Phase 1 of Trent Meadows Residential Development

Mill Street, Norwood

Township of Asphodel-Norwood

Traffic Impact Assessment Report

Prepared by:

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Prepared for:

HBNG (Norwood) Developments Inc.

March, 2024

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March 20, 2024

Mr. James Stevenson
HBNG Holborn Group
161 Trade Valley Dr.,
Vaughan, ON
L4H 3N6

Dear Mr. Stevenson:

Re: Traffic Impact Assessment Study for the Proposed Phase 1 of the Trent Meadows Development, Mill Street, Norwood, Township of Asphodel-Norwood

As requested, please find our final Traffic Impact Assessment Study report for the proposed Phase 1 of the Trent Meadows Residential Development, in the urban area of Norwood, in the Township of Asphodel-Norwood, in the County of Peterborough.

Since we are currently undertaking a traffic study for the entire Trent Meadows Residential Development, this study was requested to support the proposed Phase 1 Draft Plan of Subdivision and Zoning By-law Amendment planning applications. The study assessed the impact of Phase 1 traffic on local roads/intersection immediate to the study site as well as the Site Access Road (Street C) which will support the traffic from 152 single family and 12 townhouse residential dwelling units.

The study analyses found that the traffic-related impacts of the proposed Phase 1 development on the adjacent road network is minimal. It is our understanding that portions of Mill Street will be constructed to support the Phase 1 development. Mill Street is expected to be built to urban collector road standards.

Tranplan is pleased to have to the opportunity to work with your study team on this project. If you should require further information on the study, please do not hesitate to contact us at your convenience.

Yours truly,

Sreelakshmi Changaradil, M.Sc., E.I.T

Reviewed By,

Seo-Woon (Swan) Im, B.E.S
Tranplan Associates,
Senior Transportation Planner

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APPENDICES

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1. Introduction and Background

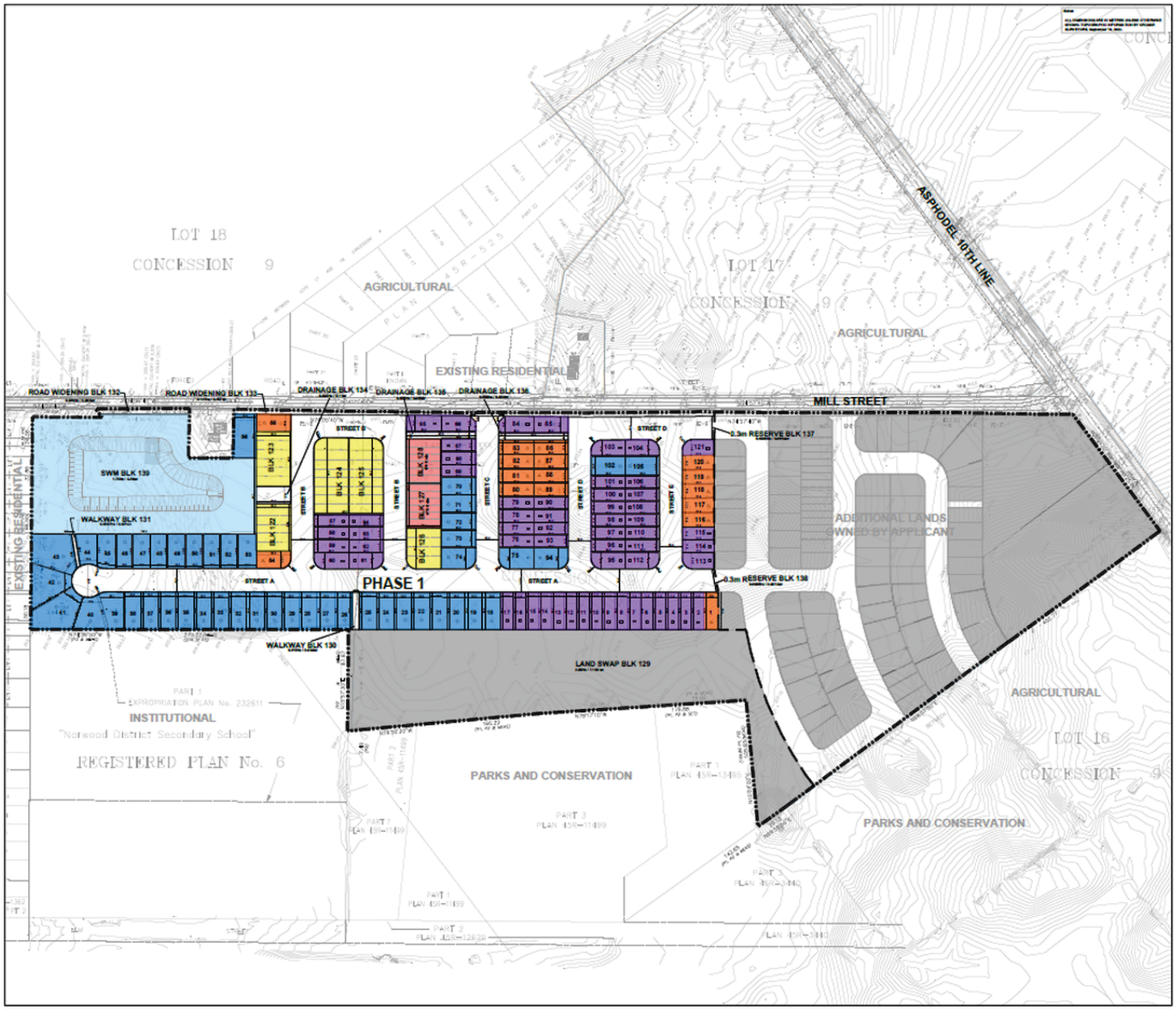
The properties on Mill Street (67 Mill Street and 112 Mill Street) previously identified as Crowley Farms Development (also referred as Cherry Blossom Development) received planning approvals (in June 2021) for approximately 520 single family units of various types and a retirement residence building for 100 units. The previous development planning applications were supported by traffic impact assessments of the proposed developments on the surrounding area road network which provided certain mitigation measures (are conditions to be satisfied as part of the planning approvals) to be provided on Highway 7 at Cedar Street and on Peterborough County Road 45 at Alma Street. In addition, since the internal layout of the internal roads and the location(s) of the access road(s) on existing roads had not been finalized, it was recommended that appropriate traffic analysis, if required, should be provided with each phase of the Draft Plan of Subdivision/Condominium planning applications.

