99	98	95	99	98
cM capacity (veh/h)	1064			1235			295	321	697	292	320	643

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	337	7	425	5	44	31
Volume Left	8	0	11	0	24	14
Volume Right	0	7	0	5	17	14
cSH	1064	1700	1235	1700	382	392
Volume to Capacity	0.01	0.00	0.01	0.00	0.12	0.08
Queue Length 95th (m)	0.2	0.0	0.2	0.0	3.1	2.1
Control Delay (s)	0.3	0.0	0.3	0.0	15.6	15.0
Lane LOS	A		A		C	B
Approach Delay (s)	0.3		0.3		15.6	15.0
Approach LOS					C	B

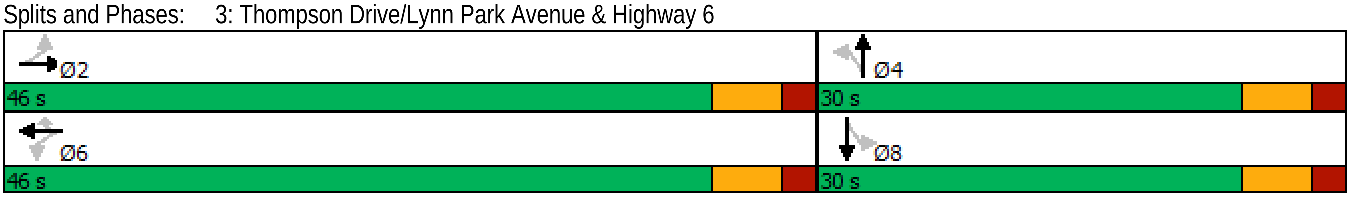
Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	33.7%	ICU Level of Service	A
Analysis Period (min)	15		

3: Thompson Drive/Lynn Park Avenue & Highway 6

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	19	229	30	261	34	42	22	33	20
Future Volume (vph)	19	229	30	261	34	42	22	33	20
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		2		6			4		8
Permitted Phases	2		6		6	4		8	
Detector Phase	2	2	6	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	30.0	30.0	30.0	30.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	30.0	30.0	30.0	30.0
Total Split (%)	60.5%	60.5%	60.5%	60.5%	60.5%	39.5%	39.5%	39.5%	39.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0		6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		45.1		45.1	45.1		9.9		9.9
Actuated g/C Ratio		0.72		0.72	0.72		0.16		0.16
v/c Ratio		0.27		0.31	0.04		0.46		0.38
Control Delay		5.4		5.7	1.9		24.6		21.7
Queue Delay		0.0		0.0	0.0		0.0		0.0
Total Delay		5.4		5.7	1.9		24.6		21.7
LOS		A		A	A		C		C
Approach Delay		5.4		5.3			24.6		21.7
Approach LOS		A		A			C		C

Intersection Summary	
Cycle Length: 76	
Actuated Cycle Length: 62.8	
Natural Cycle: 55	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.46	
Intersection Signal Delay: 9.4	Intersection LOS: A
Intersection Capacity Utilization 48.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Thompson Drive/Lynn Park Avenue & Highway 6



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	334	378	44	118	99
v/c Ratio	0.27	0.31	0.04	0.46	0.38
Control Delay	5.4	5.7	1.9	24.6	21.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	5.4	5.7	1.9	24.6	21.7
Queue Length 50th (m)	13.7	16.3	0.0	9.8	7.4
Queue Length 95th (m)	24.5	28.5	2.4	19.0	15.7
Internal Link Dist (m)	250.4	238.2		251.5	265.0
Turn Bay Length (m)			43.0		
Base Capacity (vph)	1255	1238	1077	586	594
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.27	0.31	0.04	0.20	0.17

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	229	9	30	261	34	42	22	26	33	20	23
Future Volume (vph)	19	229	9	30	261	34	42	22	26	33	20	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0			6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frpb, ped/bikes		1.00			1.00	0.98		1.00			0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		1.00			1.00	0.85		0.96			0.96	
Flt Protected		1.00			0.99	1.00		0.98			0.98	
Satd. Flow (prot)		1812			1819	1486		1721			1722	
Flt Permitted		0.96			0.94	1.00		0.85			0.86	
Satd. Flow (perm)		1748			1726	1486		1492			1508	
Peak-hour factor, PHF	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	25	297	12	39	339	44	55	29	34	43	26	30
RTOR Reduction (vph)	0	1	0	0	0	14	0	24	0	0	26	0
Lane Group Flow (vph)	0	333	0	0	378	30	0	94	0	0	73	0
Confl. Peds. (#/hr)	2					2	8					8
Heavy Vehicles (%)	5%	4%	0%	3%	4%	6%	7%	0%	0%	6%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Actuated Green, G (s)		43.9			43.9	43.9		8.2			8.2	
Effective Green, g (s)		43.9			43.9	43.9		8.2			8.2	
Actuated g/C Ratio		0.68			0.68	0.68		0.13			0.13	
Clearance Time (s)		6.0			6.0	6.0		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		1197			1182	1017		190			192	
v/s Ratio Prot												
v/s Ratio Perm		0.19			c0.22	0.02		c0.06			0.05	
v/c Ratio		0.28			0.32	0.03		0.49			0.38	
Uniform Delay, d1		3.9			4.1	3.2		26.0			25.6	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		0.6			0.7	0.1		2.0			1.3	
Delay (s)		4.5			4.8	3.3		28.0			26.9	
Level of Service		A			A	A		C			C	
Approach Delay (s)		4.5			4.6			28.0			26.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	64.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	169	2	5	167	122	4	30	2	179	40	4
Future Volume (Veh/h)	0	169	2	5	167	122	4	30	2	179	40	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	180	2	5	178	130	4	32	2	190	43	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	308			182			394	498	180	386	370	178
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	308			182			394	498	180	386	370	178
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	93	100	65	92	100
cM capacity (veh/h)	1264			1405			532	469	868	543	556	870

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	180	2	183	130	38	237
Volume Left	0	0	5	0	4	190
Volume Right	0	2	0	130	2	4
cSH	1264	1700	1405	1700	487	549
Volume to Capacity	0.00	0.00	0.00	0.08	0.08	0.43
Queue Length 95th (m)	0.0	0.0	0.1	0.0	2.0	17.3
Control Delay (s)	0.0	0.0	0.2	0.0	13.0	16.4
Lane LOS			A		B	C
Approach Delay (s)	0.0		0.1		13.0	16.4
Approach LOS					B	C

Intersection Summary			
Average Delay	5.8		
Intersection Capacity Utilization	38.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	322	20	9	278	15	12	2	4	11	2	2
Future Volume (Veh/h)	10	322	20	9	278	15	12	2	4	11	2	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	11	366	23	10	316	17	14	2	5	13	2	2
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					274							
pX, platoon unblocked												
vC, conflicting volume	333			389			727	741	366	730	747	316
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	333			389			727	741	366	730	747	316
tC, single (s)	4.1			4.2			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			96	99	99	96	99	100
cM capacity (veh/h)	1238			1122			325	340	684	332	338	729

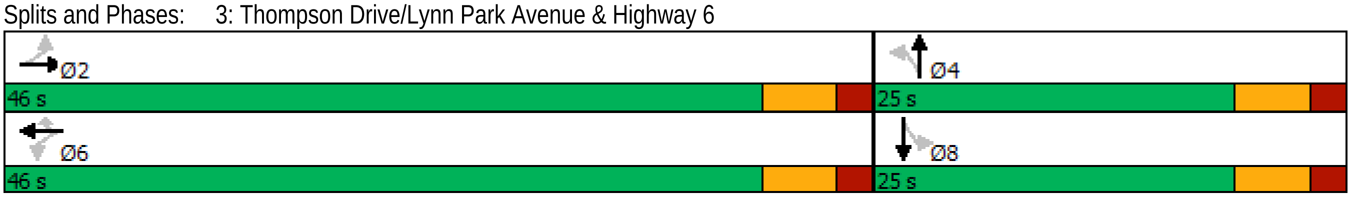
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	377	23	326	17	21	17
Volume Left	11	0	10	0	14	13
Volume Right	0	23	0	17	5	2
cSH	1238	1700	1122	1700	373	355
Volume to Capacity	0.01	0.01	0.01	0.01	0.06	0.05
Queue Length 95th (m)	0.2	0.0	0.2	0.0	1.4	1.2
Control Delay (s)	0.3	0.0	0.3	0.0	15.2	15.6
Lane LOS	A		A		C	C
Approach Delay (s)	0.3		0.3		15.2	15.6
Approach LOS					C	C

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	35.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	9	268	82	239	24	38	5	24	2
Future Volume (vph)	9	268	82	239	24	38	5	24	2
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		2		6			4		8
Permitted Phases	2		6		6	4		8	
Detector Phase	2	2	6	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	25.0	25.0	25.0	25.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	25.0	25.0	25.0	25.0
Total Split (%)	64.8%	64.8%	64.8%	64.8%	64.8%	35.2%	35.2%	35.2%	35.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0		6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		48.0		48.0	48.0		8.9		8.9
Actuated g/C Ratio		0.74		0.74	0.74		0.14		0.14
v/c Ratio		0.26		0.30	0.02		0.41		0.18
Control Delay		4.5		5.1	0.9		18.2		20.8
Queue Delay		0.0		0.0	0.0		0.0		0.0
Total Delay		4.5		5.1	0.9		18.2		20.8
LOS		A		A	A		B		C
Approach Delay		4.5		4.8			18.2		20.8
Approach LOS		A		A			B		C

Intersection Summary	
Cycle Length: 71	
Actuated Cycle Length: 64.7	
Natural Cycle: 50	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.41	
Intersection Signal Delay: 7.0	Intersection LOS: A
Intersection Capacity Utilization 56.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Thompson Drive/Lynn Park Avenue & Highway 6



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	351	353	26	105	38
v/c Ratio	0.26	0.30	0.02	0.41	0.18
Control Delay	4.5	5.1	0.9	18.2	20.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	4.5	5.1	0.9	18.2	20.8
Queue Length 50th (m)	12.7	14.2	0.0	5.4	3.2
Queue Length 95th (m)	27.0	30.3	1.4	17.2	10.2
Internal Link Dist (m)	250.4	238.2		251.5	265.0
Turn Bay Length (m)			43.0		
Base Capacity (vph)	1358	1168	1210	482	451
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.26	0.30	0.02	0.22	0.08

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	268	42	82	239	24	38	5	53	24	2	9
Future Volume (vph)	9	268	42	82	239	24	38	5	53	24	2	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0			6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frpb, ped/bikes		1.00			1.00	1.00		1.00			0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		0.98			1.00	0.85		0.93			0.96	
Flt Protected		1.00			0.99	1.00		0.98			0.97	
Satd. Flow (prot)		1842			1860	1615		1722			1761	
Flt Permitted		0.99			0.84	1.00		0.85			0.83	
Satd. Flow (perm)		1825			1575	1615		1497			1505	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	10	295	46	90	263	26	42	5	58	26	2	10
RTOR Reduction (vph)	0	5	0	0	0	8	0	52	0	0	9	0
Lane Group Flow (vph)	0	346	0	0	353	18	0	53	0	0	29	0
Confl. Peds. (#/hr)			3	3			2					2
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Actuated Green, G (s)		46.7			46.7	46.7		7.2			7.2	
Effective Green, g (s)		46.7			46.7	46.7		7.2			7.2	
Actuated g/C Ratio		0.71			0.71	0.71		0.11			0.11	
Clearance Time (s)		6.0			6.0	6.0		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		1293			1116	1144		163			164	
v/s Ratio Prot												
v/s Ratio Perm		0.19			c0.22	0.01		c0.04			0.02	
v/c Ratio		0.27			0.32	0.02		0.33			0.18	
Uniform Delay, d1		3.5			3.6	2.8		27.1			26.7	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		0.5			0.7	0.0		1.2			0.5	
Delay (s)		4.0			4.3	2.9		28.3			27.2	
Level of Service		A			A	A		C			C	
Approach Delay (s)		4.0			4.2			28.3			27.2	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	65.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Appendix F – Capacity Analysis – Future Background 2039

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	166	4	5	194	184	7	24	11	108	17	5
Future Volume (Veh/h)	4	166	4	5	194	184	7	24	11	108	17	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	5	210	5	6	246	233	9	30	14	137	22	6
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	479			215			495	711	210	507	483	246
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	479			215			495	711	210	507	483	246
tC, single (s)	4.4			4.1			7.1	6.6	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.1	3.4	3.5	4.0	3.3
p0 queue free %	99			100			98	91	98	68	95	99
cM capacity (veh/h)	940			1367			464	350	803	430	482	798

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	215	5	252	233	53	165
Volume Left	5	0	6	0	9	137
Volume Right	0	5	0	233	14	6
cSH	940	1700	1367	1700	432	443
Volume to Capacity	0.01	0.00	0.00	0.14	0.12	0.37
Queue Length 95th (m)	0.1	0.0	0.1	0.0	3.3	13.6
Control Delay (s)	0.3	0.0	0.2	0.0	14.5	17.9
Lane LOS	A		A		B	C
Approach Delay (s)	0.3		0.1		14.5	17.9
Approach LOS					B	C

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	34.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	276	5	8	347	4	18	2	13	11	2	11
Future Volume (Veh/h)	6	276	5	8	347	4	18	2	13	11	2	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	8	363	7	11	457	5	24	3	17	14	3	14
Pedestrians					1							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					274							
pX, platoon unblocked	1.00						1.00	1.00		1.00	1.00	1.00
vC, conflicting volume	462			370			874	863	364	878	865	457
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	459			370			872	861	364	876	863	454
tC, single (s)	4.3			4.1			7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.4			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	99			99			91	99	97	95	99	98
cM capacity (veh/h)	1024			1200			261	289	667	258	289	608

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	371	7	468	5	44	31
Volume Left	8	0	11	0	24	14
Volume Right	0	7	0	5	17	14
cSH	1024	1700	1200	1700	344	354
Volume to Capacity	0.01	0.00	0.01	0.00	0.13	0.09
Queue Length 95th (m)	0.2	0.0	0.2	0.0	3.5	2.3
Control Delay (s)	0.3	0.0	0.3	0.0	17.0	16.1
Lane LOS	A		A		C	C
Approach Delay (s)	0.3		0.3		17.0	16.1
Approach LOS					C	C

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	35.4%	ICU Level of Service	A
Analysis Period (min)	15		

Timings
3: Thompson Drive/Lynn Park Avenue & Highway 6

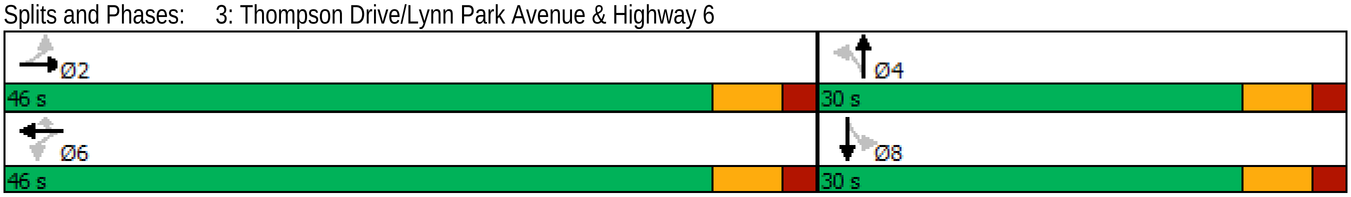
02/03/2024

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	19	253	30	288	34	42	22	33	20
Future Volume (vph)	19	253	30	288	34	42	22	33	20
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		2		6			4		8
Permitted Phases	2		6		6	4		8	
Detector Phase	2	2	6	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	30.0	30.0	30.0	30.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	30.0	30.0	30.0	30.0
Total Split (%)	60.5%	60.5%	60.5%	60.5%	60.5%	39.5%	39.5%	39.5%	39.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0		6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		45.1		45.1	45.1		9.9		9.9
Actuated g/C Ratio		0.72		0.72	0.72		0.16		0.16
v/c Ratio		0.29		0.33	0.04		0.46		0.38
Control Delay		5.6		6.0	1.9		24.6		21.7
Queue Delay		0.0		0.0	0.0		0.0		0.0
Total Delay		5.6		6.0	1.9		24.6		21.7
LOS		A		A	A		C		C
Approach Delay		5.6		5.6			24.6		21.7
Approach LOS		A		A			C		C

Intersection Summary

Cycle Length: 76
Actuated Cycle Length: 62.8
Natural Cycle: 55
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.46
Intersection Signal Delay: 9.3 Intersection LOS: A
Intersection Capacity Utilization 49.4% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Thompson Drive/Lynn Park Avenue & Highway 6



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	366	413	44	118	99
v/c Ratio	0.29	0.33	0.04	0.46	0.38
Control Delay	5.6	6.0	1.9	24.6	21.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	5.6	6.0	1.9	24.6	21.7
Queue Length 50th (m)	15.4	18.2	0.0	9.8	7.4
Queue Length 95th (m)	27.0	31.5	2.4	19.0	15.7
Internal Link Dist (m)	250.4	238.2		251.5	265.0
Turn Bay Length (m)			43.0		
Base Capacity (vph)	1257	1239	1077	586	594
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.29	0.33	0.04	0.20	0.17

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	253	9	30	288	34	42	22	26	33	20	23
Future Volume (vph)	19	253	9	30	288	34	42	22	26	33	20	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0			6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frpb, ped/bikes		1.00			1.00	0.98		1.00			0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		1.00			1.00	0.85		0.96			0.96	
Flt Protected		1.00			1.00	1.00		0.98			0.98	
Satd. Flow (prot)		1813			1820	1486		1721			1722	
Flt Permitted		0.96			0.94	1.00		0.85			0.86	
Satd. Flow (perm)		1750			1728	1486		1492			1508	
Peak-hour factor, PHF	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	25	329	12	39	374	44	55	29	34	43	26	30
RTOR Reduction (vph)	0	1	0	0	0	14	0	24	0	0	26	0
Lane Group Flow (vph)	0	365	0	0	413	30	0	94	0	0	73	0
Confl. Peds. (#/hr)	2					2	8					8
Heavy Vehicles (%)	5%	4%	0%	3%	4%	6%	7%	0%	0%	6%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Actuated Green, G (s)		43.9			43.9	43.9		8.2			8.2	
Effective Green, g (s)		43.9			43.9	43.9		8.2			8.2	
Actuated g/C Ratio		0.68			0.68	0.68		0.13			0.13	
Clearance Time (s)		6.0			6.0	6.0		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		1198			1183	1017		190			192	
v/s Ratio Prot												
v/s Ratio Perm		0.21			c0.24	0.02		c0.06			0.05	
v/c Ratio		0.30			0.35	0.03		0.49			0.38	
Uniform Delay, d1		4.0			4.2	3.2		26.0			25.6	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		0.7			0.8	0.1		2.0			1.3	
Delay (s)		4.7			5.0	3.3		28.0			26.9	
Level of Service		A			A	A		C			C	
Approach Delay (s)		4.7			4.8			28.0			26.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	64.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	187	3	5	184	135	4	34	3	198	44	4
Future Volume (Veh/h)	0	187	3	5	184	135	4	34	3	198	44	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	199	3	5	196	144	4	36	3	211	47	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	340			202			432	549	199	426	408	196
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	340			202			432	549	199	426	408	196
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	92	100	58	91	100
cM capacity (veh/h)	1230			1382			497	439	847	505	529	850

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	199	3	201	144	43	262
Volume Left	0	0	5	0	4	211
Volume Right	0	3	0	144	3	4
cSH	1230	1700	1382	1700	459	512
Volume to Capacity	0.00	0.00	0.00	0.08	0.09	0.51
Queue Length 95th (m)	0.0	0.0	0.1	0.0	2.5	23.0
Control Delay (s)	0.0	0.0	0.2	0.0	13.6	19.1
Lane LOS			A		B	C
Approach Delay (s)	0.0		0.1		13.6	19.1
Approach LOS					B	C

Intersection Summary			
Average Delay	6.6		
Intersection Capacity Utilization	40.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	355	20	9	307	15	12	2	4	11	2	2
Future Volume (Veh/h)	10	355	20	9	307	15	12	2	4	11	2	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	11	403	23	10	349	17	14	2	5	13	2	2
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					274							
pX, platoon unblocked												
vC, conflicting volume	366			426			797	811	403	800	817	349
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	366			426			797	811	403	800	817	349
tC, single (s)	4.1			4.2			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			95	99	99	96	99	100
cM capacity (veh/h)	1204			1087			291	310	652	297	308	699

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	414	23	359	17	21	17
Volume Left	11	0	10	0	14	13
Volume Right	0	23	0	17	5	2
cSH	1204	1700	1087	1700	338	320
Volume to Capacity	0.01	0.01	0.01	0.01	0.06	0.05
Queue Length 95th (m)	0.2	0.0	0.2	0.0	1.6	1.3
Control Delay (s)	0.3	0.0	0.3	0.0	16.4	16.9
Lane LOS	A		A		C	C
Approach Delay (s)	0.3		0.3		16.4	16.9
Approach LOS					C	C

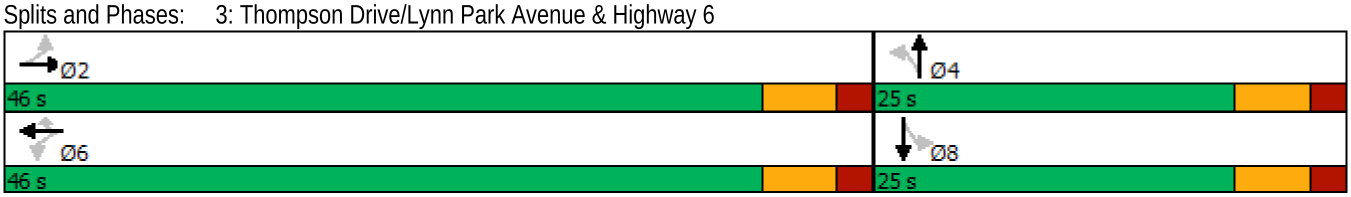
Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	36.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	9	296	82	264	24	38	5	24	2
Future Volume (vph)	9	296	82	264	24	38	5	24	2
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		2		6			4		8
Permitted Phases	2		6		6	4		8	
Detector Phase	2	2	6	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	25.0	25.0	25.0	25.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	25.0	25.0	25.0	25.0
Total Split (%)	64.8%	64.8%	64.8%	64.8%	64.8%	35.2%	35.2%	35.2%	35.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0		6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		48.0		48.0	48.0		8.9		8.9
Actuated g/C Ratio		0.74		0.74	0.74		0.14		0.14
v/c Ratio		0.28		0.32	0.02		0.41		0.18
Control Delay		4.6		5.3	0.9		18.2		20.8
Queue Delay		0.0		0.0	0.0		0.0		0.0
Total Delay		4.6		5.3	0.9		18.2		20.8
LOS		A		A	A		B		C
Approach Delay		4.6		5.0			18.2		20.8
Approach LOS		A		A			B		C

Intersection Summary

Cycle Length: 71
Actuated Cycle Length: 64.7
Natural Cycle: 50
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.41
Intersection Signal Delay: 7.0 Intersection LOS: A
Intersection Capacity Utilization 59.4% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 3: Thompson Drive/Lynn Park Avenue & Highway 6