It is noted that HBNG (Norwood) Developments Inc. who own the subject lands have acquired another property to the south of 67 Mill Street property, on municipal address 1552 County Road 42, lands known as Menzie's lands. As a result, the subject lands (67 Mill Street and 112 Mill Street) have been incorporated into a new development plan identified as the Trent Meadows Residential Development (see **Exhibit 1.1** for the extent of the development area). It is further noted that a Traffic Impact Study (TIS) covering the entire Trent Meadows Residential Development has been initiated (see **Appendix A1** for approved study Terms of Reference) covering the road network under the Ministry of Transportation, Ontario (MTO), County of Peterborough and the Township of Asphodel-Norwood jurisdictions. While the traffic impact of the full build-out of the Trent Meadows Residential Development is on-going, a portion of lands at 67 Mill Street have been organized and the owners are now ready to proceed with the Zoning By-Law Amendment and Draft Plan of Subdivision application for Phase 1 of the Trent Meadows Residential Development. The first phase of the development consists of 152 single detached and 12 townhouse units (see **Exhibit 1.2**).

The traffic impact assessment completed for Phase 1 has considered the impact of Phase 1 Access Road (Street C) connection to Mill Street, as well as the Mill Street/King Street and Mill Street/Asphodel 10th Line local road intersections. A traffic count program carried out for the study road network covering the entire Trent Meadows

Exhibit 1.1: Key Map

Exhibit 1.2: Proposed Phase 1 Site Plan



Draft Plan of Subdivision

LAND USE SCHEDULE			
LAND USE	LOT/BLOCK	AREA (ha)	UNITS
7.6m SINGLES	BLOCKS 122-126	0.765	31
11.0m SINGLES	LOTS 2-17, 57-69,76-79 84-85, 90-93, 95-101,103-104, 106-115, 121	2.072	59
12.2m SINGLES	LOTS 1, 54-56, 80-83 86-89,116-120	0.596	16
15.24m SINGLES	LOTS 18-53,70-75, 94,102, 105	2.370	46
SPECIAL LOT	LOT 84	0.076	1
6.0m TOWNS	BLOCKS 127, 128	0.230	12
LAND SWAP	BLOCK 129	2.695	-
WALKWAY	BLOCKS 130, 131	0.028	-
ROAD WIDENING	BLOCKS 132, 133	0.179	-
DRAINAGE	BLOCKS 134, 135, 136	0.117	-
0.3m RESERVES	BLOCKS 137, 138	0.001	-
SWM	BLOCK 139	1.770	-
ROADS	A-E	2.774	-
TOTAL	-	13.86	164

25' (7.6m) Singles
35' (11.0m) Singles
40' (12.2m) Singles
50' (15.2m) Singles
6.0m Towns

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

Trent Meadows Phase 1

Draft Plan of Subdivision

1 of 1

Residential Development was carried out during August 2023. These counts were the basis for developing study area peak hour volumes used for this study (see **Appendix A2** for traffic data used for this study). This report describes the analyses and presents the study findings for existing 2023 and for future 2027 planning horizon (full build-out of Phase 1, based on schedule of receiving planning approvals by the Fall 2024, Phase 1 site servicing completed by Summer 2025 and complete build-out of 164 units in two years, by the Summer of 2027).

2. Extent of the Analysis

The traffic impact assessment consisted of the following:

- Reviewed Phase 1 plans for the development.
- Visited the site and inspected the access routes to/from the site.
- Gathered available traffic count data from Tranplan files.
- Estimated the amount of new traffic that will be generated by Phase 1 using the ITE Trip Generation Manual.
- The directional orientation of site traffic was estimated based on information from its location within the surrounding area.
- Carried out intersection capacity analysis for the two (existing) study intersections under the existing and future conditions.
- Reviewed the Phase 1 Access Road (Street C), in terms of capacity/Levels of Service, intersection spacing, available sightlines and auxiliary turning lane requirements.
- Prepared this documentation of the impact assessments.

3. Existing Conditions

3.1 The Study Site

The Phase 1 site, existing traffic controls and some of the land uses surrounding the study site are illustrated in **Exhibit 3.1**. The subject site is currently farm land.

3.2 Study Site Access

Mill Street is a local road that will provide direct access to the Phase 1 development. It is a local road under the jurisdiction of Township of Asphodel-Norwood. Mill Street between King Street and Asphodel 10th Line has a two-lane rural cross-section (approximately 6.5 m wide) with grass shoulders on both sides. It has a posted speed limit of 50 km/h. Based on 2023 summer observed peak hour volumes at Mill Street/King Street intersection, daily traffic volumes on Mill Street between King Street and Asphodel 10th Line are estimated to be around 200 vehicles per day.

3.3 Peak Hour Traffic Volumes

Exhibit 3.2 (A) shows the 2023 baseline peak hour traffic volumes used for study analysis.

3.4 Existing Conditions/Level of Service (LOS)[1]

The existing peak hour traffic volumes were assessed against the capacity of the study area intersections in terms of Level of Service and volume/capacity ratios using the Highway Capacity Manual reports produced by *Trafficware Traffic Signal Timing Software -Synchro Version 11.0*. The intersection capacity analysis results are summarized in **Table 3.1** Summary of Intersection Analysis. Detailed

[1] Level of Service (LOS) is commonly used in traffic engineering to describe the level of congestion along a roadway or at an intersection. Levels from "A" to "F" denote increasing amounts of congestion with "F" representing a complete breakdown in traffic flow. Level of Service "C" and "D" are commonly used as design standards. However, many individual turning movements at TWSC intersections and commercial entrances along urban arterial corridor operate at LOS "F" during peak periods. Synchro 11 software capable of producing Highway Capacity Manual 2000 results for unsignalized intersections was used to calculate the Levels of Service.

Exhibit 3.1: Existing Traffic Control and Lane Configurations

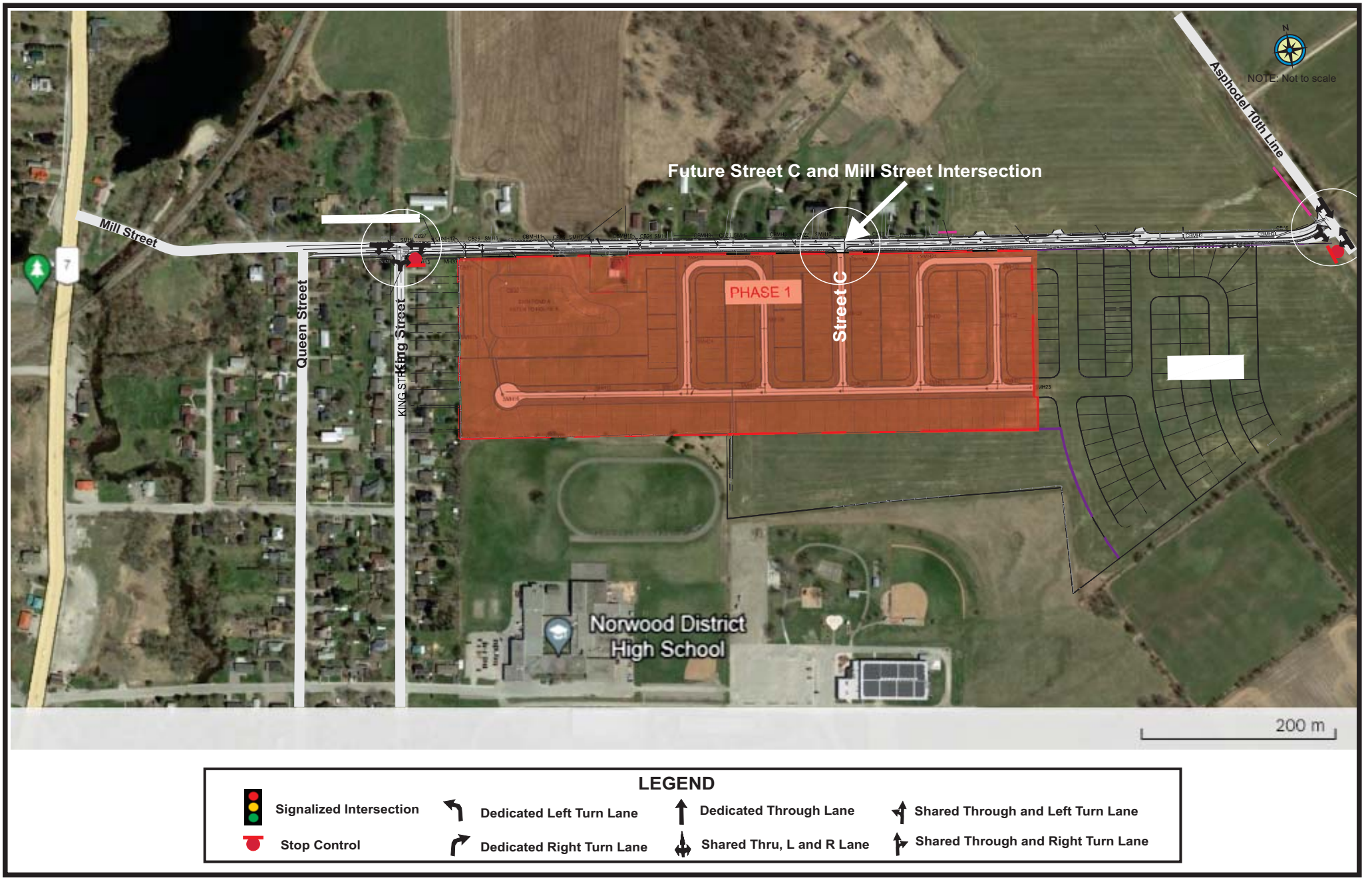
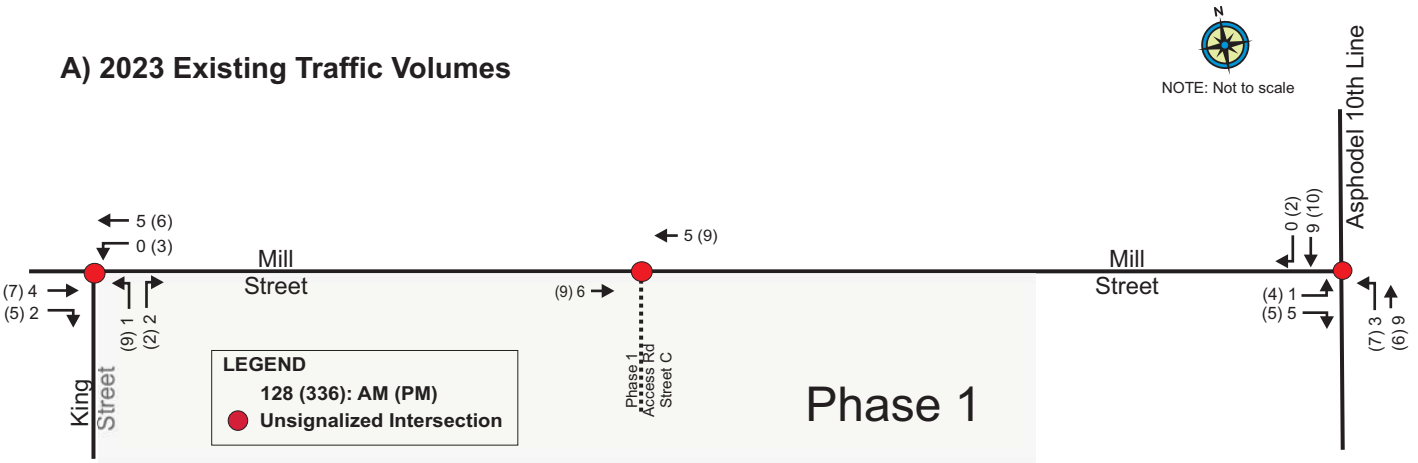
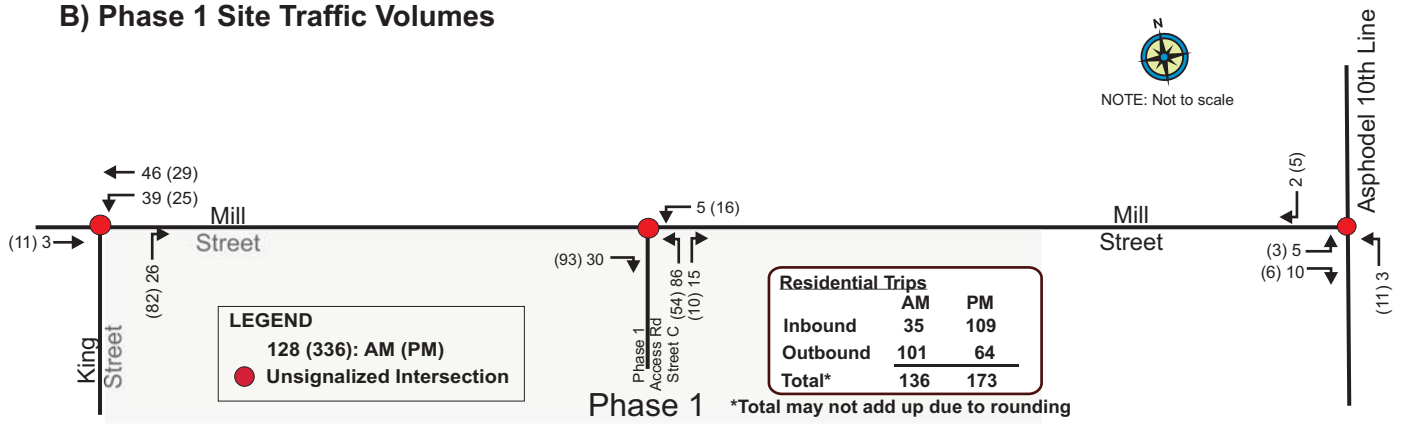