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	381	380	26	105	38
v/c Ratio	0.28	0.32	0.02	0.41	0.18
Control Delay	4.6	5.3	0.9	18.2	20.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	4.6	5.3	0.9	18.2	20.8
Queue Length 50th (m)	14.3	15.6	0.0	5.4	3.2
Queue Length 95th (m)	29.8	33.2	1.4	17.2	10.2
Internal Link Dist (m)	250.4	238.2		251.5	265.0
Turn Bay Length (m)			43.0		
Base Capacity (vph)	1361	1171	1210	482	451
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.28	0.32	0.02	0.22	0.08

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	296	42	82	264	24	38	5	53	24	2	9
Future Volume (vph)	9	296	42	82	264	24	38	5	53	24	2	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0			6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frpb, ped/bikes		1.00			1.00	1.00		1.00			0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		0.98			1.00	0.85		0.93			0.96	
Flt Protected		1.00			0.99	1.00		0.98			0.97	
Satd. Flow (prot)		1845			1862	1615		1722			1761	
Flt Permitted		0.99			0.84	1.00		0.85			0.83	
Satd. Flow (perm)		1828			1578	1615		1497			1505	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	10	325	46	90	290	26	42	5	58	26	2	10
RTOR Reduction (vph)	0	5	0	0	0	8	0	52	0	0	9	0
Lane Group Flow (vph)	0	376	0	0	380	18	0	53	0	0	29	0
Confl. Peds. (#/hr)			3	3			2					2
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Actuated Green, G (s)		46.7			46.7	46.7		7.2			7.2	
Effective Green, g (s)		46.7			46.7	46.7		7.2			7.2	
Actuated g/C Ratio		0.71			0.71	0.71		0.11			0.11	
Clearance Time (s)		6.0			6.0	6.0		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		1295			1118	1144		163			164	
v/s Ratio Prot												
v/s Ratio Perm		0.21			c0.24	0.01		c0.04			0.02	
v/c Ratio		0.29			0.34	0.02		0.33			0.18	
Uniform Delay, d1		3.5			3.7	2.8		27.1			26.7	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		0.6			0.8	0.0		1.2			0.5	
Delay (s)		4.1			4.5	2.9		28.3			27.2	
Level of Service		A			A	A		C			C	
Approach Delay (s)		4.1			4.4			28.3			27.2	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	7.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	65.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Appendix G – Capacity Analysis – Future Background 2044

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	183	4	6	214	204	7	27	12	119	19	6
Future Volume (Veh/h)	4	183	4	6	214	204	7	27	12	119	19	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	5	232	5	8	271	258	9	34	15	151	24	8
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	529			237			549	787	232	561	534	271
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	529			237			549	787	232	561	534	271
tC, single (s)	4.4			4.1			7.1	6.6	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.1	3.4	3.5	4.0	3.3
p0 queue free %	99			99			98	89	98	61	95	99
cM capacity (veh/h)	898			1342			423	315	781	387	450	773

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	237	5	279	258	58	183
Volume Left	5	0	8	0	9	151
Volume Right	0	5	0	258	15	8
cSH	898	1700	1342	1700	391	403
Volume to Capacity	0.01	0.00	0.01	0.15	0.15	0.45
Queue Length 95th (m)	0.1	0.0	0.1	0.0	4.1	18.4
Control Delay (s)	0.2	0.0	0.3	0.0	15.8	21.1
Lane LOS	A		A		C	C
Approach Delay (s)	0.2		0.1		15.8	21.1
Approach LOS					C	C

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	37.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	305	5	8	383	4	18	2	13	11	2	11
Future Volume (Veh/h)	6	305	5	8	383	4	18	2	13	11	2	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	8	401	7	11	504	5	24	3	17	14	3	14
Pedestrians					1							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					274							
pX, platoon unblocked	0.97						0.97	0.97		0.97	0.97	0.97
vC, conflicting volume	509			408			958	948	402	962	950	504
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	480			408			943	932	402	947	934	475
tC, single (s)	4.3			4.1			7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.4			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	99			99			89	99	97	94	99	98
cM capacity (veh/h)	980			1162			227	256	635	225	256	577

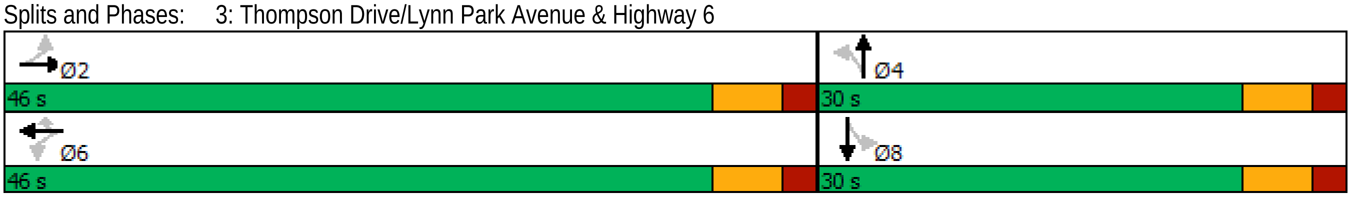
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	409	7	515	5	44	31
Volume Left	8	0	11	0	24	14
Volume Right	0	7	0	5	17	14
cSH	980	1700	1162	1700	305	315
Volume to Capacity	0.01	0.00	0.01	0.00	0.14	0.10
Queue Length 95th (m)	0.2	0.0	0.2	0.0	4.0	2.6
Control Delay (s)	0.3	0.0	0.3	0.0	18.8	17.7
Lane LOS	A		A		C	C
Approach Delay (s)	0.3		0.3		18.8	17.7
Approach LOS					C	C

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	37.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	19	279	30	318	34	42	22	33	20
Future Volume (vph)	19	279	30	318	34	42	22	33	20
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		2		6			4		8
Permitted Phases	2		6		6	4		8	
Detector Phase	2	2	6	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	30.0	30.0	30.0	30.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	30.0	30.0	30.0	30.0
Total Split (%)	60.5%	60.5%	60.5%	60.5%	60.5%	39.5%	39.5%	39.5%	39.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0		6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		45.1		45.1	45.1		9.9		9.9
Actuated g/C Ratio		0.72		0.72	0.72		0.16		0.16
v/c Ratio		0.32		0.36	0.04		0.46		0.38
Control Delay		5.8		6.2	1.9		24.6		21.7
Queue Delay		0.0		0.0	0.0		0.0		0.0
Total Delay		5.8		6.2	1.9		24.6		21.7
LOS		A		A	A		C		C
Approach Delay		5.8		5.8			24.6		21.7
Approach LOS		A		A			C		C

Intersection Summary	
Cycle Length: 76	
Actuated Cycle Length: 62.8	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.46	
Intersection Signal Delay: 9.2	Intersection LOS: A
Intersection Capacity Utilization 50.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Thompson Drive/Lynn Park Avenue & Highway 6



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	399	452	44	118	99
v/c Ratio	0.32	0.36	0.04	0.46	0.38
Control Delay	5.8	6.2	1.9	24.6	21.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	5.8	6.2	1.9	24.6	21.7
Queue Length 50th (m)	17.2	20.6	0.0	9.8	7.4
Queue Length 95th (m)	29.8	34.9	2.4	19.0	15.7
Internal Link Dist (m)	250.4	238.2		251.5	265.0
Turn Bay Length (m)			43.0		
Base Capacity (vph)	1257	1241	1077	586	594
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.32	0.36	0.04	0.20	0.17

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	279	9	30	318	34	42	22	26	33	20	23
Future Volume (vph)	19	279	9	30	318	34	42	22	26	33	20	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0			6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frpb, ped/bikes		1.00			1.00	0.98		1.00			0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		1.00			1.00	0.85		0.96			0.96	
Flt Protected		1.00			1.00	1.00		0.98			0.98	
Satd. Flow (prot)		1815			1821	1486		1721			1722	
Flt Permitted		0.96			0.95	1.00		0.85			0.86	
Satd. Flow (perm)		1752			1730	1486		1492			1508	
Peak-hour factor, PHF	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	25	362	12	39	413	44	55	29	34	43	26	30
RTOR Reduction (vph)	0	1	0	0	0	14	0	24	0	0	26	0
Lane Group Flow (vph)	0	398	0	0	452	30	0	94	0	0	73	0
Confl. Peds. (#/hr)	2					2	8					8
Heavy Vehicles (%)	5%	4%	0%	3%	4%	6%	7%	0%	0%	6%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Actuated Green, G (s)		43.9			43.9	43.9		8.2			8.2	
Effective Green, g (s)		43.9			43.9	43.9		8.2			8.2	
Actuated g/C Ratio		0.68			0.68	0.68		0.13			0.13	
Clearance Time (s)		6.0			6.0	6.0		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		1199			1184	1017		190			192	
v/s Ratio Prot												
v/s Ratio Perm		0.23			c0.26	0.02		c0.06			0.05	
v/c Ratio		0.33			0.38	0.03		0.49			0.38	
Uniform Delay, d1		4.1			4.3	3.2		26.0			25.6	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		0.7			0.9	0.1		2.0			1.3	
Delay (s)		4.9			5.2	3.3		28.0			26.9	
Level of Service		A			A	A		C			C	
Approach Delay (s)		4.9			5.1			28.0			26.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	64.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	207	3	6	204	149	4	37	3	218	49	4
Future Volume (Veh/h)	0	207	3	6	204	149	4	37	3	218	49	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	220	3	6	217	159	4	39	3	232	52	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	376			223			479	608	220	472	452	217
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	376			223			479	608	220	472	452	217
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	90	100	50	90	100
cM capacity (veh/h)	1194			1358			457	406	825	466	499	828

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	220	3	223	159	46	288
Volume Left	0	0	6	0	4	232
Volume Right	0	3	0	159	3	4
cSH	1194	1700	1358	1700	424	474
Volume to Capacity	0.00	0.00	0.00	0.09	0.11	0.61
Queue Length 95th (m)	0.0	0.0	0.1	0.0	2.9	31.7
Control Delay (s)	0.0	0.0	0.2	0.0	14.5	23.6
Lane LOS			A		B	C
Approach Delay (s)	0.0		0.1		14.5	23.6
Approach LOS					B	C

Intersection Summary			
Average Delay	8.0		
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	392	20	9	339	15	12	2	4	11	2	2
Future Volume (Veh/h)	10	392	20	9	339	15	12	2	4	11	2	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	11	445	23	10	385	17	14	2	5	13	2	2
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					274							
pX, platoon unblocked												
vC, conflicting volume	402			468			875	889	445	878	895	385
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	402			468			875	889	445	878	895	385
tC, single (s)	4.1			4.2			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			95	99	99	95	99	100
cM capacity (veh/h)	1168			1048			257	279	617	263	277	667

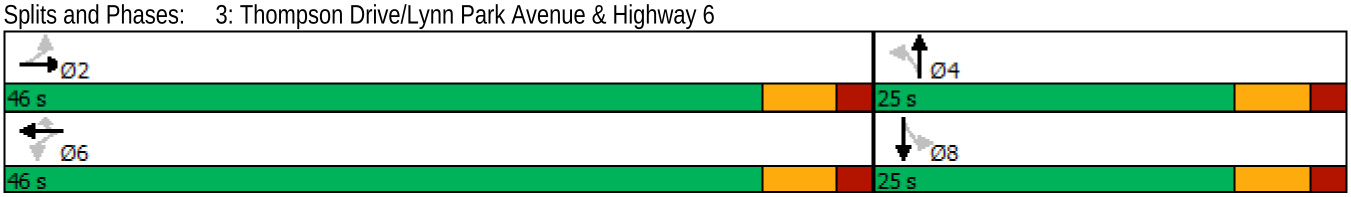
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	456	23	395	17	21	17
Volume Left	11	0	10	0	14	13
Volume Right	0	23	0	17	5	2
cSH	1168	1700	1048	1700	301	285
Volume to Capacity	0.01	0.01	0.01	0.01	0.07	0.06
Queue Length 95th (m)	0.2	0.0	0.2	0.0	1.8	1.5
Control Delay (s)	0.3	0.0	0.3	0.0	17.8	18.4
Lane LOS	A		A		C	C
Approach Delay (s)	0.3		0.3		17.8	18.4
Approach LOS					C	C

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	9	327	82	291	24	38	5	24	2
Future Volume (vph)	9	327	82	291	24	38	5	24	2
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		2		6			4		8
Permitted Phases	2		6		6	4		8	
Detector Phase	2	2	6	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	25.0	25.0	25.0	25.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	25.0	25.0	25.0	25.0
Total Split (%)	64.8%	64.8%	64.8%	64.8%	64.8%	35.2%	35.2%	35.2%	35.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0		6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		48.0		48.0	48.0		8.9		8.9
Actuated g/C Ratio		0.74		0.74	0.74		0.14		0.14
v/c Ratio		0.30		0.35	0.02		0.41		0.18
Control Delay		4.8		5.5	0.9		18.2		20.8
Queue Delay		0.0		0.0	0.0		0.0		0.0
Total Delay		4.8		5.5	0.9		18.2		20.8
LOS		A		A	A		B		C
Approach Delay		4.8		5.2			18.2		20.8
Approach LOS		A		A			B		C

Intersection Summary	
Cycle Length: 71	
Actuated Cycle Length: 64.7	
Natural Cycle: 50	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.41	
Intersection Signal Delay: 7.0	Intersection LOS: A
Intersection Capacity Utilization 62.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Thompson Drive/Lynn Park Avenue & Highway 6



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	415	410	26	105	38
v/c Ratio	0.30	0.35	0.02	0.41	0.18
Control Delay	4.8	5.5	0.9	18.2	20.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	4.8	5.5	0.9	18.2	20.8
Queue Length 50th (m)	16.0	17.3	0.0	5.4	3.2
Queue Length 95th (m)	33.2	36.6	1.4	17.2	10.2
Internal Link Dist (m)	250.4	238.2		251.5	265.0
Turn Bay Length (m)			43.0		
Base Capacity (vph)	1362	1172	1210	482	451
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.30	0.35	0.02	0.22	0.08

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	327	42	82	291	24	38	5	53	24	2	9
Future Volume (vph)	9	327	42	82	291	24	38	5	53	24	2	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0			6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frpb, ped/bikes		1.00			1.00	1.00		1.00			0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		0.99			1.00	0.85		0.93			0.96	
Flt Protected		1.00			0.99	1.00		0.98			0.97	
Satd. Flow (prot)		1848			1863	1615		1722			1761	
Flt Permitted		0.99			0.84	1.00		0.85			0.83	
Satd. Flow (perm)		1832			1580	1615		1497			1505	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	10	359	46	90	320	26	42	5	58	26	2	10
RTOR Reduction (vph)	0	4	0	0	0	8	0	52	0	0	9	0
Lane Group Flow (vph)	0	411	0	0	410	18	0	53	0	0	29	0
Confl. Peds. (#/hr)			3	3			2					2
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Actuated Green, G (s)		46.7			46.7	46.7		7.2			7.2	
Effective Green, g (s)		46.7			46.7	46.7		7.2			7.2	
Actuated g/C Ratio		0.71			0.71	0.71		0.11			0.11	
Clearance Time (s)		6.0			6.0	6.0		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		1298			1119	1144		163			164	
v/s Ratio Prot												
v/s Ratio Perm		0.22			c0.26	0.01		c0.04			0.02	
v/c Ratio		0.32			0.37	0.02		0.33			0.18	
Uniform Delay, d1		3.6			3.8	2.8		27.1			26.7	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		0.6			0.9	0.0		1.2			0.5	
Delay (s)		4.2			4.7	2.9		28.3			27.2	
Level of Service		A			A	A		C			C	
Approach Delay (s)		4.2			4.6			28.3			27.2	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	65.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Appendix H – Capacity Analysis – Future Total 2029

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	154	3	6	222	199	6	20	10	97	14	4
Future Volume (Veh/h)	3	154	3	6	222	199	6	20	10	97	14	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	4	195	4	8	281	252	8	25	13	123	18	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	533			199			514	752	195	526	504	281
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	533			199			514	752	195	526	504	281
tC, single (s)	4.4			4.1			7.1	6.6	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.1	3.4	3.5	4.0	3.3
p0 queue free %	100			99			98	92	98	71	96	99
cM capacity (veh/h)	895			1385			454	331	819	422	468	763

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	199	4	289	252	46	146
Volume Left	4	0	8	0	8	123
Volume Right	0	4	0	252	13	5
cSH	895	1700	1385	1700	422	433
Volume to Capacity	0.00	0.00	0.01	0.15	0.11	0.34
Queue Length 95th (m)	0.1	0.0	0.1	0.0	2.9	11.7
Control Delay (s)	0.2	0.0	0.3	0.0	14.6	17.5
Lane LOS	A		A		B	C
Approach Delay (s)	0.2		0.1		14.6	17.5
Approach LOS					B	C

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	36.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	316	5	8	334	6	18	3	13	19	3	19
Future Volume (Veh/h)	9	316	5	8	334	6	18	3	13	19	3	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	12	416	7	11	439	8	24	4	17	25	4	25
Pedestrians					1							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					274							
pX, platoon unblocked												
vC, conflicting volume	447			423			928	909	417	921	908	439
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	447			423			928	909	417	921	908	439
tC, single (s)	4.3			4.1			7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.4			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	99			99			90	99	97	90	99	96
cM capacity (veh/h)	1038			1147			234	271	623	239	272	622

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	428	7	450	8	45	54
Volume Left	12	0	11	0	24	25
Volume Right	0	7	0	8	17	25
cSH	1038	1700	1147	1700	311	339
Volume to Capacity	0.01	0.00	0.01	0.00	0.14	0.16
Queue Length 95th (m)	0.3	0.0	0.2	0.0	4.0	4.5
Control Delay (s)	0.4	0.0	0.3	0.0	18.5	17.6
Lane LOS	A		A		C	C
Approach Delay (s)	0.4		0.3		18.5	17.6
Approach LOS					C	C

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	34.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	20	304	30	283	37	42	24	40	24
Future Volume (vph)	20	304	30	283	37	42	24	40	24
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		2		6			4		8
Permitted Phases	2		6		6	4		8	
Detector Phase	2	2	6	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	30.0	30.0	30.0	30.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	30.0	30.0	30.0	30.0
Total Split (%)	60.5%	60.5%	60.5%	60.5%	60.5%	39.5%	39.5%	39.5%	39.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0		6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		44.7		44.7	44.7		10.0		10.0
Actuated g/C Ratio		0.71		0.71	0.71		0.16		0.16
v/c Ratio		0.34		0.33	0.04		0.46		0.45
Control Delay		6.1		6.1	1.9		24.6		23.8
Queue Delay		0.0		0.0	0.0		0.0		0.0
Total Delay		6.1		6.1	1.9		24.6		23.8
LOS		A		A	A		C		C
Approach Delay		6.1		5.6			24.6		23.8
Approach LOS		A		A			C		C

Intersection Summary

Cycle Length: 76

Actuated Cycle Length: 62.6

Natural Cycle: 55

Control Type: Semi Act-Uncoord

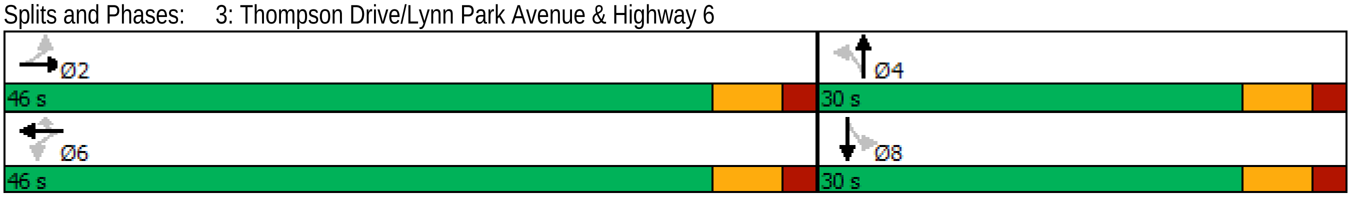
Maximum v/c Ratio: 0.46

Intersection Signal Delay: 9.7 Intersection LOS: A

Intersection Capacity Utilization 52.8% ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 3: Thompson Drive/Lynn Park Avenue & Highway 6



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	433	407	48	120	119
v/c Ratio	0.34	0.33	0.04	0.46	0.45
Control Delay	6.1	6.1	1.9	24.6	23.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	6.1	6.1	1.9	24.6	23.8
Queue Length 50th (m)	19.5	18.2	0.0	10.1	9.7
Queue Length 95th (m)	33.0	31.3	2.5	19.4	18.8
Internal Link Dist (m)	250.4	238.2		251.5	265.0
Turn Bay Length (m)			43.0		
Base Capacity (vph)	1256	1223	1074	591	595
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.34	0.33	0.04	0.20	0.20

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	304	9	30	283	37	42	24	26	40	24	28
Future Volume (vph)	20	304	9	30	283	37	42	24	26	40	24	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0			6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frpb, ped/bikes		1.00			1.00	0.98		1.00			0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		1.00			1.00	0.85		0.96			0.96	
Flt Protected		1.00			1.00	1.00		0.98			0.98	
Satd. Flow (prot)		1815			1820	1486		1724			1722	
Flt Permitted		0.97			0.94	1.00		0.85			0.85	
Satd. Flow (perm)		1759			1714	1486		1500			1504	
Peak-hour factor, PHF	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	26	395	12	39	368	48	55	31	34	52	31	36
RTOR Reduction (vph)	0	1	0	0	0	15	0	23	0	0	26	0
Lane Group Flow (vph)	0	432	0	0	407	33	0	97	0	0	93	0
Confl. Peds. (#/hr)	2					2	8					8
Heavy Vehicles (%)	5%	4%	0%	3%	4%	6%	7%	0%	0%	6%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Actuated Green, G (s)		43.5			43.5	43.5		8.3			8.3	
Effective Green, g (s)		43.5			43.5	43.5		8.3			8.3	
Actuated g/C Ratio		0.68			0.68	0.68		0.13			0.13	
Clearance Time (s)		6.0			6.0	6.0		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		1199			1168	1013		195			195	
v/s Ratio Prot												
v/s Ratio Perm		c0.25			0.24	0.02		c0.06			0.06	
v/c Ratio		0.36			0.35	0.03		0.49			0.48	
Uniform Delay, d1		4.3			4.2	3.3		25.8			25.7	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		0.8			0.8	0.1		2.0			1.8	
Delay (s)		5.1			5.1	3.4		27.8			27.6	
Level of Service		A			A	A		C			C	
Approach Delay (s)		5.1			4.9			27.8			27.6	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	63.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	23	238	327	45	88	100
Future Volume (Veh/h)	23	238	327	45	88	100
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	259	355	49	96	109
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	404				688	380
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	404				688	380
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				76	84
cM capacity (veh/h)	1166				406	672

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	284	404	205
Volume Left	25	0	96
Volume Right	0	49	109
cSH	1166	1700	514
Volume to Capacity	0.02	0.24	0.40
Queue Length 95th (m)	0.5	0.0	15.2
Control Delay (s)	0.9	0.0	16.6
Lane LOS	A		C
Approach Delay (s)	0.9	0.0	16.6
Approach LOS			C

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	204	2	5	182	129	3	28	3	204	36	3
Future Volume (Veh/h)	0	204	2	5	182	129	3	28	3	204	36	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	217	2	5	194	137	3	30	3	217	38	3
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	331			219			443	558	217	439	423	194
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	331			219			443	558	217	439	423	194
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	93	100	57	93	100
cM capacity (veh/h)	1240			1362			496	434	828	500	519	853