Exhibit 3.2: Traffic Volumes

A) 2023 Existing Traffic Volumes



B) Phase 1 Site Traffic Volumes

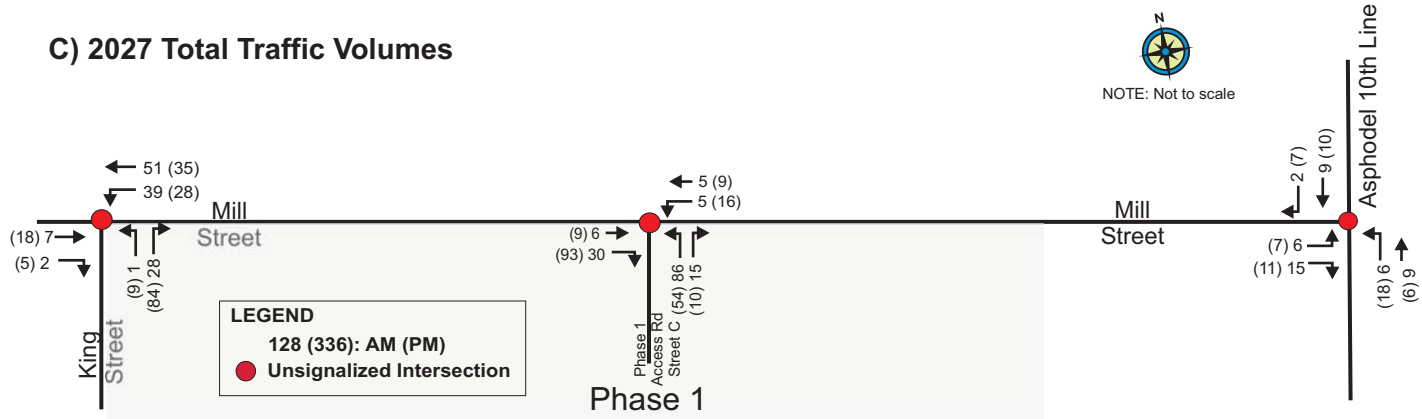


Residential Trips

	AM	PM
Inbound	35	109
Outbound	101	64
Total*	136	173

*Total may not add up due to rounding

C) 2027 Total Traffic Volumes



reports from the analysis are contained in **Appendix B** *Intersection Capacity Analysis*.

Table 3.1: **Summary of Intersection Capacity Analysis: 2023 Existing**

Intersection	2023 Existing Conditions							
	AM Peak				PM Peak			
Mill Street & 10th Line	LOS	Delay	95th Queue	v/c	LOS	Delay	95th Queue	v/c
EB (Mill Street) - LR	A	8.4	0.1	0.01	A	8.5	0.2	0.01
NB (10th Line) - LT	A	1.7	0.0	0.00	A	3.9	0.1	0.00
SB (10th Line) - TR	-	0.0	0.0	0.01	-	0.0	0.0	0.01
Mill Street & King Street	LOS	Delay	95th Queue	v/c	LOS	Delay	95th Queue	v/c
EB (Mill Street) - TR	-	0.0	0.0	0.00	-	0.0	0.0	0.01
WB (Mill Street) - LT	-	0.0	0.0	0.00	A	2.2	0.0	0.00
NB (King Street) - LR	A	8.4	0.1	0.00	A	8.6	0.3	0.01

** Delay in seconds, 95th percentile queue length calculations are based on Synchro output values (in metres).*

In general, all study intersections and associated movements currently operate at excellent Levels of Service without any measurable queuing or delay at the intersections. In assessing the three principal components of intersection measures of effectiveness (MOE's - delay, queue length and v/c ratio), it can be concluded that there is sufficient capacity in the existing study road network to accommodate growth in the background traffic.

4. Proposed Development

The proposed development consists of a mix of low-rise housing: 152 detached homes and 12 townhouses. Forecasts of future site generated traffic volumes were developed using the trip generation relationships taken from the current Institute of Transportation Engineers (ITE) *Trip Generation Manual*[2]. The following ITE land uses were utilized:

- *Single-Family Detached Housing (LU 210)*
- *Multifamily Housing (Low-Rise) Not Close to Rail Transit (LU 220)*

The forecast peak hour vehicular trip generation by the proposed development is summarized in **Table 4.1** and illustrated in **Exhibit 3.2 (B)**. The proposed Phase 1 development is estimated to produce 136 two-way vehicle trips in the AM peak hour, 173 two-way vehicle trips in the PM peak hour and 1,635 two-way vehicle trips per day.

Table 4.1: Phase 1 Trip Generation

LAND USE	WEEKDAY AM PEAK HOUR				WEEKDAY PM PEAK HOUR				DAILY			
	Trip Generation Rate	Vehicle Trips			Trip Generation Rate	Vehicle Trips			Trip Generation Rate	Vehicle Trips		
		Total	In	Out		Total	In	Out		Total	In	Out
(ITE LU210)	Trips Per Dwelling Units	109	26%	74%	Trips Per Dwelling Units	147	63%	37%	Trips Per Dwelling Units	1483	50%	50%
152 Units	Ln(T)=0.91Ln(x)+0.12		28	81	Ln(T)=0.94Ln(x) +0.27		93	54	Ln(T)=0.92Ln(x) +2.68		742	742
(ITE LU220)	Trips Per Dwelling Units	27	24%	76%	Trips Per Dwelling Units	26	63%	37%	Trips Per Dwelling Units	152	50%	50%
12 Units	(T)=0.31(x)+22.85		6	20	(T)=0.43(x)+20.55		16	10	(T)=6.41(x)+75.31		76	76
TOTAL Phase 1 (162 Units)		136	35	101		173	93	54		1635	818	818

*Totals are rounded, and may not add up due to rounding

The study assumed that all Phase 1 traffic will access Mill Street via Street C. The study further assumed that 85% of the Phase 1 traffic will travel to/from west of the site towards King Street and 15% of the Phase 1 traffic will travel to/from east of the site towards Asphodel 10th Line.

2 The Institute of Transportation Engineers, based in the United States, is an international association for traffic engineers and transportation planners. The organization publishes a number of handbooks and manuals, including the Trip Generation Manual which is based on American and Canadian experience. The 11th edition of this publication was used.

5. Analysis of Future Phase 1 Traffic on Study Road Network

The study was informed that there are no approved developments in the study area impacting Mill Street by 2027 planning horizon. As such, the study did not make any allowance for increase in traffic along Mill Street due to other developments or natural increases in traffic passing through the study area. The future total traffic (future Phase 1 traffic added to existing (2023) traffic, is provided in **Exhibit 3.2 (C)**. The intersection capacity analysis results (see **Table 5.1**) indicate that, the study intersections are projected to maintain current excellent Levels of Service with minimum queuing and delay at the study intersections.