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	217	2	199	137	36	258
Volume Left	0	0	5	0	3	217
Volume Right	0	2	0	137	3	3
cSH	1240	1700	1362	1700	457	505
Volume to Capacity	0.00	0.00	0.00	0.08	0.08	0.51
Queue Length 95th (m)	0.0	0.0	0.1	0.0	2.0	22.9
Control Delay (s)	0.0	0.0	0.2	0.0	13.6	19.3
Lane LOS			A		B	C
Approach Delay (s)	0.0		0.1		13.6	19.3
Approach LOS					B	C

Intersection Summary			
Average Delay	6.5		
Intersection Capacity Utilization	40.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	378	20	9	385	26	12	3	4	20	4	4
Future Volume (Veh/h)	17	378	20	9	385	26	12	3	4	20	4	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	19	430	23	10	438	30	14	3	5	23	5	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					274							
pX, platoon unblocked												
vC, conflicting volume	468			453			934	956	430	932	949	438
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	468			453			934	956	430	932	949	438
tC, single (s)	4.1			4.2			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			94	99	99	90	98	99
cM capacity (veh/h)	1104			1062			230	253	629	240	256	623

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	449	23	448	30	22	33
Volume Left	19	0	10	0	14	23
Volume Right	0	23	0	30	5	5
cSH	1104	1700	1062	1700	273	267
Volume to Capacity	0.02	0.01	0.01	0.02	0.08	0.12
Queue Length 95th (m)	0.4	0.0	0.2	0.0	2.1	3.3
Control Delay (s)	0.5	0.0	0.3	0.0	19.4	20.4
Lane LOS	A		A		C	C
Approach Delay (s)	0.5		0.3		19.4	20.4
Approach LOS					C	C

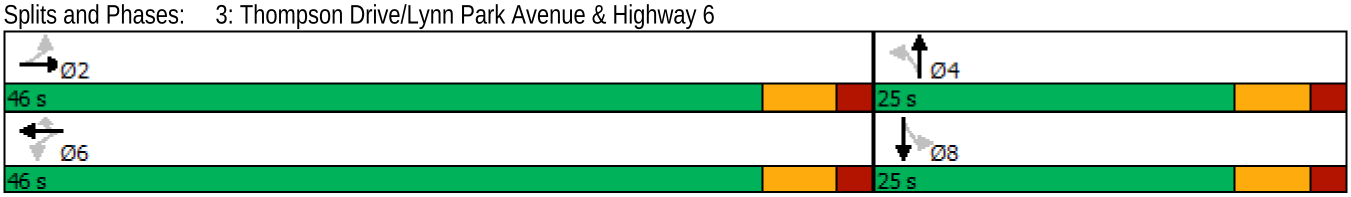
Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	13	334	82	347	35	38	7	31	3
Future Volume (vph)	13	334	82	347	35	38	7	31	3
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		2		6			4		8
Permitted Phases	2		6		6	4		8	
Detector Phase	2	2	6	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	25.0	25.0	25.0	25.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	25.0	25.0	25.0	25.0
Total Split (%)	64.8%	64.8%	64.8%	64.8%	64.8%	35.2%	35.2%	35.2%	35.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0		6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		47.3		47.3	47.3		8.9		8.9
Actuated g/C Ratio		0.74		0.74	0.74		0.14		0.14
v/c Ratio		0.32		0.40	0.03		0.42		0.23
Control Delay		5.0		6.0	1.4		18.4		21.4
Queue Delay		0.0		0.0	0.0		0.0		0.0
Total Delay		5.0		6.0	1.4		18.4		21.4
LOS		A		A	A		B		C
Approach Delay		5.0		5.6			18.4		21.4
Approach LOS		A		A			B		C

Intersection Summary

Cycle Length: 71
Actuated Cycle Length: 64.1
Natural Cycle: 55
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.42
Intersection Signal Delay: 7.4 Intersection LOS: A
Intersection Capacity Utilization 65.9% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 3: Thompson Drive/Lynn Park Avenue & Highway 6



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	427	471	38	108	50
v/c Ratio	0.32	0.40	0.03	0.42	0.23
Control Delay	5.0	6.0	1.4	18.4	21.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	6.0	1.4	18.4	21.4
Queue Length 50th (m)	16.7	20.8	0.0	5.5	4.1
Queue Length 95th (m)	34.9	44.1	2.3	17.7	12.3
Internal Link Dist (m)	250.4	238.2		251.5	265.0
Turn Bay Length (m)			43.0		
Base Capacity (vph)	1346	1187	1204	486	456
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.32	0.40	0.03	0.22	0.11

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	334	42	82	347	35	38	7	53	31	3	12
Future Volume (vph)	13	334	42	82	347	35	38	7	53	31	3	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0			6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frpb, ped/bikes		1.00			1.00	1.00		1.00			0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		0.99			1.00	0.85		0.93			0.96	
Flt Protected		1.00			0.99	1.00		0.98			0.97	
Satd. Flow (prot)		1848			1866	1615		1726			1762	
Flt Permitted		0.98			0.85	1.00		0.85			0.82	
Satd. Flow (perm)		1820			1607	1615		1498			1503	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	14	367	46	90	381	38	42	8	58	34	3	13
RTOR Reduction (vph)	0	4	0	0	0	11	0	52	0	0	12	0
Lane Group Flow (vph)	0	423	0	0	471	27	0	56	0	0	38	0
Confl. Peds. (#/hr)			3	3			2					2
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Actuated Green, G (s)		46.0			46.0	46.0		7.2			7.2	
Effective Green, g (s)		46.0			46.0	46.0		7.2			7.2	
Actuated g/C Ratio		0.71			0.71	0.71		0.11			0.11	
Clearance Time (s)		6.0			6.0	6.0		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		1284			1133	1139		165			165	
v/s Ratio Prot												
v/s Ratio Perm		0.23			c0.29	0.02		c0.04			0.03	
v/c Ratio		0.33			0.42	0.02		0.34			0.23	
Uniform Delay, d1		3.7			4.0	2.9		26.8			26.5	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		0.7			1.1	0.0		1.2			0.7	
Delay (s)		4.4			5.1	2.9		28.1			27.2	
Level of Service		A			A	A		C			C	
Approach Delay (s)		4.4			5.0			28.1			27.2	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	65.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	82	330	270	131	83	46
Future Volume (Veh/h)	82	330	270	131	83	46
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	89	359	293	142	90	50
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	435				901	364
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	435				901	364
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				69	93
cM capacity (veh/h)	1135				287	685

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	448	435	140
Volume Left	89	0	90
Volume Right	0	142	50
cSH	1135	1700	362
Volume to Capacity	0.08	0.26	0.39
Queue Length 95th (m)	2.0	0.0	14.2
Control Delay (s)	2.3	0.0	21.1
Lane LOS	A		C
Approach Delay (s)	2.3	0.0	21.1
Approach LOS			C

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		

Appendix I – Capacity Analysis – Future Total 2034

HCM Unsignalized Intersection Capacity Analysis
1: Blueline Road & Highway 6

03/28/2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	174	4	7	262	232	6	22	11	109	16	5
Future Volume (Veh/h)	4	174	4	7	262	232	6	22	11	109	16	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	5	220	5	9	332	294	8	28	14	138	20	6
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	626			225			596	874	220	608	585	332
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	626			225			596	874	220	608	585	332
tC, single (s)	4.4			4.1			7.1	6.6	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.1	3.4	3.5	4.0	3.3
p0 queue free %	99			99			98	90	98	62	95	99
cM capacity (veh/h)	823			1356			396	280	793	363	420	714

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	225	5	341	294	50	164
Volume Left	5	0	9	0	8	138
Volume Right	0	5	0	294	14	6
cSH	823	1700	1356	1700	363	376
Volume to Capacity	0.01	0.00	0.01	0.17	0.14	0.44
Queue Length 95th (m)	0.1	0.0	0.2	0.0	3.8	17.2
Control Delay (s)	0.3	0.0	0.3	0.0	16.5	21.8
Lane LOS	A		A		C	C
Approach Delay (s)	0.3		0.1		16.5	21.8
Approach LOS					C	C

Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	372	5	8	380	7	18	3	13	22	4	22
Future Volume (Veh/h)	10	372	5	8	380	7	18	3	13	22	4	22
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	13	489	7	11	500	9	24	4	17	29	5	29
Pedestrians					1							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					274							
pX, platoon unblocked	0.97						0.97	0.97		0.97	0.97	0.97
vC, conflicting volume	509			496			1068	1046	490	1057	1044	500
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	476			496			1054	1031	490	1042	1029	466
tC, single (s)	4.3			4.1			7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.4			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	99			99			87	98	97	85	98	95
cM capacity (veh/h)	980			1078			182	222	566	190	223	581

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	502	7	511	9	45	63
Volume Left	13	0	11	0	24	29
Volume Right	0	7	0	9	17	29
cSH	980	1700	1078	1700	251	280
Volume to Capacity	0.01	0.00	0.01	0.01	0.18	0.22
Queue Length 95th (m)	0.3	0.0	0.2	0.0	5.1	6.7
Control Delay (s)	0.4	0.0	0.3	0.0	22.5	21.5
Lane LOS	A		A		C	C
Approach Delay (s)	0.4		0.3		22.5	21.5
Approach LOS					C	C

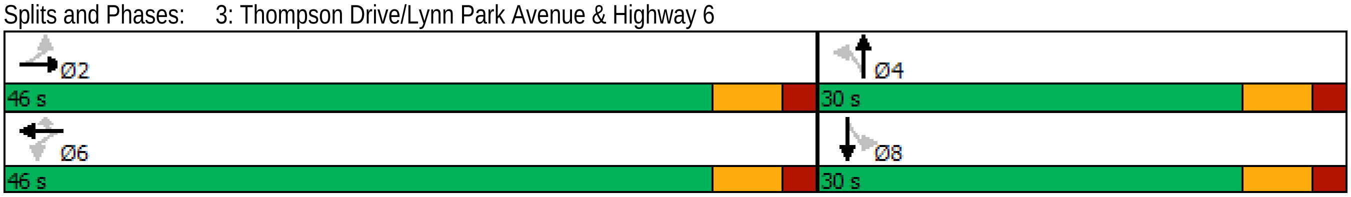
Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	38.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	21	360	30	323	37	42	24	42	26
Future Volume (vph)	21	360	30	323	37	42	24	42	26
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		2		6			4		8
Permitted Phases	2		6		6	4		8	
Detector Phase	2	2	6	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	30.0	30.0	30.0	30.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	30.0	30.0	30.0	30.0
Total Split (%)	60.5%	60.5%	60.5%	60.5%	60.5%	39.5%	39.5%	39.5%	39.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0		6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		44.6		44.6	44.6		10.1		10.1
Actuated g/C Ratio		0.71		0.71	0.71		0.16		0.16
v/c Ratio		0.40		0.38	0.04		0.46		0.48
Control Delay		6.7		6.5	1.9		24.5		24.5
Queue Delay		0.0		0.0	0.0		0.0		0.0
Total Delay		6.7		6.5	1.9		24.5		24.5
LOS		A		A	A		C		C
Approach Delay		6.7		6.1			24.5		24.5
Approach LOS		A		A			C		C

Intersection Summary

Cycle Length: 76
Actuated Cycle Length: 62.6
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 9.9 Intersection LOS: A
Intersection Capacity Utilization 56.8% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 3: Thompson Drive/Lynn Park Avenue & Highway 6



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	507	458	48	120	127
v/c Ratio	0.40	0.38	0.04	0.46	0.48
Control Delay	6.7	6.5	1.9	24.5	24.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	6.7	6.5	1.9	24.5	24.5
Queue Length 50th (m)	24.3	21.4	0.0	10.1	10.6
Queue Length 95th (m)	40.6	36.6	2.5	19.4	20.0
Internal Link Dist (m)	250.4	238.2		251.5	265.0
Turn Bay Length (m)			43.0		
Base Capacity (vph)	1254	1218	1071	586	596
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.40	0.38	0.04	0.20	0.21

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	360	9	30	323	37	42	24	26	42	26	29
Future Volume (vph)	21	360	9	30	323	37	42	24	26	42	26	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0			6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frpb, ped/bikes		1.00			1.00	0.98		1.00			0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		1.00			1.00	0.85		0.96			0.96	
Flt Protected		1.00			1.00	1.00		0.98			0.98	
Satd. Flow (prot)		1817			1821	1486		1724			1724	
Flt Permitted		0.97			0.94	1.00		0.84			0.85	
Satd. Flow (perm)		1760			1712	1486		1485			1505	
Peak-hour factor, PHF	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	27	468	12	39	419	48	55	31	34	55	34	38
RTOR Reduction (vph)	0	1	0	0	0	15	0	23	0	0	26	0
Lane Group Flow (vph)	0	506	0	0	458	33	0	97	0	0	101	0
Confl. Peds. (#/hr)	2					2	8					8
Heavy Vehicles (%)	5%	4%	0%	3%	4%	6%	7%	0%	0%	6%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Actuated Green, G (s)		43.4			43.4	43.4		8.5			8.5	
Effective Green, g (s)		43.4			43.4	43.4		8.5			8.5	
Actuated g/C Ratio		0.68			0.68	0.68		0.13			0.13	
Clearance Time (s)		6.0			6.0	6.0		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		1195			1162	1009		197			200	
v/s Ratio Prot												
v/s Ratio Perm		c0.29			0.27	0.02		0.07			c0.07	
v/c Ratio		0.42			0.39	0.03		0.49			0.50	
Uniform Delay, d1		4.6			4.5	3.4		25.7			25.7	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		1.1			1.0	0.1		1.9			2.0	
Delay (s)		5.7			5.5	3.4		27.6			27.7	
Level of Service		A			A	A		C			C	
Approach Delay (s)		5.7			5.3			27.6			27.7	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	63.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	30	263	361	59	120	136
Future Volume (Veh/h)	30	263	361	59	120	136
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	286	392	64	130	148
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	456				776	424
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	456				776	424
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				64	77
cM capacity (veh/h)	1115				358	634

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	319	456	278
Volume Left	33	0	130
Volume Right	0	64	148
cSH	1115	1700	466
Volume to Capacity	0.03	0.27	0.60
Queue Length 95th (m)	0.7	0.0	30.5
Control Delay (s)	1.1	0.0	23.5
Lane LOS	A		C
Approach Delay (s)	1.1	0.0	23.5
Approach LOS			C

Intersection Summary			
Average Delay	6.5		
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	237	2	6	207	147	4	30	4	235	40	4
Future Volume (Veh/h)	0	237	2	6	207	147	4	30	4	235	40	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	252	2	6	220	156	4	32	4	250	43	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	376			254			510	640	252	504	486	220
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	376			254			510	640	252	504	486	220
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	92	99	44	91	100
cM capacity (veh/h)	1194			1323			441	389	792	447	478	825

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	252	2	226	156	40	297
Volume Left	0	0	6	0	4	250
Volume Right	0	2	0	156	4	4
cSH	1194	1700	1323	1700	415	454
Volume to Capacity	0.00	0.00	0.00	0.09	0.10	0.65
Queue Length 95th (m)	0.0	0.0	0.1	0.0	2.5	36.7
Control Delay (s)	0.0	0.0	0.2	0.0	14.6	26.7
Lane LOS			A		B	D
Approach Delay (s)	0.0		0.1		14.6	26.7
Approach LOS					B	D

Intersection Summary			
Average Delay	8.8		
Intersection Capacity Utilization	44.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	437	20	9	456	30	12	4	4	23	4	4
Future Volume (Veh/h)	20	437	20	9	456	30	12	4	4	23	4	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	23	497	23	10	518	34	14	5	5	26	5	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					274							
pX, platoon unblocked	0.98						0.98	0.98		0.98	0.98	0.98
vC, conflicting volume	552			520			1088	1115	497	1088	1104	518
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	529			520			1078	1106	497	1078	1094	494
tC, single (s)	4.1			4.2			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			92	98	99	86	98	99
cM capacity (veh/h)	1024			1002			177	201	577	183	204	566

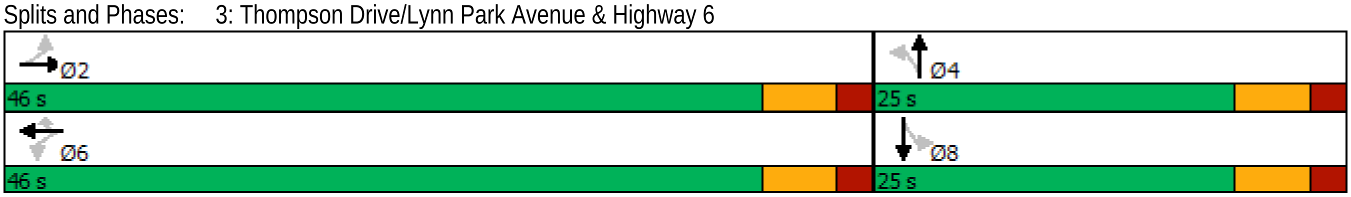
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	520	23	528	34	24	36
Volume Left	23	0	10	0	14	26
Volume Right	0	23	0	34	5	5
cSH	1024	1700	1002	1700	213	205
Volume to Capacity	0.02	0.01	0.01	0.02	0.11	0.18
Queue Length 95th (m)	0.6	0.0	0.2	0.0	3.0	5.0
Control Delay (s)	0.6	0.0	0.3	0.0	24.0	26.2
Lane LOS	A		A		C	D
Approach Delay (s)	0.6		0.3		24.0	26.2
Approach LOS					C	D

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	15	389	82	414	39	38	8	34	3
Future Volume (vph)	15	389	82	414	39	38	8	34	3
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		2		6			4		8
Permitted Phases	2		6		6	4		8	
Detector Phase	2	2	6	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	25.0	25.0	25.0	25.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	25.0	25.0	25.0	25.0
Total Split (%)	64.8%	64.8%	64.8%	64.8%	64.8%	35.2%	35.2%	35.2%	35.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0		6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		47.0		47.0	47.0		8.9		8.9
Actuated g/C Ratio		0.74		0.74	0.74		0.14		0.14
v/c Ratio		0.36		0.46	0.04		0.42		0.24
Control Delay		5.4		6.6	1.5		18.5		21.6
Queue Delay		0.0		0.0	0.0		0.0		0.0
Total Delay		5.4		6.6	1.5		18.5		21.6
LOS		A		A	A		B		C
Approach Delay		5.4		6.3			18.5		21.6
Approach LOS		A		A			B		C

Intersection Summary	
Cycle Length: 71	
Actuated Cycle Length: 63.8	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.46	
Intersection Signal Delay: 7.7	Intersection LOS: A
Intersection Capacity Utilization 72.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 3: Thompson Drive/Lynn Park Avenue & Highway 6



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	489	545	43	109	54
v/c Ratio	0.36	0.46	0.04	0.42	0.24
Control Delay	5.4	6.6	1.5	18.5	21.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	5.4	6.6	1.5	18.5	21.6
Queue Length 50th (m)	20.1	25.6	0.0	5.6	4.3
Queue Length 95th (m)	41.7	54.5	2.7	17.8	13.0
Internal Link Dist (m)	250.4	238.2		251.5	265.0
Turn Bay Length (m)			43.0		
Base Capacity (vph)	1341	1189	1201	488	458
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.36	0.46	0.04	0.22	0.12

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	389	42	82	414	39	38	8	53	34	3	13
Future Volume (vph)	15	389	42	82	414	39	38	8	53	34	3	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0			6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frpb, ped/bikes		1.00			1.00	1.00		1.00			0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		0.99			1.00	0.85		0.93			0.96	
Flt Protected		1.00			0.99	1.00		0.98			0.97	
Satd. Flow (prot)		1852			1868	1615		1728			1762	
Flt Permitted		0.98			0.86	1.00		0.85			0.82	
Satd. Flow (perm)		1818			1615	1615		1498			1498	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	16	427	46	90	455	43	42	9	58	37	3	14
RTOR Reduction (vph)	0	4	0	0	0	13	0	51	0	0	12	0
Lane Group Flow (vph)	0	485	0	0	545	30	0	58	0	0	42	0
Confl. Peds. (#/hr)			3	3			2					2
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Actuated Green, G (s)		45.7			45.7	45.7		7.3			7.3	
Effective Green, g (s)		45.7			45.7	45.7		7.3			7.3	
Actuated g/C Ratio		0.70			0.70	0.70		0.11			0.11	
Clearance Time (s)		6.0			6.0	6.0		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		1278			1135	1135		168			168	
v/s Ratio Prot												
v/s Ratio Perm		0.27			c0.34	0.02		c0.04			0.03	
v/c Ratio		0.38			0.48	0.03		0.34			0.25	
Uniform Delay, d1		3.9			4.3	2.9		26.6			26.3	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		0.9			1.5	0.0		1.2			0.8	
Delay (s)		4.8			5.8	3.0		27.9			27.1	
Level of Service		A			A	A		C			C	
Approach Delay (s)		4.8			5.6			27.9			27.1	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	109	367	298	175	109	61
Future Volume (Veh/h)	109	367	298	175	109	61
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	118	399	324	190	118	66
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	514				1054	419
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	514				1054	419
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	89				47	90
cM capacity (veh/h)	1062				224	638

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	517	514	184
Volume Left	118	0	118
Volume Right	0	190	66
cSH	1062	1700	292
Volume to Capacity	0.11	0.30	0.63
Queue Length 95th (m)	3.0	0.0	31.6
Control Delay (s)	3.0	0.0	36.1
Lane LOS	A		E
Approach Delay (s)	3.0	0.0	36.1
Approach LOS			E

Intersection Summary			
Average Delay	6.7		
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		

Appendix J – Capacity Analysis – Future Total 2039

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	189	4	7	280	250	7	24	12	119	17	5
Future Volume (Veh/h)	4	189	4	7	280	250	7	24	12	119	17	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	5	239	5	9	354	316	9	30	15	151	22	6
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	670			244			638	937	239	651	626	354
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	670			244			638	937	239	651	626	354
tC, single (s)	4.4			4.1			7.1	6.6	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.1	3.4	3.5	4.0	3.3
p0 queue free %	99			99			98	88	98	55	94	99
cM capacity (veh/h)	790			1334			369	257	774	334	398	694

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	244	5	363	316	54	179
Volume Left	5	0	9	0	9	151
Volume Right	0	5	0	316	15	6
cSH	790	1700	1334	1700	337	347
Volume to Capacity	0.01	0.00	0.01	0.19	0.16	0.52
Queue Length 95th (m)	0.2	0.0	0.2	0.0	4.5	22.6
Control Delay (s)	0.3	0.0	0.3	0.0	17.7	25.9
Lane LOS	A		A		C	D
Approach Delay (s)	0.3		0.1		17.7	25.9
Approach LOS					C	D

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	41.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	398	5	8	413	7	18	3	13	22	4	22
Future Volume (Veh/h)	10	398	5	8	413	7	18	3	13	22	4	22
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	13	524	7	11	543	9	24	4	17	29	5	29
Pedestrians					1							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					274							
pX, platoon unblocked	0.94						0.94	0.94		0.94	0.94	0.94
vC, conflicting volume	552			531			1146	1124	525	1135	1122	543
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	496			531			1125	1102	525	1113	1099	486
tC, single (s)	4.3			4.1			7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.4			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	99			99			85	98	97	82	97	95
cM capacity (veh/h)	939			1047			158	197	540	165	197	552

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	537	7	554	9	45	63
Volume Left	13	0	11	0	24	29
Volume Right	0	7	0	9	17	29
cSH	939	1700	1047	1700	221	249
Volume to Capacity	0.01	0.00	0.01	0.01	0.20	0.25
Queue Length 95th (m)	0.3	0.0	0.3	0.0	5.9	7.8
Control Delay (s)	0.4	0.0	0.3	0.0	25.4	24.3
Lane LOS	A		A		D	C
Approach Delay (s)	0.4		0.3		25.4	24.3
Approach LOS					D	C