Table 5.1: **Summary of Intersection Capacity Analysis: 2027 Total**

Intersection	2028 Total Conditions							
	AM Peak				PM Peak			
Mill Street & 10th Line	LOS	Delay	95th Queue	v/c	LOS	Delay	95th Queue	v/c
EB (Mill Street) - LR	A	8.5	0.5	0.02	A	8.6	0.5	0.02
NB (10th Line) - LT	A	3.0	0.1	0.00	A	5.4	0.3	0.01
SB (10th Line) - TR	-	0.0	0.0	0.01	-	0.0	0.0	0.01
Mill Street & King Street	LOS	Delay	95th Queue	v/c	LOS	Delay	95th Queue	v/c
EB (Mill Street) - TR	-	0.0	0.0	0.01	-	0.0	0.0	0.01
WB (Mill Street) - LT	A	3.3	0.6	0.03	A	3.3	0.5	0.02
NB (King Street) - LR	A	8.5	0.7	0.03	A	8.9	2.6	0.10
Mill Street & Phase 1 Access Road (Street C)	LOS	Delay	95th Queue	v/c	LOS	Delay	95th Queue	v/c
EB (Mill Street) - TR	-	0.0	0.0	0.02	-	0.0	0.0	0.07
WB (Mill Street) - LT	A	3.7	0.1	0.00	A	4.7	0.3	0.01
NB (Street C) - LR	A	9.1	3.0	0.11	A	9.3	2.0	0.08

** Delay in seconds, 95th percentile queue length calculations are based on Synchro output values (in metres).*

5.1 Proposed Phase 1 Access Road

The Phase 1 Draft Plan of Subdivision shows Street C as the only access to/from Mill Street. The results of the capacity analysis (see **Table 5.1**) indicate that all movements at the Street C and Mill Street are projected to operate at excellent Levels of Service (LOS "A"), with minimum delay, 95th percentile queue of less than one vehicle and sufficient residual capacity during for both AM and PM peak hours. In assessing the three principal components of intersection measures of effectiveness (MOE's - delay, queue length and v/c ratio), it can be concluded that there will be sufficient capacity in the study road network to accommodate the traffic from the study site operating with acceptable delay.

5.2 General Impact of Site Traffic on Mill Street

The impact of the proposed Phase 1 development on Mill Street was assessed. The basis for the assessment included the Township of Asphodel-Norwood's 2008 Road Needs Study Report (based on the MTO's Inventory Manual for Municipal Roads, 1991), as well as Transportation Association of Canada (TAC)'s Geometric Design Guide for Canadian Roads, 2017 were used as references for the current road classifications and standards.

According to TAC guidelines, a local residential road is expected to not carry more than 1,000 vehicles per day. Collector roads are expected to carry up to 8,000-10,000 vehicles per day. Mill Street (currently a local road serving a minor collector road function), between King Street and Asphodel 10th Line, based on 2023 observed peak hour data is carrying approximately 200 vehicles per day. When the proposed Phase 1 development is fully built-out, it is expected to add approximately 1,650 vehicles per day on Mill Street. Mill Street will carry the daily volumes that are reflective of (and function) as a minor collector/collector road with traffic volumes reaching 2,000 vehicles per day in certain sections with the Phase 1 traffic. When all phases of Trent Meadows development is completed, Mill Street, between King Street and Asphodel 10th Line is expected to be constructed to collector road standards carrying up to 8,000-10,000 vehicles per day.

Table 5.2, provides the existing and future daily volume levels and functional classification for Mill Street between King Street and Asphodel 10th Line.

Table 5.2 - Existing and Future Road Conditions

Road Section	Existing Conditions		Future Total Conditions after Phase 1	Level of Impact
	TAC	Road Needs Study		
Mill Street King Street – 10th Line	Rural Local <1000 AADT	R200 (AADT 50-199)	AADT expected to be around 2000 veh/day	Urbanize to Residential Collector

5.3 Site Access Road (Street C) Sight Distance Review

The Transportation Association, Canada (TAC) Geometric Design Guide for Canadian Roads, 2017, defines the intersection sight distance, on page 60 of Chapter 9, as "the sight distance available from a point where vehicles are required to stop on the intersection road, while drivers are looking left and right along the major roadway, before entering the intersection. The intersection sight distance is adequate when it allows the design vehicles to safely make all maneuvers that are permitted by the layout (e.g., left turns, right turns, through moves), without significantly affecting vehicles travelling on the main roadway". Based on TAC standards, the available sight distance can be measured by a reviewing the sightlines as per the proposed site access road location from the Draft Plan and the available topographic survey/air photo overlay and confirm the following intersection sight distance standards for 60 km/h design speed[3]:

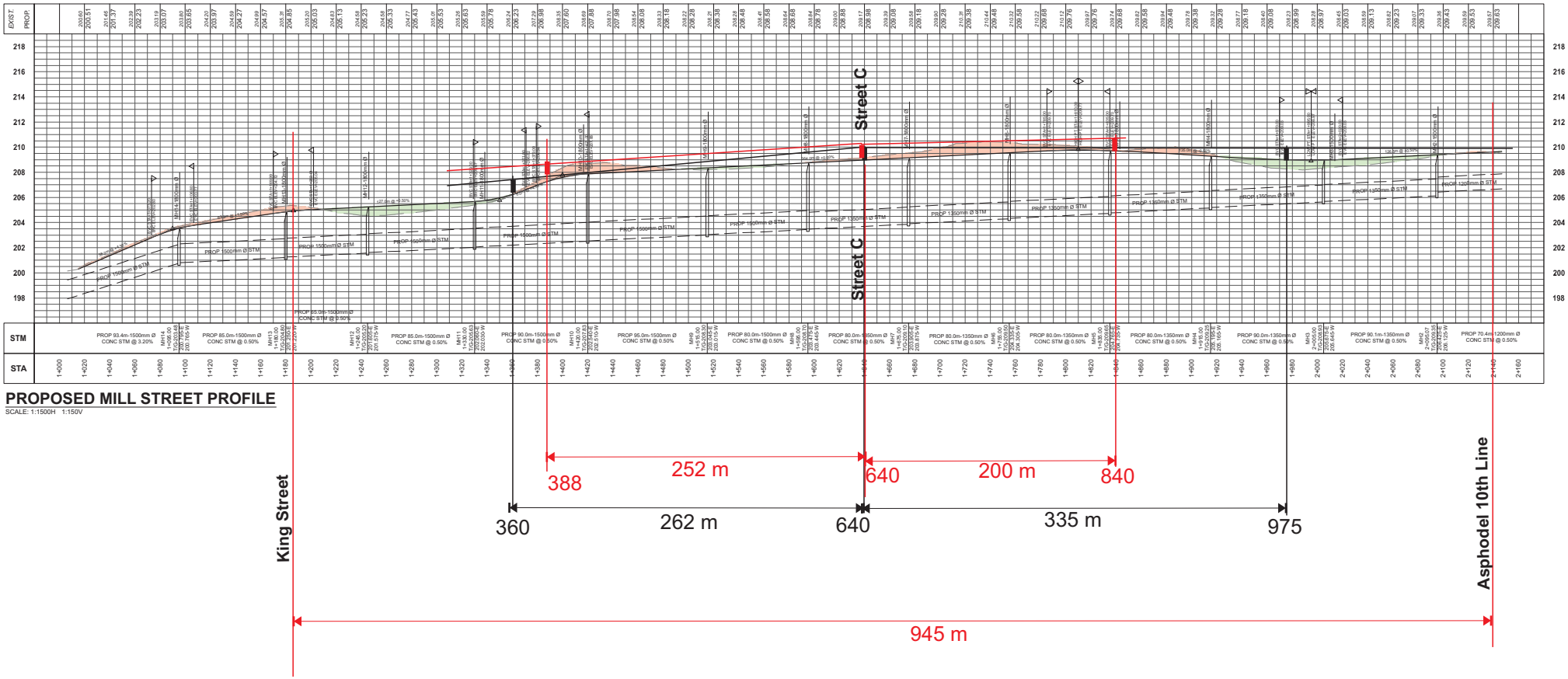
Table 5.3: Intersection Sight Distances

	Intersection Sight Distance			
Design Speed	Minimum Stopping Distance (m)	Left Turns from Minor Road (m)	Right Turns from Minor Road (m)	Left Turns from Major Road (m)
Time Gap		7.5 sec.	6.5 sec.	5.5 sec.
60 km/h	85	130	110	95

On Mill Street, at the proposed location of Street C/Mill Street intersection, there is a knoll to the east and to the west of proposed location of Street C. Based on a sight distance of 60 km/h design speed, ideal sufficient sight distance would be to accommodate all required distances for turning in and out of Street C, but a minimum stopping distance of 85 m in both directions from Street C is required. **Exhibit 5.1**: Mill Street Sightline Distance Analysis provides sightline distances on Mill Street at Street C. The sightline analysis indicates that, under the existing conditions, there is enough sightline distance to meet all intersection sight distances both to west (252 m) and to east (200 m) on Mill Street from Street C location. It is our understanding that part of Mill Street will be reconstructed with Phase 1 development. When Mill Street is reconstructed, there will be approximately 262 m sightline distance to the west and 335 m sightline distance to

[4] The design speed is 10 km/h above posted speed; Mill Street posted speed is 50 km/h.

Exhibit 5.1: Mill Street Sightline Sight Distance Analysis



PROPOSED MILL STREET PROFILE

SCALE: 1:1500H 1:150V

LEGEND

VEHICLE ON EXISTING ROAD PROFILE

EXISTING SIGHTLINE DISTANCE

VEHICLE ON FUTURE ROAD PROFILE

FUTURE SIGHTLINE DISTANCE

FUTURE ROAD FILL SECTION

FUTURE ROAD CUT SECTION

the east on Mill Street from the proposed Street C location. However, it is recommended that the available sight distance be reconfirmed in the field prior to construction of the Street C.

5.4 Site Access Road (Street C) Intersection Spacing Review

The intersection spacing assessment is carried out based on the TAC Geometric Design Guide for Canadian Roads (2017), for the proposed site access roads intersection in relation to future intersections in the study area. The intersection spacing review is summarized in **Table 5.3**. It indicates that Street C meets TAC recommended spacing requirements of existing roadways in the study road network.

Table 5.4: Site Access Road Intersection Spacing Review

ROADWAY	CLASSIFICATION	FROM	TO	SPACING (m)	TAC Recommended Spacing (m)	REVIEW COMMENT
Mill Street	Local Road	King Street	Site Access Street C	455	60	Meet Required Spacing
		Aspodel 10th Line	Site Access Street C	500	60	Meet Required Spacing

5.5 Auxiliary Lane Analysis

Left Turn Lane: Cursory review of the future projected volumes on Mill Street/Street C intersection (see **Exhibit 3.2 C**) indicates that the volumes are so low that a left turn lane volume warrants are not met.

Right Turn Taper/Lane: Cursory review of County of Peterborough right turn taper/lane warrant using Viginia Department of Transportation (VDOT) warrants were reviewed for Mill Street at Street C (see **Exhibit 3.2 C**). The review indicates that the future 2027 projected peak hour total volumes are so low that the warrants for a right-turn taper on Mill Street is not met.

6. Principal Findings and Recommendations

The following are principal findings from the study and recommendations with respect to the proposed Trent Meadows Phase 1 development.

- The study considered the weekday peak hour periods using AM and PM peak hour vehicular volumes generated by the proposed Phase 1 development.

- Under existing conditions, the two study intersections Mill Street/King Street and Mill Street/Asphodel 10th Line are both operating at excellent Levels of Service.

- The Trent Meadows Phase 1 consists of 164 low-rise residential units (152 single detached and 12 townhouse units). The 164 residential units are currently projected to be fully built-out by Summer of 2027. When built-out, it is estimated to produce 136 two-way vehicle trips in the AM peak hour, 173 two-way vehicle trips in the PM peak hour and 1,635 two-way vehicle trips per day.

- All movements at the two study intersections Mill Street/King Street and Mill Street/Asphodel 10th Line are projected to maintain their excellent Levels of Service.

- All Phase 1 traffic (will be supported by) will access Mill Street via Street C. The intersection spacing review indicates that Street C meets TAC recommended intersection spacing requirements of 60 m. It is located more than 400 m from King Street to west and approximately 500 m from Asphodel 10th Line.

- The intersection capacity analysis results indicate that all movements at Mill Street/Street C intersection are projected to operate at LOS A.

- Auxiliary turning lane analysis indicates that a left turn lane or a right turn taper is not warranted on Mill Street at Street C.

- The sightline analysis indicates that there is enough sightline distance to meet all intersection sight distances for 60 km/h design speed to west (252 m) and to

east (200 m) on Mill Street from Street C location under the existing conditions. When Mill Street is reconstructed with Phase 1 development (urbanized and to a collector road design standards), there will be approximately 262 m sightline distance to the west and 335 m sightline distance to the east on Mill Street from the proposed Street C location.

- No other mitigation measures are required to support the proposed Trent Meadows Phase 1 development.

TECHNICAL APPENDIX

APPENDIX A1: Study Terms of Reference

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TRAFFIC, TRANSIT, PARKING & TRANSPORTATION PLANNING
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June 12, 2023

James Stevenson
HBNG Holborn Group
161 Trade Valley Dr.,
Vaughan, ON
L4H 3N6

Dear Mr. Stevenson:

Re: Proposed Terms of Reference to Carry Out Traffic Impact Study for Submission to MTO, County of Peterborough and Township of Asphodel-Norwood for the Proposed Residential Development to be located at 67 Mill Street and 112 Mill Street (formerly known as Crowley Farms/Cherry Blossom Residential Development) and Property Known as Menzies Lands in Norwood, Township of Asphodel-Norwood, County of Peterborough

Please find below the suggested study scope of a Traffic Impact Study for your review and comments for the proposed Residential development in the Township of Asphodel-Norwood, County of Peterborough:

The County of Peterborough TIS Guidelines, and the Ministry of Transportation Ontario (MTO) TIS Guidelines, supported by Count of Peterborough Transportation Master Plan (TMP), is used as reference to prepare this Terms of Reference for the Traffic Impact Study.

1. It is noted that the developments proposed at 67 Mill Street and 112 Mill Street (formerly known as Crowley Farms/Cherry Blossom Residential Development) have planning approvals already. It is our understanding that the property known as Menzies Lands have been acquired by HBNG and will be developed as part of a larger subdivision plan. The resulting overall site plan indicates changes in the number of units proposed for the Mill Street properties and new road network connection to Menzies Lands, thereby changing previous site traffic distribution assumptions (see enclosed plans).
2. The focus of the study will be based on Menzies Lands as the proposed development (274 residential units with future plans for commercial block unknown at this time) requiring planning approvals and the Mill Street properties will be incorporated into the study as "Approved" background

developments.

3. The following are the study intersections proposed for intersection capacity analysis:

    i. Highway 7/County Road 45 (MTO, Signalized)
    ii. Highway 7/Victoria Street (MTO)
    iii. Highway 7/Elm Street (MTO)
    iv. Highway 7/Cedar Street (MTO)
    v. Highway 7/10th Line (MTO)*
    vi. Highway 7/Mill Street (MTO)
    vii. County Road 45/Alma Street (County)
    viii. County Road 45/Queen Street (County)
    ix. County Road 45/County Road 42 (County)*
    x. County Road 42/10th Line (County)
    xi. Mill Street/10th Line (Township)
    xii. Mill Street/King Street (Township)

    * denotes intersection previously not assessed

    xiii. The local road segments within the Township jurisdiction will be assessed in terms of their (TAC and MTO based) functional and environmental design capacity.

4. The existing conditions (2023) will be based on traffic data to be gathered/collected after the approval of this study Terms of Reference by all approving agencies. The study proposes to use the summer peak weekday AM and PM traffic volumes for the study area.
5. The planning horizons for study background and total traffic is assumed to be 2028, 2033, and 2038 (2028 as the build-out planning horizon, 2033 and 2038 as the five and ten years after build-out year to comply with MTO planning horizons).
6. The background traffic growth will be based on analysis of historical traffic data (AADT) for applicable roadway segments, and in consultation with MTO/County staff on appropriate growth rate that should be used for road sections under their jurisdiction. Furthermore, included in the background traffic will be any developments currently under construction or have received planning approvals that are pending. This information is to be provided by the appropriate approving agencies.
7. The directional orientation of the site traffic will be estimated on the basis of the observed traffic patterns at the study intersections.
8. Synchro 11 software will be used for the intersection capacity analyses with the observed/forecast volumes. Unless specific input values are requested to be used, default Synchro values for all variables, including the saturation flow rate, and peak hour factor will be maintained. The approving agency

staff will be consulted for any infrastructure improvements that should be applied to the study intersections.

9. Site Access requirements and geometrics will be evaluated in accordance with standards outlined in the TAC "Geometric Design Guide for Canadian Roads, 2017". The following will be evaluated:
    - Capacity
    - Safety
    - Local Road spacing
    - Auxiliary turning lanes warrant analysis shall be assessed based on TAC Warrants or MTO monographs as per MTO/County of Peterborough requirement.
    - Available sight distances at the future proposed site access roads intersections
10. The study findings, conclusions, including any mitigation measure will be clearly identified and appropriate time line will be provided with the recommendations.
11. Other concerns/issues raised by the staff from the approving agencies.

Please feel free to suggest any items of concern which we may have not addressed in this study scope.

If you should require further information on the study, please do not hesitate to contact us at your convenience.

Yours truly,

Seo-Woon Im, B.E.S.
Senior Transportation Planner

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

Notes

ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN. TOPOGRAPHIC INFORMATION BY JBF SURVEYORS, JUNE 19, 2014.

Draft Plan of Subdivision

Legal Description

Part Lot 16 Concession 9 Asphodel As In R359437 Except Pt 5 45r9975 And Except Part 1 Plan 45r16300 Subject To An Easement As In R359437
TOWNSHIP OF ASPHODEL-NORWOOD,
COUNTY OF PETERBOROUGH

Owner's Certificate

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

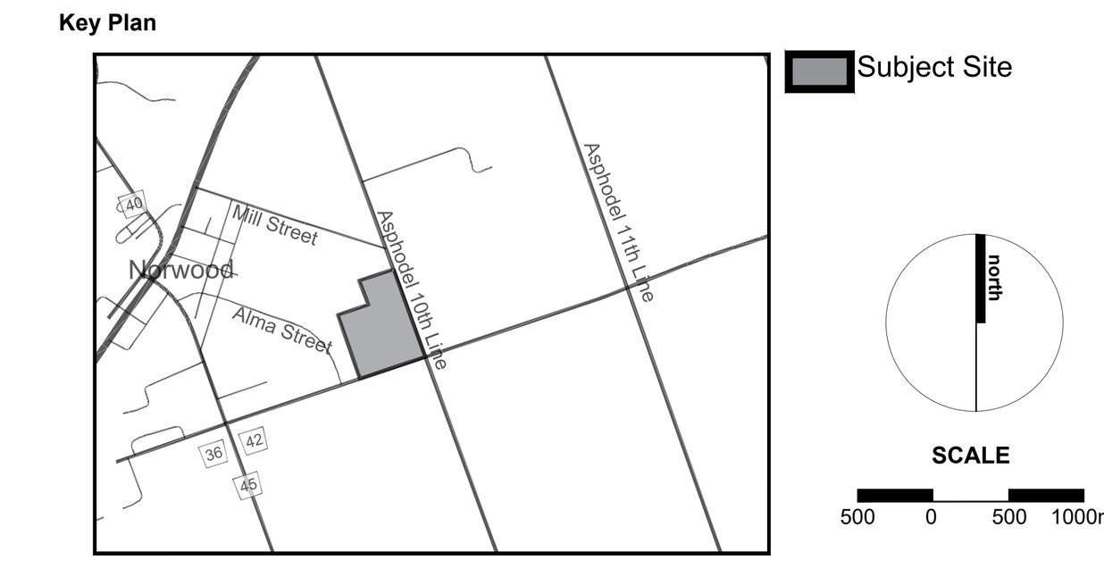
DATE: ____________ ____________
HBNG Holborn Group

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: ____________ ____________
XXX- O.L.S.
XXXX

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, Retirement Residence, Park, Stormwater Management, Open Space
E. As Shown F. As Shown
G. As Shown H. Municipal Water Supply I. Bondhead Sandy Loam
J. As Shown K. All Services As Required L. As Shown

Unit Count:

25' (7.6m) Singles	42
36' (11.0m) Singles	60
40' (12.2m) Singles	40
50' (15.2m) Singles	105
6.0m Towns	27

Total: 274

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 07, 2023
File No.	1604D
Plan Scale	1:1000 (Arch D)
Drawn By	T.H.
Checked By	D.M.
Other	

Project
67 Mill Street & 112 Mill Street
Norwood, ON.