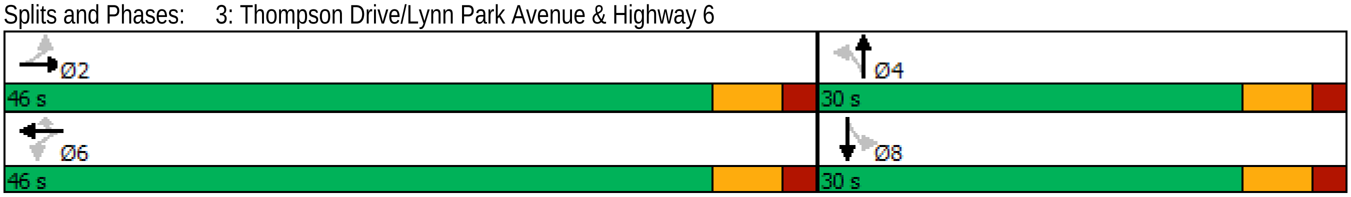
Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	39.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	21	384	30	350	37	42	24	42	26
Future Volume (vph)	21	384	30	350	37	42	24	42	26
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		2		6			4		8
Permitted Phases	2		6		6	4		8	
Detector Phase	2	2	6	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	30.0	30.0	30.0	30.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	30.0	30.0	30.0	30.0
Total Split (%)	60.5%	60.5%	60.5%	60.5%	60.5%	39.5%	39.5%	39.5%	39.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0		6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		44.6		44.6	44.6		10.1		10.1
Actuated g/C Ratio		0.71		0.71	0.71		0.16		0.16
v/c Ratio		0.43		0.40	0.04		0.46		0.48
Control Delay		7.0		6.8	1.9		24.5		24.5
Queue Delay		0.0		0.0	0.0		0.0		0.0
Total Delay		7.0		6.8	1.9		24.5		24.5
LOS		A		A	A		C		C
Approach Delay		7.0		6.3			24.5		24.5
Approach LOS		A		A			C		C

Intersection Summary

Cycle Length: 76
Actuated Cycle Length: 62.6
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 10.0 Intersection LOS: A
Intersection Capacity Utilization 58.0% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 3: Thompson Drive/Lynn Park Avenue & Highway 6



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	538	494	48	120	127
v/c Ratio	0.43	0.40	0.04	0.46	0.48
Control Delay	7.0	6.8	1.9	24.5	24.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	7.0	6.8	1.9	24.5	24.5
Queue Length 50th (m)	26.4	23.8	0.0	10.1	10.6
Queue Length 95th (m)	43.9	40.0	2.5	19.4	20.0
Internal Link Dist (m)	250.4	238.2		251.5	265.0
Turn Bay Length (m)			43.0		
Base Capacity (vph)	1254	1221	1071	586	596
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.43	0.40	0.04	0.20	0.21

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	384	9	30	350	37	42	24	26	42	26	29
Future Volume (vph)	21	384	9	30	350	37	42	24	26	42	26	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0			6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frpb, ped/bikes		1.00			1.00	0.98		1.00			0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		1.00			1.00	0.85		0.96			0.96	
Flt Protected		1.00			1.00	1.00		0.98			0.98	
Satd. Flow (prot)		1817			1821	1486		1724			1724	
Flt Permitted		0.97			0.94	1.00		0.84			0.85	
Satd. Flow (perm)		1760			1714	1486		1485			1505	
Peak-hour factor, PHF	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	27	499	12	39	455	48	55	31	34	55	34	38
RTOR Reduction (vph)	0	1	0	0	0	15	0	23	0	0	26	0
Lane Group Flow (vph)	0	537	0	0	494	33	0	97	0	0	101	0
Confl. Peds. (#/hr)	2					2	8					8
Heavy Vehicles (%)	5%	4%	0%	3%	4%	6%	7%	0%	0%	6%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Actuated Green, G (s)		43.4			43.4	43.4		8.5			8.5	
Effective Green, g (s)		43.4			43.4	43.4		8.5			8.5	
Actuated g/C Ratio		0.68			0.68	0.68		0.13			0.13	
Clearance Time (s)		6.0			6.0	6.0		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		1195			1164	1009		197			200	
v/s Ratio Prot												
v/s Ratio Perm		c0.31			0.29	0.02		0.07			c0.07	
v/c Ratio		0.45			0.42	0.03		0.49			0.50	
Uniform Delay, d1		4.7			4.6	3.4		25.7			25.7	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		1.2			1.1	0.1		1.9			2.0	
Delay (s)		6.0			5.8	3.4		27.6			27.7	
Level of Service		A			A	A		C			C	
Approach Delay (s)		6.0			5.5			27.6			27.7	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	63.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	30	290	394	59	120	136
Future Volume (Veh/h)	30	290	394	59	120	136
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	315	428	64	130	148
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	492				841	460
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	492				841	460
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				60	76
cM capacity (veh/h)	1082				327	605

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	348	492	278
Volume Left	33	0	130
Volume Right	0	64	148
cSH	1082	1700	433
Volume to Capacity	0.03	0.29	0.64
Queue Length 95th (m)	0.8	0.0	35.1
Control Delay (s)	1.1	0.0	27.0
Lane LOS	A		D
Approach Delay (s)	1.1	0.0	27.0
Approach LOS			D

Intersection Summary			
Average Delay	7.1		
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	255	3	6	225	160	4	34	4	253	44	4
Future Volume (Veh/h)	0	255	3	6	225	160	4	34	4	253	44	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	271	3	6	239	170	4	36	4	269	47	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	409			274			550	692	271	544	525	239
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	409			274			550	692	271	544	525	239
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	90	99	35	90	100
cM capacity (veh/h)	1161			1301			410	363	773	415	454	805

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	271	3	245	170	44	320
Volume Left	0	0	6	0	4	269
Volume Right	0	3	0	170	4	4
cSH	1161	1700	1301	1700	386	423
Volume to Capacity	0.00	0.00	0.00	0.10	0.11	0.76
Queue Length 95th (m)	0.0	0.0	0.1	0.0	3.1	50.2
Control Delay (s)	0.0	0.0	0.2	0.0	15.5	35.6
Lane LOS			A		C	E
Approach Delay (s)	0.0		0.1		15.5	35.6
Approach LOS					C	E

Intersection Summary			
Average Delay	11.5		
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	470	20	9	485	30	12	4	4	23	4	4
Future Volume (Veh/h)	20	470	20	9	485	30	12	4	4	23	4	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	23	534	23	10	551	34	14	5	5	26	5	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					274							
pX, platoon unblocked	0.96						0.96	0.96		0.96	0.96	0.96
vC, conflicting volume	585			557			1158	1185	534	1158	1174	551
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	544			557			1143	1171	534	1143	1159	508
tC, single (s)	4.1			4.2			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			91	97	99	84	97	99
cM capacity (veh/h)	991			970			156	180	550	162	183	544

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	557	23	561	34	24	36
Volume Left	23	0	10	0	14	26
Volume Right	0	23	0	34	5	5
cSH	991	1700	970	1700	189	182
Volume to Capacity	0.02	0.01	0.01	0.02	0.13	0.20
Queue Length 95th (m)	0.6	0.0	0.2	0.0	3.4	5.7
Control Delay (s)	0.6	0.0	0.3	0.0	26.7	29.5
Lane LOS	A		A		D	D
Approach Delay (s)	0.6		0.3		26.7	29.5
Approach LOS					D	D

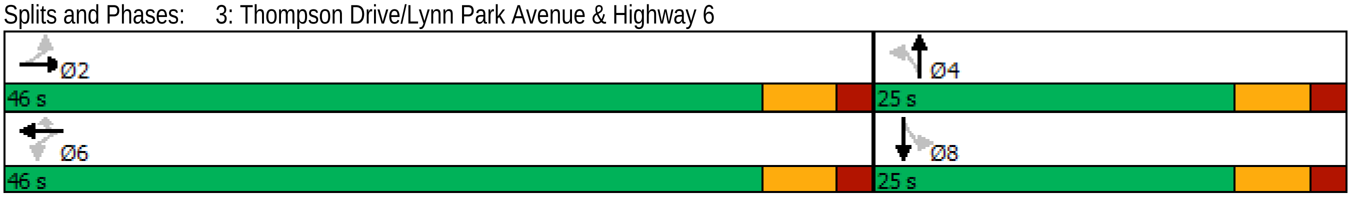
Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	15	417	82	439	39	38	8	34	3
Future Volume (vph)	15	417	82	439	39	38	8	34	3
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		2		6			4		8
Permitted Phases	2		6		6	4		8	
Detector Phase	2	2	6	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	25.0	25.0	25.0	25.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	25.0	25.0	25.0	25.0
Total Split (%)	64.8%	64.8%	64.8%	64.8%	64.8%	35.2%	35.2%	35.2%	35.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0		6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		47.0		47.0	47.0		8.9		8.9
Actuated g/C Ratio		0.74		0.74	0.74		0.14		0.14
v/c Ratio		0.39		0.48	0.04		0.42		0.24
Control Delay		5.6		6.9	1.5		18.5		21.6
Queue Delay		0.0		0.0	0.0		0.0		0.0
Total Delay		5.6		6.9	1.5		18.5		21.6
LOS		A		A	A		B		C
Approach Delay		5.6		6.5			18.5		21.6
Approach LOS		A		A			B		C

Intersection Summary

Cycle Length: 71
Actuated Cycle Length: 63.8
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 7.8 Intersection LOS: A
Intersection Capacity Utilization 75.2% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 3: Thompson Drive/Lynn Park Avenue & Highway 6



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	520	572	43	109	54
v/c Ratio	0.39	0.48	0.04	0.42	0.24
Control Delay	5.6	6.9	1.5	18.5	21.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	5.6	6.9	1.5	18.5	21.6
Queue Length 50th (m)	22.0	27.7	0.0	5.6	4.3
Queue Length 95th (m)	45.6	58.6	2.7	17.8	13.0
Internal Link Dist (m)	250.4	238.2		251.5	265.0
Turn Bay Length (m)			43.0		
Base Capacity (vph)	1343	1189	1201	488	458
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.39	0.48	0.04	0.22	0.12

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	417	42	82	439	39	38	8	53	34	3	13
Future Volume (vph)	15	417	42	82	439	39	38	8	53	34	3	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0			6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frpb, ped/bikes		1.00			1.00	1.00		1.00			0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		0.99			1.00	0.85		0.93			0.96	
Flt Protected		1.00			0.99	1.00		0.98			0.97	
Satd. Flow (prot)		1854			1868	1615		1728			1762	
Flt Permitted		0.98			0.86	1.00		0.85			0.82	
Satd. Flow (perm)		1820			1613	1615		1498			1498	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	16	458	46	90	482	43	42	9	58	37	3	14
RTOR Reduction (vph)	0	3	0	0	0	13	0	51	0	0	12	0
Lane Group Flow (vph)	0	517	0	0	572	30	0	58	0	0	42	0
Confl. Peds. (#/hr)			3	3			2					2
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Actuated Green, G (s)		45.7			45.7	45.7		7.3			7.3	
Effective Green, g (s)		45.7			45.7	45.7		7.3			7.3	
Actuated g/C Ratio		0.70			0.70	0.70		0.11			0.11	
Clearance Time (s)		6.0			6.0	6.0		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		1279			1134	1135		168			168	
v/s Ratio Prot												
v/s Ratio Perm		0.28			c0.35	0.02		c0.04			0.03	
v/c Ratio		0.40			0.50	0.03		0.34			0.25	
Uniform Delay, d1		4.0			4.4	2.9		26.6			26.3	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		1.0			1.6	0.0		1.2			0.8	
Delay (s)		5.0			6.0	3.0		27.9			27.1	
Level of Service		A			A	A		C			C	
Approach Delay (s)		5.0			5.8			27.9			27.1	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	109	403	327	175	109	61
Future Volume (Veh/h)	109	403	327	175	109	61
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	118	438	355	190	118	66
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	545				1124	450
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	545				1124	450
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	89				42	89
cM capacity (veh/h)	1034				203	613

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	556	545	184
Volume Left	118	0	118
Volume Right	0	190	66
cSH	1034	1700	267
Volume to Capacity	0.11	0.32	0.69
Queue Length 95th (m)	3.1	0.0	36.8
Control Delay (s)	3.0	0.0	43.7
Lane LOS	A		E
Approach Delay (s)	3.0	0.0	43.7
Approach LOS			E

Intersection Summary			
Average Delay	7.5		
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		

Appendix K – Capacity Analysis – Future Total 2044

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	206	4	8	300	269	7	27	13	130	19	6
Future Volume (Veh/h)	4	206	4	8	300	269	7	27	13	130	19	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	5	261	5	10	380	341	9	34	16	165	24	8
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	721			266			691	1012	261	704	676	380
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	721			266			691	1012	261	704	676	380
tC, single (s)	4.4			4.1			7.1	6.6	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.1	3.4	3.5	4.0	3.3
p0 queue free %	99			99			97	85	98	45	94	99
cM capacity (veh/h)	754			1310			336	232	752	299	372	671

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	266	5	390	341	59	197
Volume Left	5	0	10	0	9	165
Volume Right	0	5	0	341	16	8
cSH	754	1700	1310	1700	303	314
Volume to Capacity	0.01	0.00	0.01	0.20	0.19	0.63
Queue Length 95th (m)	0.2	0.0	0.2	0.0	5.7	31.9
Control Delay (s)	0.3	0.0	0.3	0.0	19.7	34.1
Lane LOS	A		A		C	D
Approach Delay (s)	0.3		0.1		19.7	34.1
Approach LOS					C	D

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	44.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	426	5	8	449	7	18	3	13	22	4	22
Future Volume (Veh/h)	10	426	5	8	449	7	18	3	13	22	4	22
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	13	561	7	11	591	9	24	4	17	29	5	29
Pedestrians					1							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					274							
pX, platoon unblocked	0.92						0.92	0.92		0.92	0.92	0.92
vC, conflicting volume	600			568			1232	1209	562	1220	1207	591
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	520			568			1208	1183	562	1195	1181	510
tC, single (s)	4.3			4.1			7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.4			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	99			99			82	98	97	79	97	94
cM capacity (veh/h)	894			1014			134	171	515	141	172	521

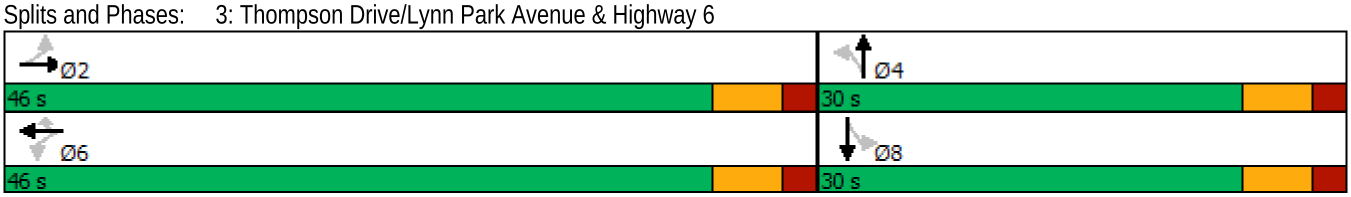
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	574	7	602	9	45	63
Volume Left	13	0	11	0	24	29
Volume Right	0	7	0	9	17	29
cSH	894	1700	1014	1700	191	217
Volume to Capacity	0.01	0.00	0.01	0.01	0.24	0.29
Queue Length 95th (m)	0.4	0.0	0.3	0.0	7.0	9.3
Control Delay (s)	0.4	0.0	0.3	0.0	29.5	28.3
Lane LOS	A		A		D	D
Approach Delay (s)	0.4		0.3		29.5	28.3
Approach LOS					D	D

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	40.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	21	410	30	380	37	42	24	42	26
Future Volume (vph)	21	410	30	380	37	42	24	42	26
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		2		6			4		8
Permitted Phases	2		6		6	4		8	
Detector Phase	2	2	6	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	30.0	30.0	30.0	30.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	30.0	30.0	30.0	30.0
Total Split (%)	60.5%	60.5%	60.5%	60.5%	60.5%	39.5%	39.5%	39.5%	39.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0		6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		44.6		44.6	44.6		10.1		10.1
Actuated g/C Ratio		0.71		0.71	0.71		0.16		0.16
v/c Ratio		0.46		0.44	0.04		0.46		0.48
Control Delay		7.3		7.1	1.9		24.5		24.5
Queue Delay		0.0		0.0	0.0		0.0		0.0
Total Delay		7.3		7.1	1.9		24.5		24.5
LOS		A		A	A		C		C
Approach Delay		7.3		6.7			24.5		24.5
Approach LOS		A		A			C		C

Intersection Summary	
Cycle Length: 76	
Actuated Cycle Length: 62.6	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.48	
Intersection Signal Delay: 10.1	Intersection LOS: B
Intersection Capacity Utilization 59.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Thompson Drive/Lynn Park Avenue & Highway 6



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	571	533	48	120	127
v/c Ratio	0.46	0.44	0.04	0.46	0.48
Control Delay	7.3	7.1	1.9	24.5	24.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	7.3	7.1	1.9	24.5	24.5
Queue Length 50th (m)	28.9	26.5	0.0	10.1	10.6
Queue Length 95th (m)	47.4	44.0	2.5	19.4	20.0
Internal Link Dist (m)	250.4	238.2		251.5	265.0
Turn Bay Length (m)			43.0		
Base Capacity (vph)	1254	1223	1071	586	596
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.46	0.44	0.04	0.20	0.21

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	410	9	30	380	37	42	24	26	42	26	29
Future Volume (vph)	21	410	9	30	380	37	42	24	26	42	26	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0			6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frpb, ped/bikes		1.00			1.00	0.98		1.00			0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		1.00			1.00	0.85		0.96			0.96	
Flt Protected		1.00			1.00	1.00		0.98			0.98	
Satd. Flow (prot)		1818			1822	1486		1724			1724	
Flt Permitted		0.97			0.94	1.00		0.84			0.85	
Satd. Flow (perm)		1760			1716	1486		1485			1505	
Peak-hour factor, PHF	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	27	532	12	39	494	48	55	31	34	55	34	38
RTOR Reduction (vph)	0	1	0	0	0	15	0	23	0	0	26	0
Lane Group Flow (vph)	0	570	0	0	533	33	0	97	0	0	101	0
Confl. Peds. (#/hr)	2					2	8					8
Heavy Vehicles (%)	5%	4%	0%	3%	4%	6%	7%	0%	0%	6%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Actuated Green, G (s)		43.4			43.4	43.4		8.5			8.5	
Effective Green, g (s)		43.4			43.4	43.4		8.5			8.5	
Actuated g/C Ratio		0.68			0.68	0.68		0.13			0.13	
Clearance Time (s)		6.0			6.0	6.0		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		1195			1165	1009		197			200	
v/s Ratio Prot												
v/s Ratio Perm		c0.32			0.31	0.02		0.07			c0.07	
v/c Ratio		0.48			0.46	0.03		0.49			0.50	
Uniform Delay, d1		4.9			4.8	3.4		25.7			25.7	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		1.4			1.3	0.1		1.9			2.0	
Delay (s)		6.2			6.1	3.4		27.6			27.7	
Level of Service		A			A	A		C			C	
Approach Delay (s)		6.2			5.8			27.6			27.7	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	63.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	30	320	430	59	120	136
Future Volume (Veh/h)	30	320	430	59	120	136
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	348	467	64	130	148
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	531				913	499
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	531				913	499
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				56	74
cM capacity (veh/h)	1047				296	576

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	381	531	278
Volume Left	33	0	130
Volume Right	0	64	148
cSH	1047	1700	400
Volume to Capacity	0.03	0.31	0.70
Queue Length 95th (m)	0.8	0.0	41.0
Control Delay (s)	1.1	0.0	32.2
Lane LOS	A		D
Approach Delay (s)	1.1	0.0	32.2
Approach LOS			D

Intersection Summary			
Average Delay	7.9		
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	274	3	7	244	174	4	37	4	274	49	4
Future Volume (Veh/h)	0	274	3	7	244	174	4	37	4	274	49	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	291	3	7	260	185	4	39	4	291	52	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	445			294			595	750	291	588	568	260
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	445			294			595	750	291	588	568	260
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	88	99	24	88	99
cM capacity (veh/h)	1126			1279			377	336	753	382	429	784

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	291	3	267	185	47	347
Volume Left	0	0	7	0	4	291
Volume Right	0	3	0	185	4	4
cSH	1126	1700	1279	1700	356	391
Volume to Capacity	0.00	0.00	0.01	0.11	0.13	0.89
Queue Length 95th (m)	0.0	0.0	0.1	0.0	3.6	72.0
Control Delay (s)	0.0	0.0	0.3	0.0	16.6	54.8
Lane LOS			A		C	F
Approach Delay (s)	0.0		0.2		16.6	54.8
Approach LOS					C	F

Intersection Summary			
Average Delay	17.4		
Intersection Capacity Utilization	49.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	507	20	9	517	30	12	4	4	23	4	4
Future Volume (Veh/h)	20	507	20	9	517	30	12	4	4	23	4	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	23	576	23	10	588	34	14	5	5	26	5	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					274							
pX, platoon unblocked	0.94						0.94	0.94		0.94	0.94	0.94
vC, conflicting volume	622			599			1238	1264	576	1238	1253	588
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	562			599			1220	1248	576	1220	1236	525
tC, single (s)	4.1			4.2			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			90	97	99	81	97	99
cM capacity (veh/h)	954			935			134	158	521	140	161	520

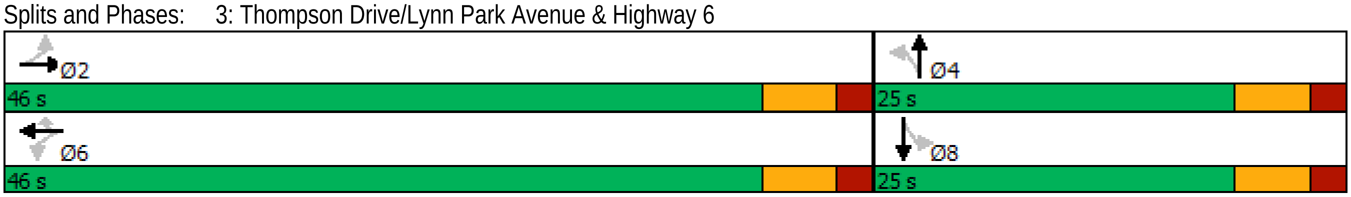
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	599	23	598	34	24	36
Volume Left	23	0	10	0	14	26
Volume Right	0	23	0	34	5	5
cSH	954	1700	935	1700	165	159
Volume to Capacity	0.02	0.01	0.01	0.02	0.15	0.23
Queue Length 95th (m)	0.6	0.0	0.3	0.0	4.0	6.7
Control Delay (s)	0.7	0.0	0.3	0.0	30.5	34.2
Lane LOS	A		A		D	D
Approach Delay (s)	0.6		0.3		30.5	34.2
Approach LOS					D	D

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	52.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	15	448	82	466	39	38	8	34	3
Future Volume (vph)	15	448	82	466	39	38	8	34	3
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		2		6			4		8
Permitted Phases	2		6		6	4		8	
Detector Phase	2	2	6	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	25.0	25.0	25.0	25.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	25.0	25.0	25.0	25.0
Total Split (%)	64.8%	64.8%	64.8%	64.8%	64.8%	35.2%	35.2%	35.2%	35.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0		6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		47.0		47.0	47.0		8.9		8.9
Actuated g/C Ratio		0.74		0.74	0.74		0.14		0.14
v/c Ratio		0.41		0.51	0.04		0.42		0.24
Control Delay		5.8		7.3	1.5		18.5		21.6
Queue Delay		0.0		0.0	0.0		0.0		0.0
Total Delay		5.8		7.3	1.5		18.5		21.6
LOS		A		A	A		B		C
Approach Delay		5.8		6.9			18.5		21.6
Approach LOS		A		A			B		C

Intersection Summary	
Cycle Length: 71	
Actuated Cycle Length: 63.8	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.51	
Intersection Signal Delay: 8.0	Intersection LOS: A
Intersection Capacity Utilization 78.3%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 3: Thompson Drive/Lynn Park Avenue & Highway 6



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	554	602	43	109	54
v/c Ratio	0.41	0.51	0.04	0.42	0.24
Control Delay	5.8	7.3	1.5	18.5	21.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	5.8	7.3	1.5	18.5	21.6
Queue Length 50th (m)	24.1	30.1	0.0	5.6	4.3
Queue Length 95th (m)	49.7	63.8	2.7	17.8	13.0
Internal Link Dist (m)	250.4	238.2		251.5	265.0
Turn Bay Length (m)			43.0		
Base Capacity (vph)	1345	1187	1201	488	458
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.41	0.51	0.04	0.22	0.12

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	448	42	82	466	39	38	8	53	34	3	13
Future Volume (vph)	15	448	42	82	466	39	38	8	53	34	3	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0			6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frpb, ped/bikes		1.00			1.00	1.00		1.00			0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		0.99			1.00	0.85		0.93			0.96	
Flt Protected		1.00			0.99	1.00		0.98			0.97	
Satd. Flow (prot)		1855			1869	1615		1728			1762	
Flt Permitted		0.98			0.86	1.00		0.85			0.82	
Satd. Flow (perm)		1822			1612	1615		1498			1498	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	16	492	46	90	512	43	42	9	58	37	3	14
RTOR Reduction (vph)	0	3	0	0	0	13	0	51	0	0	12	0
Lane Group Flow (vph)	0	551	0	0	602	30	0	58	0	0	42	0
Confl. Peds. (#/hr)			3	3			2					2
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Actuated Green, G (s)		45.7			45.7	45.7		7.3			7.3	
Effective Green, g (s)		45.7			45.7	45.7		7.3			7.3	
Actuated g/C Ratio		0.70			0.70	0.70		0.11			0.11	
Clearance Time (s)		6.0			6.0	6.0		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		1281			1133	1135		168			168	
v/s Ratio Prot												
v/s Ratio Perm		0.30			c0.37	0.02		c0.04			0.03	
v/c Ratio		0.43			0.53	0.03		0.34			0.25	
Uniform Delay, d1		4.1			4.6	2.9		26.6			26.3	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		1.1			1.8	0.0		1.2			0.8	
Delay (s)		5.2			6.4	3.0		27.9			27.1	
Level of Service		A			A	A		C			C	
Approach Delay (s)		5.2			6.1			27.9			27.1	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	109	443	359	175	109	61
Future Volume (Veh/h)	109	443	359	175	109	61
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	118	482	390	190	118	66
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	580				1203	485
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	580				1203	485
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	88				35	89
cM capacity (veh/h)	1004				181	586

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	600	580	184
Volume Left	118	0	118
Volume Right	0	190	66
cSH	1004	1700	241
Volume to Capacity	0.12	0.34	0.76
Queue Length 95th (m)	3.2	0.0	43.8
Control Delay (s)	3.0	0.0	55.9
Lane LOS	A		F
Approach Delay (s)	3.0	0.0	55.9
Approach LOS			F

Intersection Summary			
Average Delay	8.8		
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		

Appendix L – Capacity Analysis – Highway 6 and Blueline Road – With Southbound Left Turn Lane

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	274	3	7	244	174	4	37	4	274	49	4
Future Volume (Veh/h)	0	274	3	7	244	174	4	37	4	274	49	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	291	3	7	260	185	4	39	4	291	52	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	445			294			595	750	291	588	568	260
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	445			294			595	750	291	588	568	260
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	88	99	24	88	99
cM capacity (veh/h)	1126			1279			377	336	753	382	429	784

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	291	3	267	185	47	291	56
Volume Left	0	0	7	0	4	291	0
Volume Right	0	3	0	185	4	0	4
cSH	1126	1700	1279	1700	356	382	443
Volume to Capacity	0.00	0.00	0.01	0.11	0.13	0.76	0.13
Queue Length 95th (m)	0.0	0.0	0.1	0.0	3.6	49.7	3.4
Control Delay (s)	0.0	0.0	0.3	0.0	16.6	39.0	14.3
Lane LOS			A		C	E	B
Approach Delay (s)	0.0		0.2		16.6	35.0	
Approach LOS					C	D	

Intersection Summary			
Average Delay	11.4		
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix M – Highway 6 and Street B – Signal Warrant Analysis

Signal Warrant Calculation

Major Street:	Highway 6
Minor Street:	Street B
Comment	2029 Future Total

VOLUME	AM	PM	FACTOR *	
1A - All	821	942	n/a	441
1B - Minor	188	129	25%	79
2A - Major	633	813	25%	362
2B - Crossi	88	83	25%	43

* This factor relates average of the "peak eight hours" to the average of the "am and pm peak hours"

Number of Approaches: 1 [x] 2 [ ]

Tee Intersection Configuration: Yes [x] No [ ]

Flow Condition: Free Fv (Rural) [x] Restricted Flow (Urban) [ ]

OVERALL WARRANT

	Yes	No	
150% Satisfied:	[ ]	[X]	Warrant for new intersection with forecast traffic
120% Satisfied:	[ ]	[X]	Warrant for existing intersection with forecast traffic
100% Satisfied:	[ ]	[X]	Warrant for existing intersection with existing traffic *
COMBO 80% Satisfied:	[ ]	[X]	Warrant for existing intersection with existing traffic
80% Satisfied:	[ ]	[X]	

* Consider full underground provisions if 100% for forecast traffic

---

WARRANT 1 - MINIMUM VEHICULAR VOLUME

APPROACH LANES	1		2 OR MORE		AVERAGE HOUR PERIOD
FLOW CONDITION	FREE FLOW X	REST. FLOW	FREE FLOW	REST. FLOW	
ALL APPROACHES	480	720	600	900	441
	% FULFILLED				92%
APPROACH LANES	1		2 OR MORE		AVERAGE HOUR PERIOD
FLOW CONDITION	FREE FLOW X	REST. FLOW	FREE FLOW	REST. FLOW	
MINOR STREET APPROACHES	180	255	120	170	79
	% FULFILLED				44%

	Yes	No
150% Satisfied:	[ ]	[X]
120% Satisfied:	[ ]	[X]
100% Satisfied:	[ ]	[X]
80% Satisfied:	[ ]	[X]

WARRANT 2 - DELAY TO CROSS TRAFFIC

APPROACH LANES	1		2 OR MORE		AVERAGE HOUR PERIOD
FLOW CONDITION	FREE FLOW X	REST. FLOW	FREE FLOW	REST. FLOW	
MAJOR STREET APPROACHES	480	720	600	900	362
	% FULFILLED				75%
APPROACH LANES	1		2 OR MORE		AVERAGE HOUR PERIOD
FLOW CONDITION	FREE FLOW X	REST. FLOW	FREE FLOW	REST. FLOW	
TRAFFIC CROSSING MAJOR STREET	50	75	50	75	43
	% FULFILLED				86%

	Yes	No
150% Satisfied:	[ ]	[X]
120% Satisfied:	[ ]	[X]
100% Satisfied:	[ ]	[X]
80% Satisfied:	[ ]	[X]

1A - MINIMUM VEHICULAR VOLUME: Total vehicle volume on all approaches for average day

1B - MINIMUM VEHICULAR VOLUME: Total vehicle volume on minor streets

2A - DELAY TO CROSS TRAFFIC: Total vehicle volume on major street for average day

2B - DELAY TO CROSS TRAFFIC: Total vehicle and pedestrian volume crossing major street; comprising: (1) lefts from both minor streets, (2) heaviest through from minor street, (3) 50% of heavier left turn from major street when following criteria met: (a) left turn volume >120 and (b) left turn volume plus opposing volume > 720, (4) pedestrians crossing the major street.

Signal Warrant Calculation

Major Street: Highway 6

Minor Street: Street B

Comment 2034 Future Total

VOLUME	AM	PM	FACTOR *	
1A - All	969	1,119	n/a	523
1B - Minor	256	170	25%	107
2A - Major	713	949	25%	416
2B - Crossi	120	109	25%	57

* This factor relates average of the "peak eight hours" to the average of the "am and pm peak hours"

Number of Approaches: 1 [x] 2 [ ]

Tee Intersection Configuration: Yes [x] No [ ]

Flow Condition: Free Fv (Rural) [x] Restricted Flow (Urban) [ ]

OVERALL WARRANT

150% Satisfied:	Yes [ ]	No [X]	Warrant for new intersection with forecast traffic
120% Satisfied:	Yes [ ]	No [X]	Warrant for existing intersection with forecast traffic
100% Satisfied:	Yes [ ]	No [X]	Warrant for existing intersection with existing traffic *
COMBO 80% Satisfied:	Yes [ ]	No [X]	Warrant for existing intersection with existing traffic
80% Satisfied:	Yes [X]	No [ ]	

* Consider full underground provisions if 100% for forecast traffic

WARRANT 1 - MINIMUM VEHICULAR VOLUME

APPROACH LANES	1		2 OR MORE		AVERAGE HOUR PERIOD
FLOW CONDITION	FREE FLOW X	REST. FLOW	FREE FLOW	REST. FLOW	
ALL APPROACHES	480	720	600	900	523
	% FULFILLED				109%
APPROACH LANES	1		2 OR MORE		AVERAGE HOUR PERIOD
FLOW CONDITION	FREE FLOW X	REST. FLOW	FREE FLOW	REST. FLOW	
MINOR STREET APPROACHES	180	255	120	170	107
	% FULFILLED				59%

150% Satisfied:	Yes [ ]	No [X]
120% Satisfied:	Yes [ ]	No [X]
100% Satisfied:	Yes [ ]	No [X]
80% Satisfied:	Yes [ ]	No [X]

WARRANT 2 - DELAY TO CROSS TRAFFIC

APPROACH LANES	1		2 OR MORE		AVERAGE HOUR PERIOD
FLOW CONDITION	FREE FLOW X	REST. FLOW	FREE FLOW	REST. FLOW	
MAJOR STREET APPROACHES	480	720	600	900	416
	% FULFILLED				87%
APPROACH LANES	1		2 OR MORE		AVERAGE HOUR PERIOD
FLOW CONDITION	FREE FLOW X	REST. FLOW	FREE FLOW	REST. FLOW	
TRAFFIC CROSSING MAJOR STREET	50	75	50	75	57
	% FULFILLED				114%

150% Satisfied:	Yes [ ]	No [X]
120% Satisfied:	Yes [ ]	No [X]
100% Satisfied:	Yes [ ]	No [X]
80% Satisfied:	Yes [X]	No [ ]

1A - MINIMUM VEHICULAR VOLUME: Total vehicle volume on all approaches for average day

1B - MINIMUM VEHICULAR VOLUME: Total vehicle volume on minor streets

2A - DELAY TO CROSS TRAFFIC: Total vehicle volume on major street for average day

2B - DELAY TO CROSS TRAFFIC: Total vehicle and pedestrian volume crossing major street; comprising: (1) lefts from both minor streets, (2) heaviest through from minor street, (3) 50% of heavier left turn from major street when following criteria met: (a) left turn volume >120 and (b) left turn volume plus opposing volume > 720, (4) pedestrians crossing the major street.

Signal Warrant Calculation

Major Street: Highway 6

Minor Street: Street B

Comment 2034 Future Total

VOLUME	AM	PM	FACTOR *	
1A - All	969	1,119	n/a	523
1B - Minor	256	170	25%	107
2A - Major	713	949	25%	416
2B - Crossi	120	109	25%	57

* This factor relates average of the "peak eight hours" to the average of the "am and pm peak hours"

Number of Approaches: 1 [x] 2 [ ]

Tee Intersection Configuration: Yes [x] No [ ]

Flow Condition: Free Fv (Rural) [x] Restricted Flow (Urban) [ ]

OVERALL WARRANT

	Yes	No	
150% Satisfied:		X	Warrant for new intersection with forecast traffic
120% Satisfied:		X	Warrant for existing intersection with forecast traffic
100% Satisfied:		X	Warrant for existing intersection with existing traffic *
COMBO 80% Satisfied:		X	Warrant for existing intersection with existing traffic
80% Satisfied:	X		

* Consider full underground provisions if 100% for forecast traffic

---

WARRANT 1 - MINIMUM VEHICULAR VOLUME

APPROACH LANES	1		2 OR MORE		AVERAGE HOUR PERIOD
FLOW CONDITION	FREE FLOW X	REST. FLOW	FREE FLOW	REST. FLOW	
ALL APPROACHES	480	720	600	900	523
	% FULFILLED				109%
APPROACH LANES	1		2 OR MORE		AVERAGE HOUR PERIOD
FLOW CONDITION	FREE FLOW X	REST. FLOW	FREE FLOW	REST. FLOW	
MINOR STREET APPROACHES	180	255	120	170	107
	% FULFILLED				59%

	Yes	No
150% Satisfied:		X
120% Satisfied:		X
100% Satisfied:		X
80% Satisfied:		X

WARRANT 2 - DELAY TO CROSS TRAFFIC

APPROACH LANES	1		2 OR MORE		AVERAGE HOUR PERIOD
FLOW CONDITION	FREE FLOW X	REST. FLOW	FREE FLOW	REST. FLOW	
MAJOR STREET APPROACHES	480	720	600	900	416
	% FULFILLED				87%
APPROACH LANES	1		2 OR MORE		AVERAGE HOUR PERIOD
FLOW CONDITION	FREE FLOW X	REST. FLOW	FREE FLOW	REST. FLOW	
TRAFFIC CROSSING MAJOR STREET	50	75	50	75	57
	% FULFILLED				114%

	Yes	No
150% Satisfied:		X
120% Satisfied:		X
100% Satisfied:		X
80% Satisfied:	X	

1A - MINIMUM VEHICULAR VOLUME: Total vehicle volume on all approaches for average day

1B - MINIMUM VEHICULAR VOLUME: Total vehicle volume on minor streets

2A - DELAY TO CROSS TRAFFIC: Total vehicle volume on major street for average day

2B - DELAY TO CROSS TRAFFIC: Total vehicle and pedestrian volume crossing major street; comprising: (1) lefts from both minor streets, (2) heaviest through from minor street, (3) 50% of heavier left turn from major street when following criteria met: (a) left turn volume >120 and (b) left turn volume plus opposing volume > 720, (4) pedestrians crossing the major street.

Signal Warrant Calculation

Major Street:	Highway 6
Minor Street:	Street B
Comment	2034 Future Total

VOLUME	AM	PM	FACTOR *	
1A - All	969	1,119	n/a	523
1B - Minor	256	170	25%	107
2A - Major	713	949	25%	416
2B - Crossi	120	109	25%	57

* This factor relates average of the "peak eight hours" to the average of the "am and pm peak hours"

Number of Approaches: 1 [x] 2 [ ]

Tee Intersection Configuration: Yes [x] No [ ]

Flow Condition: Free Fv (Rural) [x] Restricted Flow (Urban) [ ]

OVERALL WARRANT

	Yes	No	
150% Satisfied:		X	Warrant for new intersection with forecast traffic
120% Satisfied:		X	Warrant for existing intersection with forecast traffic
100% Satisfied:		X	Warrant for existing intersection with existing traffic *
COMBO 80% Satisfied:		X	Warrant for existing intersection with existing traffic
80% Satisfied:	X		

* Consider full underground provisions if 100% for forecast traffic

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WARRANT 1 - MINIMUM VEHICULAR VOLUME

APPROACH LANES	1		2 OR MORE		AVERAGE HOUR PERIOD
FLOW CONDITION	FREE FLOW X	REST. FLOW	FREE FLOW	REST. FLOW	
ALL APPROACHES	480	720	600	900	523
	% FULFILLED				109%
APPROACH LANES	1		2 OR MORE		AVERAGE HOUR PERIOD
FLOW CONDITION	FREE FLOW X	REST. FLOW	FREE FLOW	REST. FLOW	
MINOR STREET APPROACHES	180	255	120	170	107
	% FULFILLED				59%

	Yes	No
150% Satisfied:		X
120% Satisfied:		X
100% Satisfied:		X
80% Satisfied:		X

WARRANT 2 - DELAY TO CROSS TRAFFIC

APPROACH LANES	1		2 OR MORE		AVERAGE HOUR PERIOD
FLOW CONDITION	FREE FLOW X	REST. FLOW	FREE FLOW	REST. FLOW	
MAJOR STREET APPROACHES	480	720	600	900	416
	% FULFILLED				87%
APPROACH LANES	1		2 OR MORE		AVERAGE HOUR PERIOD
FLOW CONDITION	FREE FLOW X	REST. FLOW	FREE FLOW	REST. FLOW	
TRAFFIC CROSSING MAJOR STREET	50	75	50	75	57
	% FULFILLED				114%

	Yes	No
150% Satisfied:		X
120% Satisfied:		X
100% Satisfied:		X
80% Satisfied:	X	

1A - MINIMUM VEHICULAR VOLUME: Total vehicle volume on all approaches for average day

1B - MINIMUM VEHICULAR VOLUME: Total vehicle volume on minor streets

2A - DELAY TO CROSS TRAFFIC: Total vehicle volume on major street for average day

2B - DELAY TO CROSS TRAFFIC: Total vehicle and pedestrian volume crossing major street; comprising: (1) lefts from both minor streets, (2) heaviest through from minor street, (3) 50% of heavier left turn from major street when following criteria met: (a) left turn volume >120 and (b) left turn volume plus opposing volume > 720, (4) pedestrians crossing the major street.

Appendix N – Capacity Analysis – Highway 6 and Street B – Unsignalized vs. Traffic Signals vs. Roundabout

Lane Group	EBL	EBT	WBT	SBL
Lane Configurations				
Traffic Volume (vph)	109	443	359	109
Future Volume (vph)	109	443	359	109
Turn Type	Perm	NA	NA	Perm
Protected Phases		2	6	
Permitted Phases	2			4
Detector Phase	2	2	6	4
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0
Total Split (s)	46.0	46.0	46.0	24.0
Total Split (%)	65.7%	65.7%	65.7%	34.3%
Yellow Time (s)	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	Max	Max	None	None
Act Effct Green (s)	44.0	44.0	44.0	10.9
Actuated g/C Ratio	0.66	0.66	0.66	0.16
v/c Ratio	0.24	0.39	0.48	0.58
Control Delay	7.2	7.0	7.3	26.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.2	7.0	7.3	26.8
LOS	A	A	A	C
Approach Delay		7.1	7.3	26.8
Approach LOS		A	A	C

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 66.9	
Natural Cycle: 55	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay: 9.8	Intersection LOS: A
Intersection Capacity Utilization 60.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 4: Highway 6 & Street B

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	118	482	580	184
v/c Ratio	0.24	0.39	0.48	0.58
Control Delay	7.2	7.0	7.3	26.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.2	7.0	7.3	26.8
Queue Length 50th (m)	5.1	23.7	27.1	16.3
Queue Length 95th (m)	15.2	49.7	59.8	33.3
Internal Link Dist (m)		754.8	549.0	170.6
Turn Bay Length (m)	30.0			
Base Capacity (vph)	494	1250	1214	501
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.24	0.39	0.48	0.37

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	109	443	359	175	109	61
Future Volume (vph)	109	443	359	175	109	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		6.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.96		0.95	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1805	1900	1816		1752	
Flt Permitted	0.40	1.00	1.00		0.97	
Satd. Flow (perm)	753	1900	1816		1752	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	118	482	390	190	118	66
RTOR Reduction (vph)	0	0	20	0	33	0
Lane Group Flow (vph)	118	482	560	0	151	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	NA		Perm	
Protected Phases		2	6			
Permitted Phases	2				4	
Actuated Green, G (s)	44.0	44.0	44.0		10.9	
Effective Green, g (s)	44.0	44.0	44.0		10.9	
Actuated g/C Ratio	0.66	0.66	0.66		0.16	
Clearance Time (s)	6.0	6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	495	1249	1194		285	
v/s Ratio Prot		0.25	c0.31			
v/s Ratio Perm	0.16				c0.09	
v/c Ratio	0.24	0.39	0.47		0.53	
Uniform Delay, d1	4.6	5.3	5.7		25.7	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	1.1	0.9	0.3		1.9	
Delay (s)	5.8	6.2	6.0		27.6	
Level of Service	A	A	A		C	
Approach Delay (s)		6.1	6.0		27.6	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	66.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	109	443	359	175	109	61
Future Volume (veh/h)	109	443	359	175	109	61
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	118	482	390	190	118	66
Approach Volume (veh/h)		600	580		184	
Crossing Volume (veh/h)		118	118		390	
High Capacity (veh/h)		1263	1263		1019	
High v/c (veh/h)		0.48	0.46		0.18	
Low Capacity (veh/h)		1050	1050		831	
Low v/c (veh/h)		0.57	0.55		0.22	

Intersection Summary			
Maximum v/c High	0.48		
Maximum v/c Low	0.57		
Intersection Capacity Utilization	78.7%	ICU Level of Service	D

Intersection			
Intersection Delay, s/veh	11.0		
Intersection LOS	B		

Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	600	580	184
Demand Flow Rate, veh/h	600	580	184
Vehicles Circulating, veh/h	118	118	390
Vehicles Exiting, veh/h	456	600	308
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	11.7	11.3	7.4
Approach LOS	B	B	A

Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	600	580	184
Cap Entry Lane, veh/h	1004	1004	765
Entry HV Adj Factor	1.000	1.000	1.000
Flow Entry, veh/h	600	580	184
Cap Entry, veh/h	1004	1004	765
V/C Ratio	0.598	0.578	0.241
Control Delay, s/veh	11.7	11.3	7.4
LOS	B	B	A
95th %tile Queue, veh	4	4	1

Appendix O – Terms of Reference

520 Industrial Parkway South, Suite 201
Aurora, Ontario L4G 6W8

Phone: 905-503-2563
www.nextrans.ca

NextEng Consulting Group Inc.

To: Norfolk County

From: Janus Mora, Nextrans Consulting Engineers

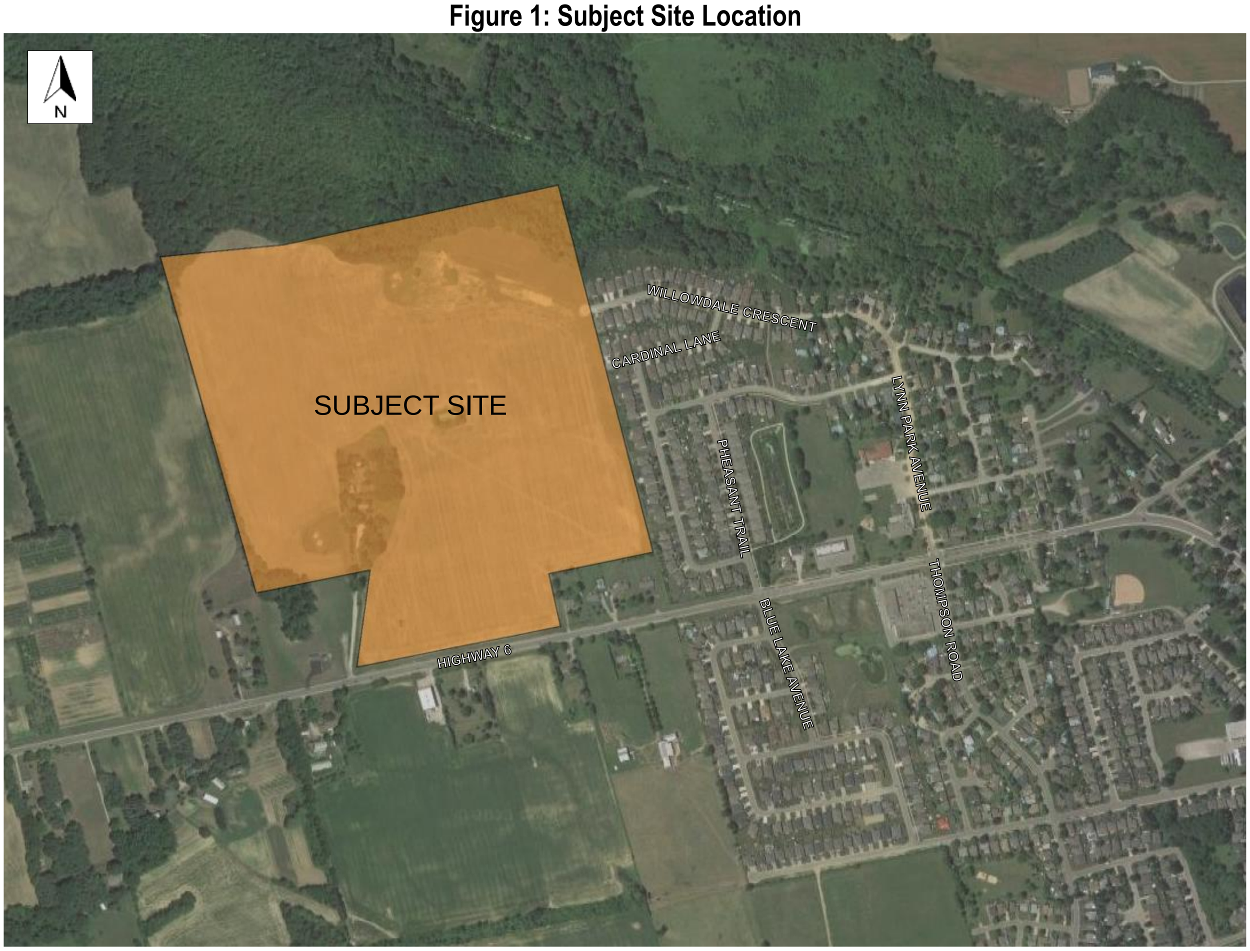
Date: December 20, 2023

Re: **Terms of Reference – Transportation Impact Study**
Draft Plan of Subdivision and Zoning By-law Amendment
Lynn River Heights, Port Dover
County File No. 28TPL2017317, ZNPL2017318
Our Project No. NT-23-233

INTRODUCTION

Nextrans wishes to confirm the following scope of work for a Transportation Impact Study in support of the proposed Draft Plan of Subdivision and Zoning By-law Amendment application(s) for the proposed Lynn River Heights Phase 2 Subdivision (herein referred to as the "subject site"), located on Highway 6 in Port Dover, Norfolk County (the "County"). **Figure 1** illustrates the location of the subject site.

Figure 1: Subject Site Location



In accordance with the June 2023 Draft Plan of Subdivision, the site is proposed to have 455 residential dwelling units and two (2) mixed-use future development blocks fronting Highway 6. Access to the site will be provided from Highway 6 through an intersection with a new street, Street B, and through extensions of Willowdale Crescent and Cardinal Lane from the east.

The following outlines the proposed scope of work for the Transportation Impact Study.

ASSESSMENT OF EXISTING CONDITIONS

A review of the existing conditions of the study area will be conducted, which will include descriptions of the site location, the nature of the development proposal, the surrounding road network lane configurations, and traffic control, transit routes, and active transportation facilities.

STUDY AREA & TRAFFIC DATA

The study will consider the weekday AM and PM peak periods for traffic analyses. The proposed study area will include the analysis of the following intersections:

- Highway 6 and Pheasant Trail / Blue Lake Avenue;
- Highway 6 and Lynn Park Avenue / Thompson Drive;
- Highway 6 and Blueline Road; and
- Highway 6 and Street B.

In the case that historic traffic data for the study area intersections is unavailable, new turning movement counts at the will be collected to capture and quantify existing traffic conditions.

TRAFFIC ASSESSMENT

Traffic operations during the identified weekday and weekend peak hours will be assessed using Synchro 10 software, in accordance with the Highway Capacity Manual (HCM) 2000 capacity analysis methodology.

BACKGROUND TRAFFIC

General Corridor Growth Rate – Historical traffic data will be reviewed and Nextrans will consult with the County as required to determine corridor growth rates within the study area road network.

Road Network Improvements – Nextrans will identify potential road network improvements within the study area and account for any traffic diversions associated with these improvements within in the analysis.

Background Development Traffic – Nextrans will consult with the county for any relevant background developments to be considered within the study. Nextrans requests that all relevant background traffic documents be made available.

TRIP GENERATION, DISTRIBUTION, & ASSIGNMENT

The Institute of Transportation Engineers (ITE) Trip Generation Manual 11th Edition will be used to estimate the number of site generated vehicle trips. The general trip distribution will be based on a review of data from the 2016 Transportation Tomorrow Survey and existing traffic patterns observed in TMC. Trip assignment will be conducted accordingly to reflect the configuration of the proposed site accesses, turning restrictions, and logical routings.

FUTURE TRAFFIC SCENARIOS

Future background and future total analyses for the study area intersections will be conducted for horizon years 2028 and 2033, five (5)-years and 10-years, respectively, beyond the full build-out of the site.

The intersection of Highway 6 and Street B will be assessed under two scenarios, one with the intersection configured as a roundabout and another as a signalized intersection, for the purpose of determining the efficacy of each configuration.

REMEDIAL MEASURES

Under future total conditions, any through or shared through/turning movements at the studied intersections that exceed a V/C ratio of 0.90 or exclusive movements that exceed a V/C ratio of 1.00 will be identified. If remedial actions such as signal optimization are unsuccessful this will also be identified. If remedial measures are to be employed, a scenario will be provided demonstrating the change in intersection operations.

The need for signalization at the new intersection of Highway 6 and Street B will be assessed through signal warrant analysis, in accordance with the methodology of the Ontario Traffic Manual Book 12.

If deemed warranted, the evaluation of a roundabout option compared to a signalized intersection will consider:

- Intersection level of service (LOS)
- Safety assessments
- High-level review / comparison of capital costs (short-term) and cost of maintenance (long-term)
- Other secondary considerations including consumption of land and land acquisition requirements.

We trust the enclosed sufficiently addresses your needs. Should you have any questions, please do not hesitate to contact the undersigned.

Yours truly,

NEXTRANS CONSULTING ENGINEERS

Janus Mora, B.Eng., EIT
Transportation Analyst

Enclosed: Proposed Draft Plan of Subdivision

Legal Description

LYNN RIVER HEIGHTS PHASE 2
PART OF LOT 8, CONCESSION 2, GEOGRAPHIC
TOWNSHIP OF WOODHOUSE
NOW IN NORFOLK COUNTY

Owner's Certificate

I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.

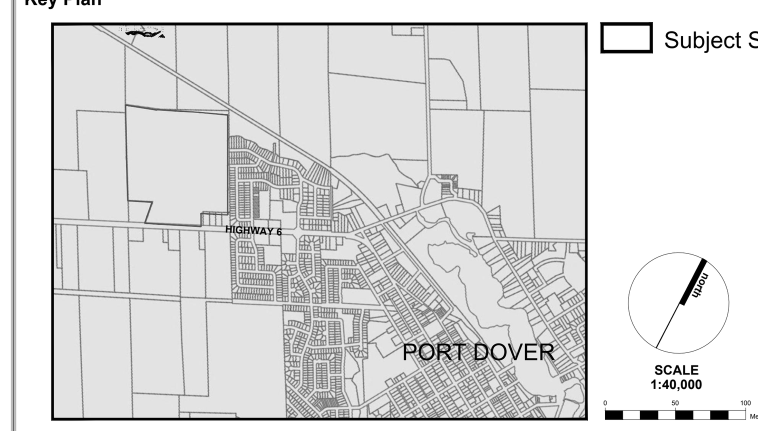
DATE: JUNE 2023 — DEMOCRAT PORT DOVER LIMITED.

Surveyor's Certificate

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

DATE: JUNE 2017 — KIM S. HUSTED, - O.L.S.

Key Plan



Revision No.	Date	Issued / Revision	By

Additional Information Required Under Section 51(17) of the Planning Act R.S.O. 1990, c.P.13 as Amended

A. As Shown B. As Shown C. As Shown
D. Residential, Employment, Commercial, Park, Stormwater Management, Open Space
E. As Shown F. As Shown
G. As Shown H. Municipal Water Supply I. Loam
J. As Shown K. All Services As Required L. As Shown

Description	Lots/Blocks	Units	Area
9.0m Semi Detached	260-307, 434-441	56	1.69ha/4.18ac
10m Single Detached	227-259,308-319,423-433, 442-449	64	2.17ha/5.38ac
12m Single Detached	1-5, 89-150, 201-214, 320-339,371-378, 393-422	139	5.59ha/13.81ac
15m Single Detached	6-88, 151-200, 215-226, 340-370,379-392	190	11.38ha/28.12ac
Total Residential	1-449	449	**20.83ha/51.45ac**
20m ROW	Street A-J, Cardinal Lane, Willowdale Crescent	N/A	8.78ha/21.69ac
Total Roadways			**8.77ha/21.69ac**
Walkway	455,456	N/A	0.04ha/0.10ac
Parks & Open Space	450	N/A	0.73ha/1.8ac
SWM	451	N/A	1.36ha/3.35ac
6m Buffer	457	N/A	0.44ha/1.09ac
Hazard	458	N/A	4.35ha/10.76ac
Future Development	452, 453, 454	N/A	3.27ha/8.09ac
0.3 Reserves* (already included in lot area calculations)	459-518	N/A	0.05ha/0.12ac
Total Other	69 (Blocks 450 - 518)		**10.24ha/25.30ac**

Total Draft Plan of Subdivision: 39.8ha/98.2ac

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

230-7050 WESTON ROAD WOODBRIDGE, ON. L4L 8G7 | P: 905 761 5588 F: 905 761 5589 | WWW.MHBCPLAN.COM

Stamp

Date	November 02, 2023
File No.	08103-B
Plan Scale	1:1500 (Arch D)
Drawn By	P.B.
Checked By	D.W.
Other	

Project

LYNN RIVER HEIGHTS PHASE 2

File Name: **DRAFT PLAN OF SUBDIVISION**

Dwg No.: **1 of 1**

Scale Bar 0 2 4 Meters

N:\08103\B - Lynn River Heights Phase II, Port Dover\6 - Tech Production\1-Final Figures\DPOS\CAD

KITCHENER | WOODBRIDGE | LONDON | BARRIE | HAMILTON

STREETSCAPE & PARKING PLAN **REPORT**

Lynn River Heights, Phase 2

Port Dover, Norfolk County

Date:
April 12 2024

Prepared for:
Democrat Port Dover Ltd.

Prepared by:
MacNaughton Hermsen Britton Clarkson Planning Limited
7050 Weston Road, Suite 230
Woodbridge ON L4L 8G7
T: 905 761 5588 x 214
F: 905 761 5589

Our File 08103B

CELEBRATING 50 YEARS est. 1973

MHBC

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LIST OF **APPENDICES**

1.0 **Introduction**

MacNaughton Hermsen Britton Clarkson Planning Limited (hereinafter "MHBC") has been retained by Democrat Port Dover Ltd., (hereinafter "the Owner"), to provide a Streetscape and Parking Plan in support of the applications for a Draft Plan of Subdivision ("DPOS") implementing Zoning By-law Amendment ("ZBA"). The applications facilitate the development of 449 low density residential units on the lands municipally addressed as 597 Highway 6 (hereinafter the Subject Lands"), and more commonly referred to as the Lynn River Heights Phase 2 Development.

The area of the subject lands to be developed as low density residential is 20.83 ha (excluding the two future development blocks, environmental block, parkland block, and open space blocks). This equates to a net density of 21.55 units per hectare which is in conformity with the maximum density of 40 units per net hectare permitted by Section 5.3.1 of the Draft Port Dover Secondary Plan

During the statutory Public Meeting held on December 5th, 2023, concerns were raised regarding the design and density of the proposed Phase 2 DPOS and ZBA with respect to lot frontages and the ability to accommodate adequate on-street parking, in excess of the off-street (on-site) parking provisions required by County's the Zoning By-law. This Report addresses the comments received, by providing additional analysis regarding the on-street parking conditions based on the Phase 2 DPOS design and provisions in the ZBA.

1.1 Executive Summary

The purpose of this Streetscape and Parking Plan Report is to review the potential impact of the design of the Phase 2 DPOS and implementing ZBA in relation to the on-street parking supply within the proposed subdivision. This report outlines the methodology used to determine the requirements for on-street parking spaces, as well as compares the historical on-street parking demand within existing developments in the Town of Port Dover.

In summary, the findings were positive and demonstrate that the proposed Phase 2 development will be able to supply 329 on-street parking spaces within the draft plan of subdivision **in addition to** the 2 off-street parking spaces per dwelling unit (i.e. parking spaces provided on the lot) required by the County's Comprehensive Zoning By-law. The subdivision's on-street parking capacity/supply exceeds the historical demands of on-street parking spaces within the Study Area as well as what is expected to occur within the Phase 2 development. Based on historical trends assessed within the Study Area, the Phase 2 subdivision will be able to supply more than double the number of on-street parking spaces than what is expected to be demanded within the development.

2.0 **Off-Street Parking**

It is important to note that the Phase 2 DPOS and ZBA have been designed to accommodate the required off-street parking spaces of two (2) spaces per dwelling unit (i.e. parking provided on the lot) specified Section by 4.9(a) of Norfolk County Zoning By-law 1-Z-2014. Therefore, any on-street parking spaces serve as **additional** overflow parking spaces within the DPOS, in excess of the required on-site spaces provided.

The proposed Phase 2 DPOS and ZBA comprise the following dwelling types and provide the following off-street (on-site) parking spaces:

Lots	Zoning	Dwelling Unit Type	Number of Units	Off Street Parking Required	Off Street Parking Proposed
1-9,89-150,201-214, 320-339,371-378,393-422	R1-B (H)	12.0 m Single Detached	139	2	2
10-88,151-200,215-226,340-370,379-392	R1-A (H) with Special Provision 14.043	15.0 m Single Detached	190	2	2
227-259,308-319,423-433,442-449	R1 with Special Provision 14.040	10.0 m Single Detached	64	2	2
260-307,434-441	R2 with Special Provision 14.041	9.0 m Semi Detached	56	2	2
Total			449	898	898

Detailed design of housing formats will be produced at a later stage in the planning process. However, the following diagrams within **Figure 1** provide a typical lot layout for each of the housing types proposed in the Phase 2 subdivision and demonstrate how 2 parking spaces are accommodated on each lot type.

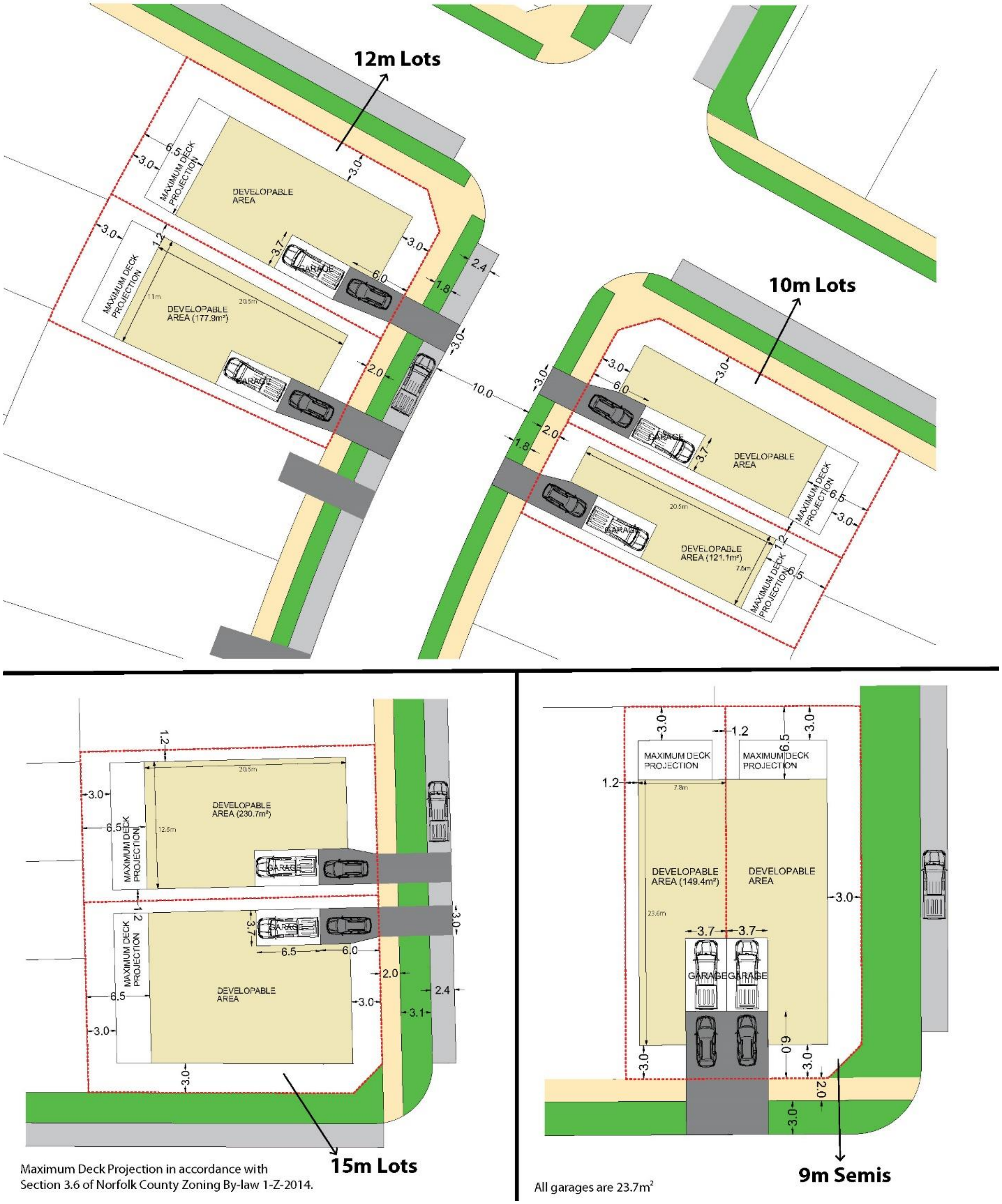


Figure 1 - Typical Lot Layouts within Development

3.0 **On-Street Parking Study Area**

Our analysis, includes an evaluation of three (3) different "Study Areas" within the community of Port Dover: Lyn Park Avenue, Lynn Dover Drive, and Viking Lane. All the Study Areas are situated within the Port Dover urban boundary and have a similar built form to the Phase 2 plan of subdivision. Overall, the Study Areas consist of low-rise residential dwellings, consisting of single detached homes and townhouses. In total, the Study Areas consist of approximately 529 residential dwellings, comprised of 432 single detached dwellings and 97 townhouses.

Figure 2 – Location Map of Subject Lands and Study Area

3.1 Description of Study Area 1: Lynn Park Avenue

Lynn Park Avenue is located on the north-west side of Port Dover, and is immediately adjacent to the proposed DPOS. The site is approximately 66.47 acres (21.6 ha) in total area. This site is considered 'Phase 1' of the subject development, with the proposed Phase 2 DPOS continuing development within the urban boundary. The Lynn Park area consists of 208 single detached dwellings.

Figure 3 – Location Map of Study Area 1: Lynn Park Avenue

3.2 Description of Study Area 2: Lynn Dover Drive

Lynn Dover Drive is located on the north side of Port Dover. The site is approximately 27.18 acres (11.0 ha) in total area. There are a total of 128 residential dwelling units providing a mix of single detached dwellings and townhouse units. The Lynn Dover area consists of 118 single detached dwellings and 10 townhouses.

Figure 4 –Location Map of Study Area 2: Lynn Dover Drive

3.3 Description of Study Area 3: Viking Lane

Viking Lane is located on the east side of Port Dover. The site is approximately 39.78 acres (16.1 ha) in total area. The site is the most recent residential development within Port Dover, and it develops the eastern limit of the urban boundary. There are a total of 193 residential dwelling units providing a mix of single detached dwellings and townhouse units. The Viking Lane area consists of 106 single detached dwellings and 87 townhouses. Development is currently planned northeast of the site for additional residential uses.

Figure 5 – Location Map of Viking Lane

4.0 **On- Street Parking Assumptions**

On-street parking serves as overflow to the off-street parking spaces provided on each lot. Given the dynamic and fluid nature of on-street parking demand, determining the quantity and timing of on-street parking demand will vary based on a number of factors. Therefore, this Report relies on several parameters to determine the potential on-street parking supply within the proposed DPOS.

The Report's parameters are based on the following standards and regulations:

- Norfolk County Zoning By-law 1-Z-2014 (Extracts)(**Appendix A**)
- Draft Zoning By-law Amendment (**Appendix B**)
- Norfolk County Parking By-law 2011-189 (Extracts)(**Appendix C**)
- Ontario Traffic Manual – Book 11 – Pavement, Hazard and Delineation Markings dated March 2000 (Extracts)(**Appendix D**)
- Phase 2 Draft Plan of Subdivision dated March 14, 2024

Based on the sources noted above, the following parameters have been assumed when determining the overall maximum on-street parking capacity/supply of the Phase 2 DPOS.

- On-street parking spaces will be in excess of the two (2) spaces per dwelling unit required on-site, in accordance with 4.9(a) of Norfolk County Zoning By-law 1-Z-2014
- On-street Parking spaces must be 9 metres from an intersection, in accordance with Section 8.5(a) of County Parking By-law 2011-189
- On-street parking spaces must be 1.2 metres from a driveway, in accordance with Section 8.5(d) of County Parking By-law 2011-89
- On-street parking spaces must be 6.7 metres in length as per the Ontario Traffic Manual (Note: the OTM space length of 6.7 metres includes maneuvering room. As such, there is sufficient maneuvering room in each space in addition to the 1.2 metre separation space from every driveway)
- The maximum driveway width of 3.0 metres combined with the minimum landscape area along a street line of 6.0 metres, in accordance with 2.i.(g),(h), 3.i.(g),(h), and 4.i.(e),(f) of the ZBA, enables the location of on-street parking spaces to maintain the required 1.2 metre separation from the driveway
- On-street parking counts and demand ratios identified within the Study Area represent the on-street parking demand within the Study Area and do not represent the total on-site and available on-street parking within the Study Area

5.0 **On-Street Parking Demand Analysis**

To determine the potential on-street parking demand within the Phase 2 development, an assessment of the existing on-street parking demand was undertaken in the Study Areas by reviewing historical aerial images of existing developments within Port Dover. The following streets and surrounding development areas were reviewed based on their similarities to the built form of the proposed development:

- Lynn Park Avenue (Lynn River Heights Phase 1)
- Lynn Dover Drive
- Viking Lane

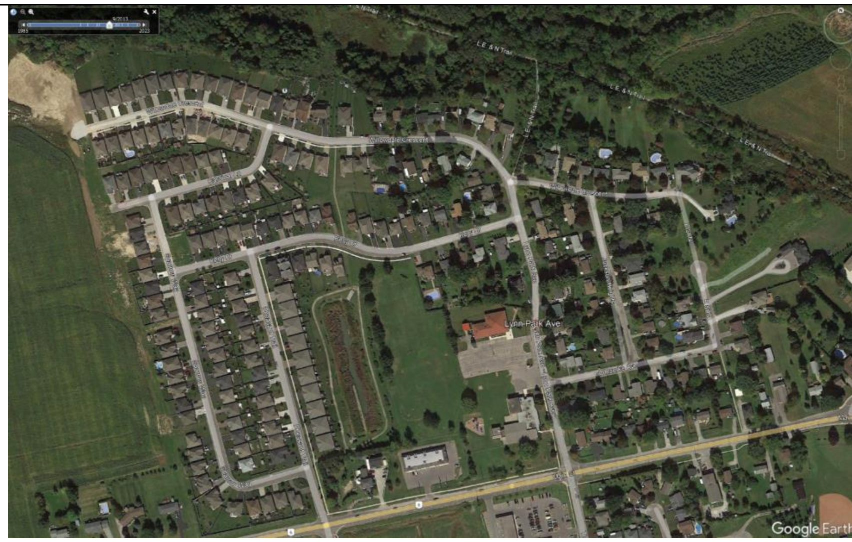
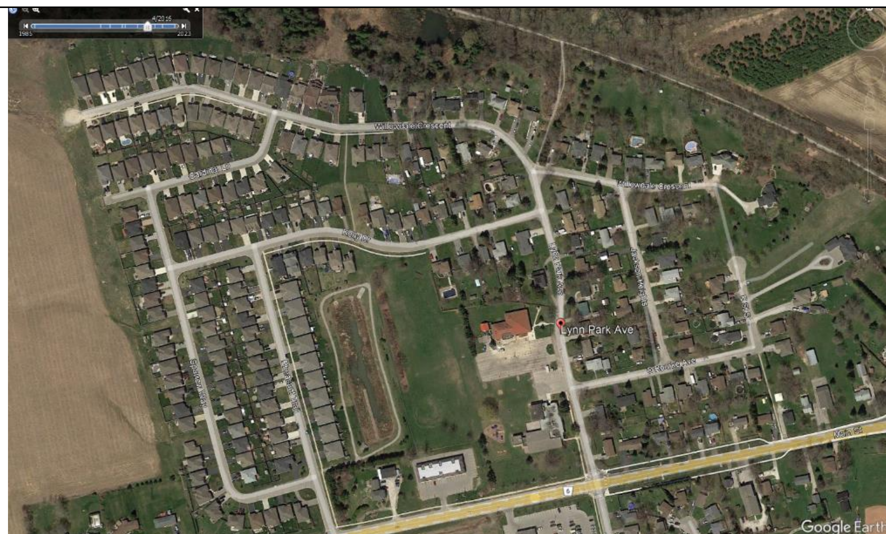
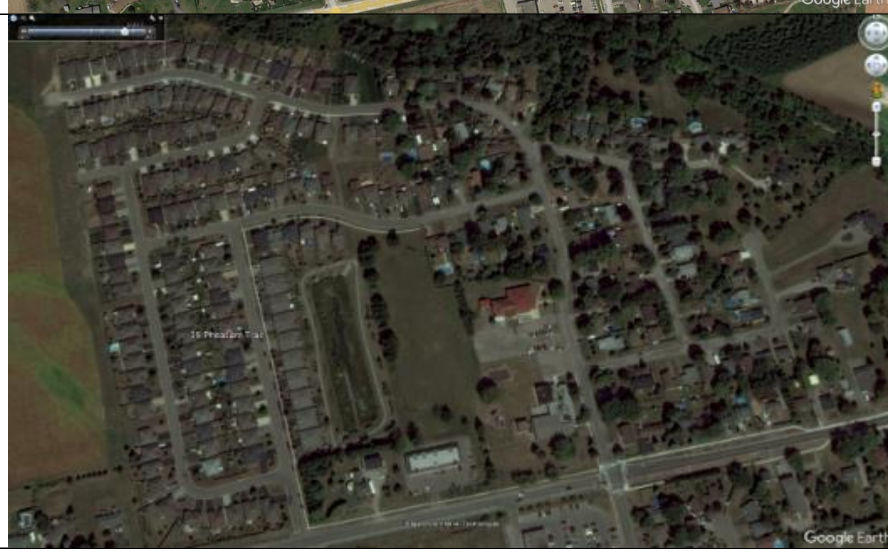
5.1 Methodology

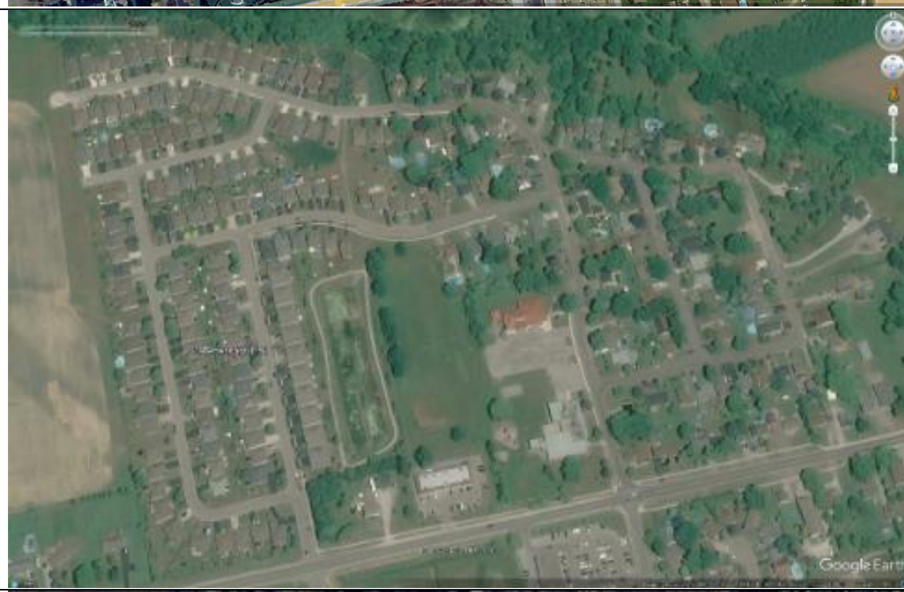
Publicly available mages were taken from Google Earth between the years of 2010 to 2023. The total number of parked cars on the street were recorded per individual image, to assess the historic trends of on-street parking within the Study Areas. To understand the relationship between the number of on-street parked cars and housing within the Study Areas, an on-street parking ratio was established representing the number of on-street parked cars per dwelling unit. The rate was calculated based on the formula below:

$$\text{On-Street Parking Demand Ratio} = \frac{\text{Total Dwellings in Study Areas}}{\text{Number of Visible On-Street Parked Cars within the Study Areas}}$$

5.2 Lynn Park Avenue (Phase I)

Year: May 2010 **Number of On-Street Parked Cars:** 23 **Number of Single Detached Dwellings:** 208 **On-Street Parking Demand Ratio:** *0.11 cars per dwelling unit parked on-street*	

Year: September 2013 **Number of On-Street Parked Cars:** 18 **Number of Single Detached Dwellings:** 208 **On-Street Parking Demand Ratio:** *0.09 cars per dwelling unit parked on-street*	
Year: April 2016 **Number of On-Street Parked Cars:** 22 **Number of Single Detached Dwellings:** 208 **On-Street Parking Demand Ratio:** *0.11 cars per dwelling unit parked on-street*	
Year: June 2017 **Number of On-Street Parked Cars:** 19 **Number of Single Detached Dwellings:** 208 **On-Street Parking Demand Ratio:** *0.09 cars per dwelling unit parked on-street*	

Year: July 2018 **Number of On-Street Parked Cars:** 28 **Number of Single Detached Dwellings:** 208 **On-Street Parking Demand Ratio:** *0.13 cars per dwelling unit parked on-street*	
Year: July 2020 **Number of On-Street Parked Cars:** 17 **Number of Single Detached Dwellings:** 208 **On-Street Parking Demand Ratio:** *0.08 cars per dwelling unit parked on-street*	
Year: November 2023 **Number of On-Street Parked Cars:** 21 **Number of Single Detached Dwellings:** 208 **On-Street Parking Demand Ratio:** *0.10 cars per dwelling unit parked on-street*	

5.3 Lynn Dover Drive

Year: September 2013 **Number of On-Street Parked Cars:** 7 **Number of Single Detached Dwellings:** 50 **Number of Townhouses:** 10 **Total Number of Dwellings Units:** 60 **On-Street Demand Parking ratio:** *0.12 cars per dwelling unit*	
Year: April 2016 **Number of On-Street Parked Cars:** 14 **Number of Single Detached Dwellings:** 112 **Number of Townhouses:** 10 **Total Number of Dwellings Units:** 121 **On-Street Demand Parking Ratio:** *0.12 cars per dwelling unit*	

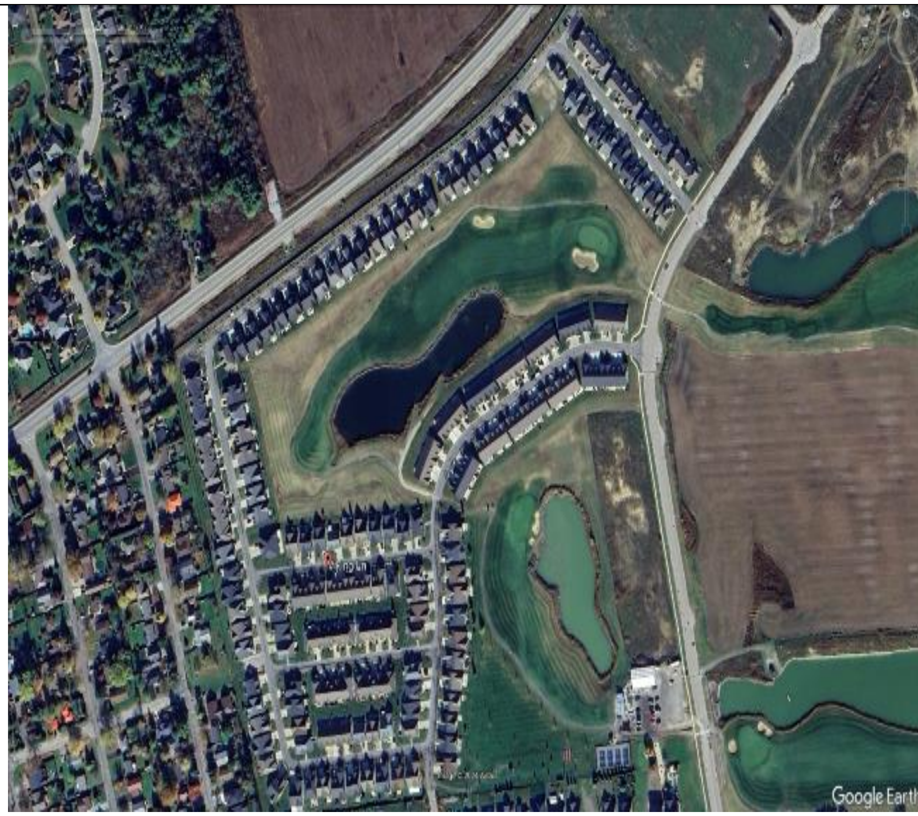
Year: June 2017 **Number of On-Street Parked Cars:** 22 **Number of Single Detached Dwellings:** 118 **Number of Townhouses:** 10 **Total Number of Dwellings Units:** 128 **On-Street Demand Parking Ratio:** *0.17 cars per dwelling unit*	
Year: July 2018 **Number of On-Street Parked Cars:** 22 **Number of Single Detached Dwellings:** 118 **Number of Townhouses:** 10 **Total Number of Dwellings Units:** 128 **On-Street Demand Parking Ratio:** *0.17 cars per dwelling unit*	

Year: July 2020 **Number of On-Street Parked Cars:** 18 **Number of Single Detached Dwellings:** 118 **Number of Townhouses:** 10 **Total Number of Dwellings Units:** 128 **On-Street Demand Parking Ratio:** *0.14 cars per dwelling unit*	
Year: November 2023 **Number of On-Street Parked Cars:** 9 **Number of Single Detached Dwellings:** 118 **Number of Townhouses:** 10 **Total Number of Dwellings Units:** 128 **On-Street Demand Parking Ratio:** *0.07 cars per dwelling unit*	

5.4 Viking Lane (Recent Development)

Year: September 2013 **Number of On-Street Parked Cars:** 6 **Number of Single Detached Dwellings:** 21 **Number of Townhouses:** 23 **Total Number of Dwellings Units:** 44 **On-Street Demand Parking Ratio:** *0.14 cars per dwelling unit*	
Year: April 2016 **Number of On-Street Parked Cars:** 6 **Number of Single Detached Dwellings:** 59 **Number of Townhouses:** 28 **Total Number of Dwellings Units:** 87 **On-Street Demand Parking Ratio:** *0.07 cars per dwelling unit*	

Year: June 2017 **Number of On-Street Parked Cars:** 30+ due to construction **Number of Single Detached Dwellings:** 68 **Number of Townhouses:** 35 **Total Number of Dwellings Units:** 103 **On-Street Demand Parking Ratio:** *0.29 cars per dwelling unit*	
Year: July 2020 **Number of On-Street Parked Cars:** 11 **Number of Single Detached Dwellings:** 106 **Number of Townhouses:** 87 **Total Number of Dwellings Units:** 193 **On-Street Demand Parking Ratio:** *0.06 cars per dwelling unit*	

Year: November 2023 **Number of On-Street Parked Cars:** 5 **Number of Single Detached Dwellings:** 106 **Number of Townhouses:** 87 **Total Number of Dwellings Units:** 193 **On-Street Demand Parking Ratio:** *0.03 cars per dwelling unit*	

6.0 **Summary of Findings**

The findings of the Study Area parking assessment are summarized in the following table:

	Lynn Park Avenue	Lynn Dover Drive	Viking Lane	Total Study Area Averages
Average Number of Cars	21	15	12	16
Most Number of On-Street Parked Cars	28	22	30	27
Least Number of On-Street Parked Cars	17	7	5	10
Average On-Street Parking Demand Ratio	0.10	0.13	0.12	0.12
Highest On-Street Parking Demand Ratio	0.11	0.17	0.29	0.19
Lowest On-Street Parking Demand Ratio	0.08	0.07	0.03	0.06

Within the Total Study Area, it was determined that there was an overall average of 16 on-street parked cars, as observed based on aerial imagery taken at various times. Reviewing the highest and lowest number of on-street parked cars, the average highest number is 27 on-street parked cars, and the lowest average number is 10 on-street cars.

In the Total Study Area, the average On-Street Parking Demand Ratio was 0.12 on-street parked cars per dwelling unit. The highest average On-Street Parking Demand Ratio was 0.19 on-street parked cars per dwelling unit and the lowest average On-Street Parking Demand Ratio was 0.06 parked cars per dwelling unit.

Study Area 3: Viking Lane demonstrated the highest On-Street Parking Demand Ratio (0.29), while Study Area 2: Lynn Dover Drive (0.17) and Study Area 1: Lynn Park (0.11) were on the lower end.

To ensure a conservative analysis, the highest On-Street Parking Demand Ratio of 0.29 (Viking Lane) was applied to the Phase 2 DPOS. Based on the 449 low density residential units in Phase 2, this equates to a demand for 131 on-street parking spaces. As outlined in Section 7.2 of this Report, the Phase 2 development can provide **329 on-street parking spaces**. As such, the Phase 2 supply exceeds (over double) the 131 spaces calculated by applying the highest On-Street Parking Demand Ratio in the Study Area.

7.0 **Streetscape & Parking Plan**

7.1 Street Profiles

In order to calculate the available capacity/supply of street parking in the Phase 2 subdivision, it is important to understand the design of the Phase 2 street system.

The proposed Phase 2 DPOS provides right-of-way ("ROW") widths of 20 metres, which will be used to accommodate both vehicular and pedestrian level traffic throughout the subdivision. In addition to accommodating traffic, the street profiles also accommodate landscaping features, to provide aesthetically pleasing landscaping opportunities within the ROW.

The Street Profile Key Map (**Figure 6**) differentiates the ROWs within the Phase 2 DPOS between collector streets and local streets, based on their function within the subdivision. Collector streets are intended to provide primary access to and from the subdivision, and will be the main route of travel for ingress and egress for the development. Local streets are intended to have lower traffic volumes, and will primarily serve residents who reside in the dwellings of the local streets.

The conceptual Streetscape & Parking Plan (**Appendix E**) considers the built form and driveway locations on individual lots, as well as the on-street parking locations within the DPOS, (these locations and street profiles are not absolute, and slight variations may arise). The Streetscape and Parking Plan offers five different street profiles (1 collector road & 4 local roads) as follows:

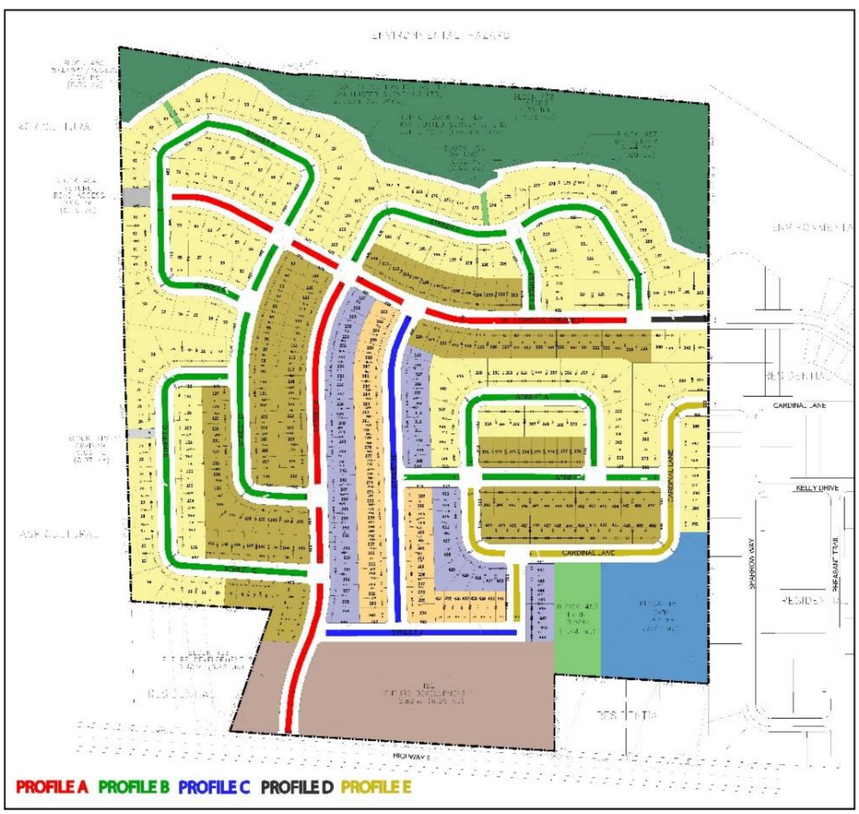


Figure 6 – Street Profiles Key Map

20 METRE STREET PROFILE OPTIONS

PROFILE A - 20 m Collector Street – one sided parking, two sidewalks, two-sided landscape strip, wider travelled road with bike sharrows

2.0 m	1.8 m	2.4 m	10.0 m	1.8 m	2.0 m
Sidewalk	Landscape & Street furnishings (light standards / hydrants)	Parking	Vehicle travel (3.5 m / lane) plus 1.5 m bike sharrows	Landscape & Street furnishings (light standards / hydrants	Sidewalk

PROFILE B - 20 m Local Street – two-sided parking, one sidewalk, full landscaping, regular travelled road

2.0 m	3.1 m	2.4 m	7.0 m	2.4 m	3.1 m
Sidewalk	Landscape & Street furnishings (light standards / hydrants)	Parking	Vehicle travel	Parking	Landscape & Street furnishings (light standards / hydrants)

PROFILE C - 20 m Local Street – no street parking, one sidewalk, two-sided landscaping strip, wider travelled road with bike sharrows

2.0 m	3.0 m	10.0 m	3.0 m	2.0 m
Sidewalk	Landscape & Street furnishings (light standards / hydrants)	Vehicle travel (3.5 m / lane) plus 1.5 m bike sharrows	Landscape & Street furnishings (light standards / hydrants)	Sidewalk

PROFILE D - 20 m Local Street – one sided street parking, one sidewalk, two-sided landscaping strip, regular travelled road (match profile of existing street – Willowdale Crescent)

4.3 m	2.4 m	7.0 m	2.0 m	4.3 m
Landscape & Street furnishings (light standards / hydrants)	Parking	Vehicle travel	Sidewalk	Landscape & Street furnishings (light standards / hydrants)

PROFILE E - 20 m Local Street – one sided street parking, no sidewalk, two-sided landscaping strip, regular travelled road (match profile of existing street - Cardinal Lane)

5.3 m	7.0 m	2.4 m	5.3 m
Landscape & Street furnishings (light standards / hydrants)	Vehicle travel	Parking	Landscape & Street furnishings (light standards / hydrants)

7.2 Phase 2 On-Street Parking Assessment

The Streetscape and Parking Plan contained in **Appendix E**, demonstrates the potential implementation of the various street profiles provided in 7.1 of this report. The streetscape considers sidewalks, bike sharrows and landscaping features, which will aide in the connectivity of both pedestrian and vehicular traffic.

Based on the conceptual Streetscape and Parking Plan, approximately 329 on-street parking spaces can be accommodated within the Phase 2 DPOS (Note – this number may be slightly reduced based on the final number and location of fire hydrants).

As previously outlined, when the Study Area's highest parking demand ratio of 0.29 (Viking Lane) is applied to the 449 low density residential units in the Phase 2 subdivision, it equates to a demand for 131 on-street parking spaces. Since the street system in the Phase 2 subdivision has the capacity to supply 329 parking spaces, the supply of parking spaces greatly exceeds (over double) the projected parking demand of the Phase 2 plan. Further expressed, there is capacity in the Phase 2 subdivision to supply an additional 0.73 on-street parking spaces for each dwelling unit within the development.

8.0 **Conclusions**

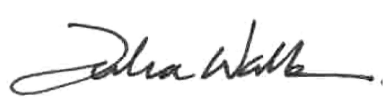
The findings and conclusion of the proceeding analysis are summarized in the following:

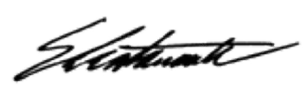
1. The proposed density of 21.55 units per net hectare within the Phase 2 DPOS conforms to the 40 units per net hectare density permitted for low density residential units in the Draft Port Dover Secondary Plan.
2. The Phase 2 DPOS will provide 898 off-street (on-site) parking spaces in accordance with Section 4.9(a) of the Norfolk County Zoning By-law 1-Z-2014, which requires two (2) spaces per dwelling unit.
3. The Phase 2 DPOS will provide for 329 on-street parking spaces, based on the conceptual Streetscape and Parking Plan, which equates to an on-street parking supply ratio of 0.73 additional parking spaces per dwelling unit.
4. The Study Area's highest On-Street Parking Demand Ratio of 0.29 was observed in Study Area 3: Viking Lane. When this ratio applied to the Phase 2 subdivision, it equates to an on-street parking demand of 131 spaces. The Phase 2 subdivision has the capacity to supply 329 on-street parking spaces, which is over double the highest parking demand amount in the Study Area.

Based on the preceding, it is our professional opinion that the Phase 2 subdivision density, design, and the standards proposed by the site specific zoning by-law amendment conform with County (and Provincial) planning policies, are appropriate and desirable for the development and the community, and represent good planning. Further, the design of the Phase 2 subdivision accommodates a high number of on-street parking spaces which exceeds the number of spaces proposed to be generated/required by the development.

Yours truly,

MHBC





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Appendix **A**

Norfolk County Zoning By-law

1-Z-2014 (Extracts)

4.5 Parking of *Vehicles* in Residential *Zones*

The parking of *vehicles* in residential *Zones* shall be subject to the following:

a) not more than one (1) *vehicle* per *dwelling unit* shall be a *vehicle* used for commercial purposes;

b) such commercial *vehicles* shall not exceed a height of 2.2 metres or a length of 6.7 metres;

c) *recreational vehicles,* trailers, and *vehicles* that do not have a current licence plate, shall be prohibited from parking continuously in any *required front yard* or *required exterior side yard.*

4.6 Parking for Multiple Uses

When a *building, structure* or *lot* accommodates more than one (1) type of use, the *parking space* requirement for such *building, structure* or *lot* shall be the sum of the requirements for the separate uses thereof.

4.7 Requirements for *Loading Space*s

Where loading docks are provided on a *lot,* a *loading space* for each loading dock shall have a minimum width of 3 metres and a depth of 10 metres, and sufficient space shall be provided on the same *lot* for the manoeuvring of *vehicles* using the loading docks. Such manoeuvring space shall not utilize any *required parking space.*

4.8 Requirements for Stacking Spaces

Where a *restaurant* incorporates a drive-through or pick up window, a sufficient number of stacking spaces shall be provided for *vehicles* waiting to be served from the drive-through or pick up window.

4.9 Number of Parking Spaces

Any *building, structure* or use shall have *parking spaces* provided and maintained in accordance with the following:

	Type of Use	Minimum Requirement
	Residential	
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*
b)	*apartment dwelling[8-Z-2017]*	1.5 *parking spaces* for each *dwelling unit*
c)	*dwelling unit* in a non-residential *building*	1 *parking space* for each *dwelling unit*
d)	*boarding or lodging house*	2 *parking spaces* for each *dwelling unit* plus 1 *parking space* for each room for boarders
e)	*accessory residential dwelling unit*	1 *parking space* in addition to those required for the primary residential *dwelling unit* use

Appendix **B**

Norfolk County Parking By-law 2011-189 (Extracts)

8.5 Notwithstanding any other section of this By-Law, no person shall park or stand a vehicle or permit a vehicle to remain parked or standing on a highway,

a) within 9 metres of an intersection unless signage or pavement markings indicate a lesser distance;

b) within 3 metres of a fire hydrant;

c) so as, in the opinion of the Municipal Law Enforcement Officer, to obstruct ingress to, or egress from a driveway;

d) unless there are pavement markings installed by the Corporation designating parking spaces, not less than 1.2 metres of a driveway, measured from the curb cut or where there is not a curb cut, from the intersection of the prolonged edge of travelled portion of the driveway and the edge of the roadway;

e) so as to obstruct the removal of any other vehicle previously parked or standing;

f) for the purpose of maintaining or repairing the vehicle, except for any repairs that have been necessitated by an emergency;

g) except as permitted in Section 7.2(j) of this By-Law, a motor vehicle, recreational vehicle (RV), tow vehicle or trailer or any combination of these vehicles if attached, over 8 metres in length or 2.2 metres in height for a time period in excess of two consecutive hours;

h) where ice and snow is being, or is to be removed.

i) on or across a sidewalk of part thereof;

j) on a crosswalk or part thereof

k) in a manner to obstruct traffic;

l) where the highway is 6 metres wide or less;

m) on a boulevard or part thereof;

n) within 15 metres of a railway crossing;

o) on a bridge or any approach thereto;

p) for a period of more than 48 consecutive hours.

Appendix **C**

Draft Zoning By-law Amendment (Text & Schedule)

The Corporation of Norfolk County
By-Law __-Z-2023

Being a By-Law to Amend Zoning By-Law 1-Z-2014, as amended, for property described as Part of Lot 8, Concession 2, Geographic Township of Woodhouse, County of Norfolk, municipally addressed as 597 Highway 6, Port Dover.

WHEREAS Norfolk Council is empowered to enact this By-Law, by virtue of the provisions of Section 34 and 36(1) (Holding) of the *Planning Act, R.S.O. 1990, CHAPTER P.13*, as amended;

AND WHEREAS this By-Law conforms to the Norfolk County Official Plan.

NOW THEREFORE the Council of The Corporation of Norfolk County hereby enacts as follows:

1. That Schedule A of By-Law 1-Z-2014, as amended, is hereby further amended by changing the zoning of a portion of the subject lands described as Part 1, Part 2, Part 3, Part 4, Part 5 and Part 6 identified on Map A (attached to and forming part of this By-Law) as follows:

   Part 1: From Urban Residential Type 1 Zone (R1-A) with a Holding (H) Provision to Urban Residential Type 1 Zone (R1-B) with Holding (H) and a Special Provision **14.1040**:

   Part 2: From Urban Residential Type 1 Zone (R1-A) with a Holding (H) Provision and Urban Residential Type 2 Zone (R2) with a Holding (H) Provision to Urban Residential Type 1 Zone (R1) with Holding (H) and a Special Provision **14.1041**;

   Part 3: From Urban Residential Type 1 Zone (R1-A) with a Holding (H) Provision to Urban Residential Type 2 Zone (R2) with a Holding (H) and a Special Provision **14.1042**;

   Part 4: From Urban Residential Type 1 Zone (R1-A) with a Holding (H) Provision and Urban Residential Type 2 Zone (R2) with a Holding (H) Provision to Neighbourhood Commercial (CN) Zone with a Holding (H) and a Special Provision **14.1043**;

   Part 5: From Urban Residential Type 1 Zone (R1-A) with a Holding (H) Provision to Open Space Zone (OS);

Part 6: From Urban Residential Type 1 Zone (R1-A) with a Holding (H) Provision to Urban Residential Type 1 Zone (R1-A) with Holding (H) and a Special Provision **14.1044**

2. That Subsection 14 Special Provisions is hereby further amended by adding a new **Subsection 14.1040** as follows:

   Part 1, identified on Map A (attached to and forming part of this By-Law)

   i) In lieu of the corresponding provisions in the R1-B Zone, the following provisions shall apply to lands zoned Urban Residential Type 1 Zone (R1-B) with a Special Provision **14.1040**:

a) Minimum *lot area*:	
i) *Interior lot*	360 square metres
ii) *Corner lot*	450 square metres
b) Minimum *lot frontage*:	
i) *Interior lot*	12 metres
ii) *Corner lot*	15 metres
c) Minimum *front yard*:	
i) To residential dwelling unit	3 metres
ii) To attached garage	6 metres
d) Minimum *exterior side yard*:	3 metres
e) Minimum *interior side yard*:	1.2 metres
f) Minimum *rear yard*:	6.5 metres
g) Maximum *driveway* width along *street line*:	3 metres
h) Minimum length of landscape area along *street line*:	6 metres

   ii) Notwithstanding Section 3.20.1, where in any Zone a 0.30 metre reserve separates a side yard from a street, the exterior side yard requirement and the minimum lot area requirement shall be provided and measured as though the reserve is non-existent.

3. That Subsection 14 Special Provisions is hereby further amended by adding a new **Subsection 14.1041** as follows:

   Part 2, identified on Map A (attached to and forming part of this By-Law)

   i) In lieu of the corresponding provisions in the R1 Zone, the following provisions shall apply to lands zoned Urban Residential Type 1 Zone (R1) with a Special Provision **14.1041**:

a) Minimum *lot area*:	
i. *Interior lot*	272 square metres
ii. *Corner lot*	360 square metres
b) Minimum *lot frontage*:	
i. *Interior lot*	10 metres
ii. *Corner lot*	13 metres
c) Minimum *front yard*:	
i. To residential dwelling unit	3 metres
ii. To attached garage	6 metres
d) Minimum *exterior side yard*:	3 metres
e) Minimum *interior side yard*:	1.2 metres
f) Minimum *rear yard*:	6.5 metres
g) Maximum *driveway* width along *street line*:	3 metres
h) Minimum length of landscape area along *street line*:	6 metres

ii) Notwithstanding Section 3.20.1, where in any Zone a 0.30 metre reserve separates a side yard from a street, the exterior side yard requirement and the minimum lot area requirement shall be provided and measured as though the reserve is non-existent.

4. That Subsection 14 Special Provisions is hereby further amended by adding a new Subsection **14.1042** as follows:

Part 3, identified on Map A (attached to and forming part of this By-Law)

i) In lieu of the provisions in the corresponding R2 Zone, the following provisions shall apply to lands zoned Urban Residential Type 2 Zone (R2) with a Special Provision **14.1042**:

Provision	*Semi-detached* (per unit)
a) Minimum *lot area*:	
i) *Interior lot*	267 square metres
ii) *Corner lot*	352 square metres
b) Minimum *front yard*:	

iii) To residential dwelling unit 3 metres

iv) To attached garage 6 metres

c) Minimum *exterior side yard*: 3 metres

d) Minimum *rear yard*: 6.5 metres

ii) Notwithstanding Section 3.20.1, where in any *Zone* a *0.30 metre reserve* separates a *side yard* from a *street,* the *exterior side yard* requirement and the minimum lot area requirement shall be provided and measured as though the reserve is non-existent.

5. That Subsection 14 Special Provisions is hereby further amended by adding **14.1043** as follows:

Part 4, identified on Map A (attached to and forming part of this By-Law)

i) In addition to the "Permitted Uses" provisions in the CN Zone, the following provision shall apply to lands zoned Neighbourhood Commercial (CN) Zone with Special Provision **14.1043**:

a) a dwelling apartment use shall also be a permitted use.

ii) In lieu of the corresponding "Zone Provisions for any Sole Residential Use" in the CN Zone, the following provisions shall apply to lands zoned Neighbourhood Commercial (CN) Zone with Special Provision **14.1043**:

a) Notwithstanding the provisions in Subsection 6.5.3, any sole residential use and *home occupations* shall conform to the provisions in the Urban Residential Type 4 Zone (R4) and the Urban Residential Type 6 Zone (R6) as the respective provisions apply to the type of sole residential use.

iii) In lieu of or in addition to the corresponding "Zone Provisions for Non-Residential Uses or Non-Residential Uses in Combination with Residential Uses" in the CN Zone, the following provisions shall apply to lands zoned Neighbourhood Commercial (CN) Zone with Special Provision **14.1043**:

a) Minimum *front yard, exterior side yard, interior side yard* and *rear yard* Requirements shall not apply.

b) Minimum setback from a *street line* 3 metres

c) Minimum setback from an adjoining Residential *Zone* 7.5 metres

d) Minimum *building height* 3 storeys

e) Maximum *building height* 6 storeys

f) Maximum *lot coverage* 50 percent

g) *Outdoor storage*: prohibited in a yard adjoining a residential *Zone*

iv) Notwithstanding Section 3.20.1, where in any Zone a 0.30 metre reserve separates a side yard from a street, the exterior side yard requirement and the minimum lot area requirement shall be provided and measured as though the reserve is non-existent.

6. That Subsection 14 Special Provisions is hereby further amended by adding a new **Subsection 14.1044** as follows:

   Part 6, identified on Map A (attached to and forming part of this By-Law)

   i) In lieu of the corresponding provisions in the R1-A Zone, the following provisions shall apply to lands zoned Urban Residential Type 1 Zone (R1-A) with a Special Provision **14.1044**:

      a) Maximum *driveway* width along *street line*: 3 metres

      b) Minimum length of landscape area along *street line*: 6 metres

   ii) Notwithstanding Section 3.20.1, where in any Zone a 0.30 metre reserve separates a side yard from a street, the exterior side yard requirement and the minimum lot area requirement shall be provided and measured as though the reserve is non-existent.

7. That the holding (H) provision of this By-Law identified on Part 1, Part 2, Part 3, Part 4 and Part 6 on Map A (attached to and forming part of this By-Law) be removed upon a successful development agreement to the satisfaction of the General Manager of the Community Development Division.

8. That the effective date of this By-Law shall be the date of passage thereof.

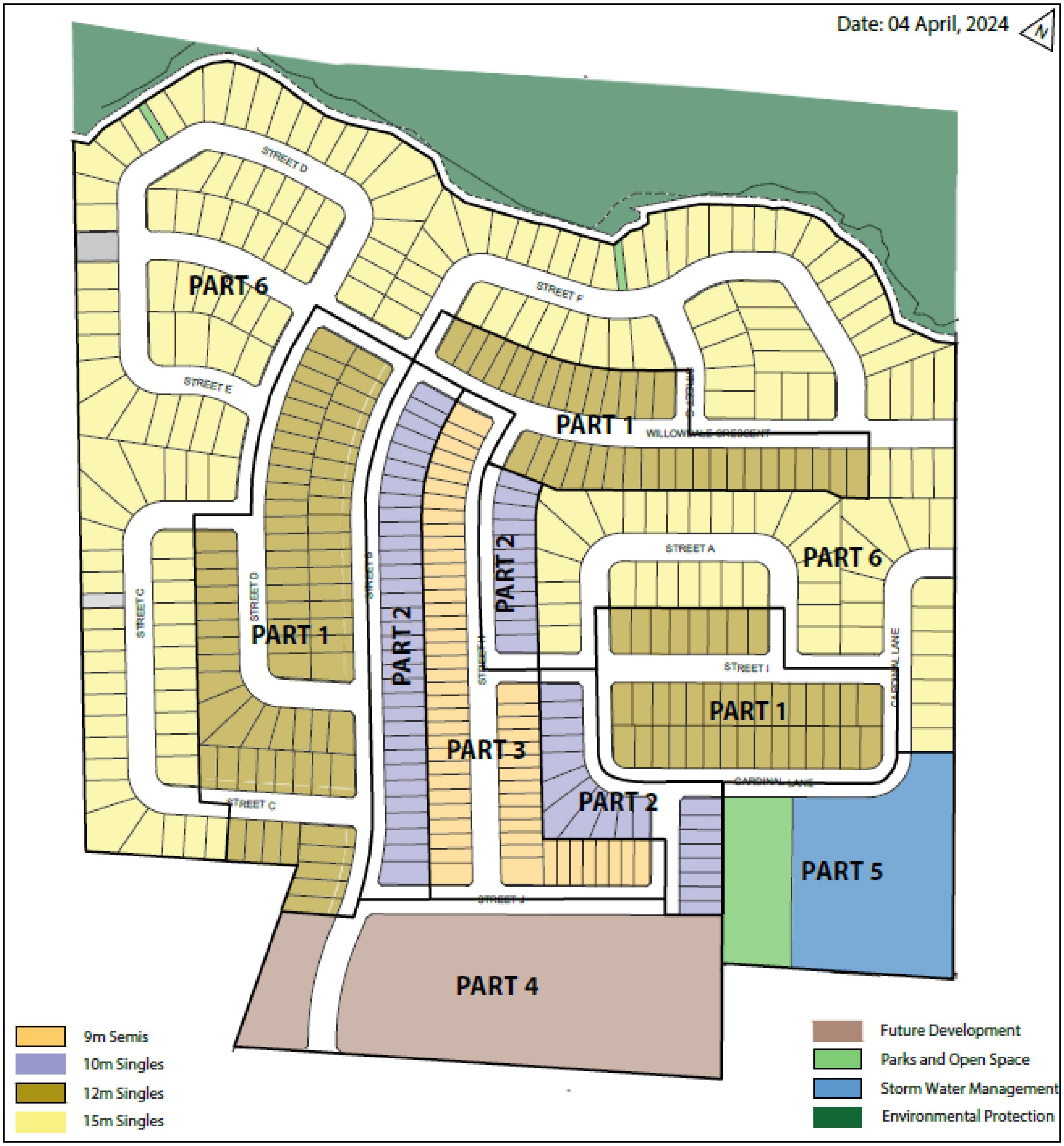
ENACTED AND PASSED this date day _ of month _, 2023

Mayor

____

County Clerk

Zoning By-law Amendment
Norfolk County - Map A
In the Geographic Township of Woodhouse (Port Dover)



Part 1:
From R1-A(H)
To: R1-B (H) Special Provision 14.1040

Part 2:
From R1-A(H) & R2(H)
To: R1(H) Special Provision 14.1041

Part 3:
From R1-A(H) & R2(H)
To: R2 (H) Special Provision 14.1042

Part 4:
From R1-A(H) & R2(H)
To: CN (H) with Special Provision 14.1043

Part 5:
From R1-A(H)
To: OS

Part 6:
From R1-A(H)
To: R1-A (H) Special Provision 14.1044

Explanation of the Purpose and Effect of By-Law __-Z-2023

This By-Law affects a parcel of land described as Part of Lot 8, Concession 2, Geographic Township of Woodhouse, Norfolk County, municipally addressed as 597 Highway 6, Port Dover.

The subject lands were originally zoned in 2006 for residential uses in accordance with the Lynn River Heights Phase 2 Plan of Subdivision. However, the original Draft Plan of Subdivision Approval lapsed in 2015 and a revised June 2023 Draft Plan of Subdivision has now been approved with this Zoning By-law Amendment.

The purpose of this By-Law is to:

- to change the zoning of lands shown as Part 1 from R1-A with a Holding (H) to R1-B with a special provision 14.1040;
- to change the zoning of lands shown as Part 2 from R1-A and R2 with a Holding (H) to R1 with a special provision 14.1041 and a Holding (H),
- to change the zoning of lands shown as Part 3 from R1-A to R2 with a special provision 14.1042 and a Holding (H),
- to change the zoning of lands shown as Part 4 from R1-A and R2 with a Holding (H) to CN with a special provision 14.1043 and a Holding (H);
- to change the zoning of lands shown as Part 5 from R1-A with a Holding (H) to OS;
- to change the zoning of lands shown as Part 6 from R1-A with a Holding (H) to R1-A with a special provision 14.1044 and a Holding (H).

The changes to the zoning as set out in this By-law will implement a proposed draft plan of subdivision that includes a total of 455 single detached and semi-detached units, a future mixed use block, a stormwater management facility and a public park use. The special provisions to the Residential Zones will allow relief of minimum lot areas, minimum lot frontages, various setbacks, will add maximum driveway widths and minimum landscape widths along the street line to promote on-street parking, and will clarify setbacks relative to 0.3 m reserves. The special provisions to the Neighbourhood Commercial zone will allow a dwelling apartment use, reduce setbacks overall except when adjacent to a Residential Zone, prohibit outdoor storage adjacent to a Residential Zone, set out minimum and maximum building heights, and maximum lot coverage on the subject lands.

The existing Holding provision is updated to ensure a development agreement is executed on Part 1, Part 2, Part 3, Part 4 and Part 6 of Map A to the satisfaction of the General Manager of the Community Development Division.

Appendix **D**

Ontario Traffic Manual - Book 11 - Pavement, Hazard and Delineation Markings (Extracts)

3.10 Parking

Parking space markings encourage an orderly and efficient use of parking spaces in areas of high turnover. These markings are also useful to identify where parking is prohibited, such as bus stops, loading zones, approaches to a corner, and to help to prevent encroachment on fire hydrant zones.

Stalls

Type

Curbside parking is generally designated as parallel parking. Angle parking should be limited to streets that function primarily as parking areas.

Length

Parallel parking stalls are 6 m to 6.7 m long to provide manoeuvring space for vehicles. Stalls at either end of a series may be as short as 5.5 m, provided there is no obstruction in front of or behind the stall. Angled parking stalls are generally denoted by lines 5.5 m long.

Width

Parallel parking stalls are 2.3 m to 3.7 m wide. Stalls should be wider if the parking lane is used as a travel lane during peak periods, or if the parking turnover is high.

Setback

Parallel parking stalls should have the following minimum setbacks:

- 4.6 m setback on each side from fire hydrants;
- 6.1 m setback on each side of an intersection. Setback should be greater if required for adequate sight distance. Greater setback is especially helpful near uncontrolled intersections, on roads with high operating speeds, or where through vehicles need more room to manoeuvre around left-turning vehicles.

Local statutory prohibitions on parking may supersede these minimums, or may impose additional restrictions. Approaches to pedestrian crossings, traffic signals, bus stops, private driveways, railroad crossings, or fire stations may be subject to such local restrictions. Local parking restrictions must be observed when marking parking stalls.

Curb Markings and Restrictions

Markings

Markings used to define parking spaces must be white. The front and rear limits of each parallel parking stall, and the lateral limits of angle parking stalls, should be defined by solid lines approximately 10 cm wide. Examples of acceptable configurations for marking parking stalls are shown in Figure 47.

Restrictions

Signs should be used rather than pavement markings to denote areas where parking is restricted. On narrow roadways, curbside parking is often prohibited on one or both sides. On one-way roads narrower than about 5 m, and two-way roads narrower than about 8 m, parking is generally prohibited on both sides. On one-way roads 5 m to 7.5 m wide, and on two-ways roads 8 m to 9.5 m wide, parking is generally prohibited on one side.

Appendix E

Conceptual Streetscape and Parking Plan

1 = One On-Street Parking Space
Total On-Street Parking Spaces: 329 Spaces
Note: On-street parking spaces are excess to the two spaces provided per dwelling unit
ENVIRONMENTAL HAZARD
BLOCK 455 WALKWAY/ACCESS 0.02 ha (0.05 ac)
EDGE OF CULTIVATION AS PER KIM HUSTED SURVEYING LTD, AUGUST 24, 2004,
BLOCK 458 HAZARD 4.35 ha (10.76 ac)
TOP OF BANK AS PER KIM HUSTED SURVEYING LTD, JUNE, 2017 (Harzard Line)
AGRICULTURAL
BLOCK 457 6m BUFFER 0.44 ha (1.09 ac)
BLOCK 456 WALKWAY 0.02 ha (0.05 ac)
BLOCK 454 FUTURE ROAD ACCESS 0.06 ha (0.15 ac)
STREET D
STREET F
ENVIRONMENTAL HAZARD
STREET E
STREET G
WILLOWDALE CRESCENT
WILLOWDALE CRESCENT
RESIDENTIAL
STREET A
CARDINAL LANE
STREET B
STREET D
STREET C
BLOCK 519 DRAINAGE 0.03 ha (0.07 ac)
STREET H
STREET I
CARDINAL LANE
KELLY DRIVE
AGRICULTURAL
CARDINAL LANE
STREET C
SPARROW WAY
PHEASANT TRAIL
RESIDENTIAL
BLOCK 450 PARK 0.58ha (1.44 ac)
BLOCK 451 SWM 1.52 ha (3.74 ac)
STREET J
BLOCK 453 FUTURE DEVELOPMENT 2 0.40ha (0.98 ac)
452 FUTURE DEVELOPMENT 1 2.82ha (6.96 ac)
RESIDENTIAL
RESIDENTIAL
HIGHWAY 6