File Name: Draft Plan of Subdivision	Dwg No.: 1 of 1

Scale Bar

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

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PRELIMINARY

FOR DISCUSSION PURPOSES ONLY

Notes

ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN. TOPOGRAPHIC INFORMATION BY JBF SURVEYORS, JUNE 19, 2014.

Draft Plan of Subdivision

Legal Description

Part Lot 17 Concession 9 Asphodel As In R701496 Save And Except Part 3 & 4 Plan 45r16789
TOWNSHIP OF ASPHODEL-NORWOOD,
COUNTY OF PETERBOROUGH

Owner's Certificate

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

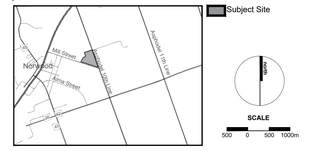
DATE: _____ _____
HBNG Holborn Group

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: _____ _____
XXX- O.L.S.
XXXX

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, Retirement Residence, Park, Stormwater Management, Open Space
E. As Shown F. As Shown
G. As Shown H. Municipal Water Supply I. Bondhead Sandy Loam
J. As Shown K. All Services As Required L. As Shown

Unit Count:

25' (7.6m) Singles	20
36' (11.0m) Singles	24
40' (12.2m) Singles	17
50' (15.2m) Singles	50
6.0m Towns	13
Total:	**124**

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	07 March, 2023
File No.	1604D
Plan Scale	1:600 (Arch D)
Drawn By	T.H.
Checked By	D.M.
Other	
Project	67 Mill Street & 112 Mill Street Norwood, ON.
File Name	Draft Plan of Subdivision
Dwg No.	1 of 1
Scale Bar	

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

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Draft Plan of Subdivision

Legal Description

Part Lot J Plan 6 Norwood And Part Lot 17 Concession 9 Asphodel And Part Lot 18 Concession 9 Asphodel As In R223760 (firstly, Secondly & Thirdly) Except R232611 & Parts 1, 2, 3 & 4 Plan 45r11499 And Parts 1 & 2 Plan 45r16789
TOWNSHIP OF ASPHODEL-NORWOOD,
COUNTY OF PETERBOROUGH

Owner's Certificate

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

DATE: ____________ HBNG Holborn Group

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: ____________ XXX- O.L.S.
XXXX

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, Retirement Residence, Park, Stormwater Management, Open Space
E. As Shown F. As Shown
G. As Shown H. Municipal Water Supply I. Bondhead Sandy Loam
J. As Shown K. All Services As Required L. As Shown

Unit Count:

25' (7.6m) Singles	46
36' (11.0m) Singles	60
40' (12.2m) Singles	44
50' (15.2m) Singles	120
6.0m Towns	33
Total: 303	

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

Stamp	Date: 07 March, 2023
	File No.: 1604D
	Plan Scale: 1:1000 (Arch D)
	Drawn By: T.H.
	Checked By: D.M.
	Other
Project: 67 Mill Street & 112 Mill Street Norwood, ON.	north
File Name: Draft Plan of Subdivision	Dwg No.: 1 of 1

Scale Bar

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

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APPENDIX A2: Traffic Data

15 MINUTE REPORT

North-South Road: King Street
East-West Road: Mill Street
Municipality: Asphodel-Norwood
Weather: Sunny
Day: Thursday
Survey Date: August 10, 2023

TIME BEGINNING	NORTH APPROACH								EAST APPROACH								SOUTH APPROACH								WEST APPROACH								Total Vehicular Traffic	Total PED/BIKE Traffic
	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike		
	Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right				
7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
7:30	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0
8:15	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	5	0
8:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	3	0
8:45	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	4	1
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3	4	0	0	0	0	0	12	0
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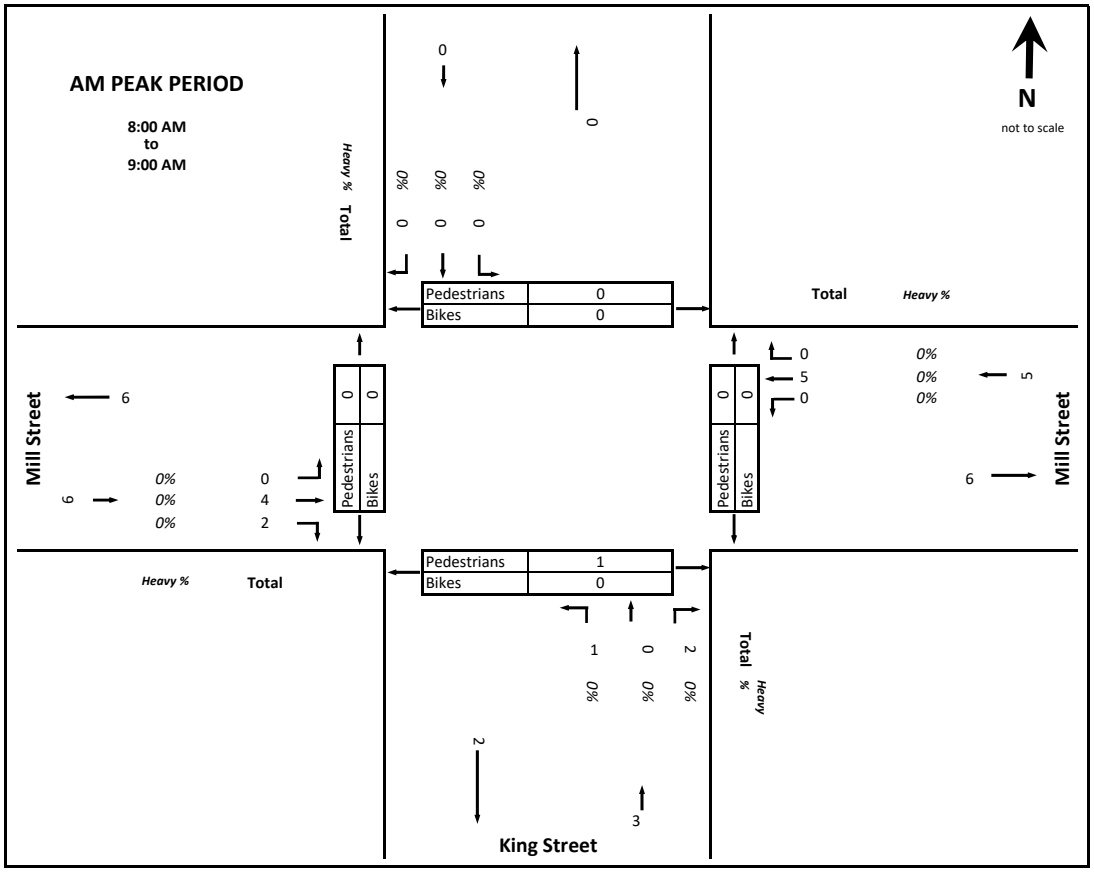
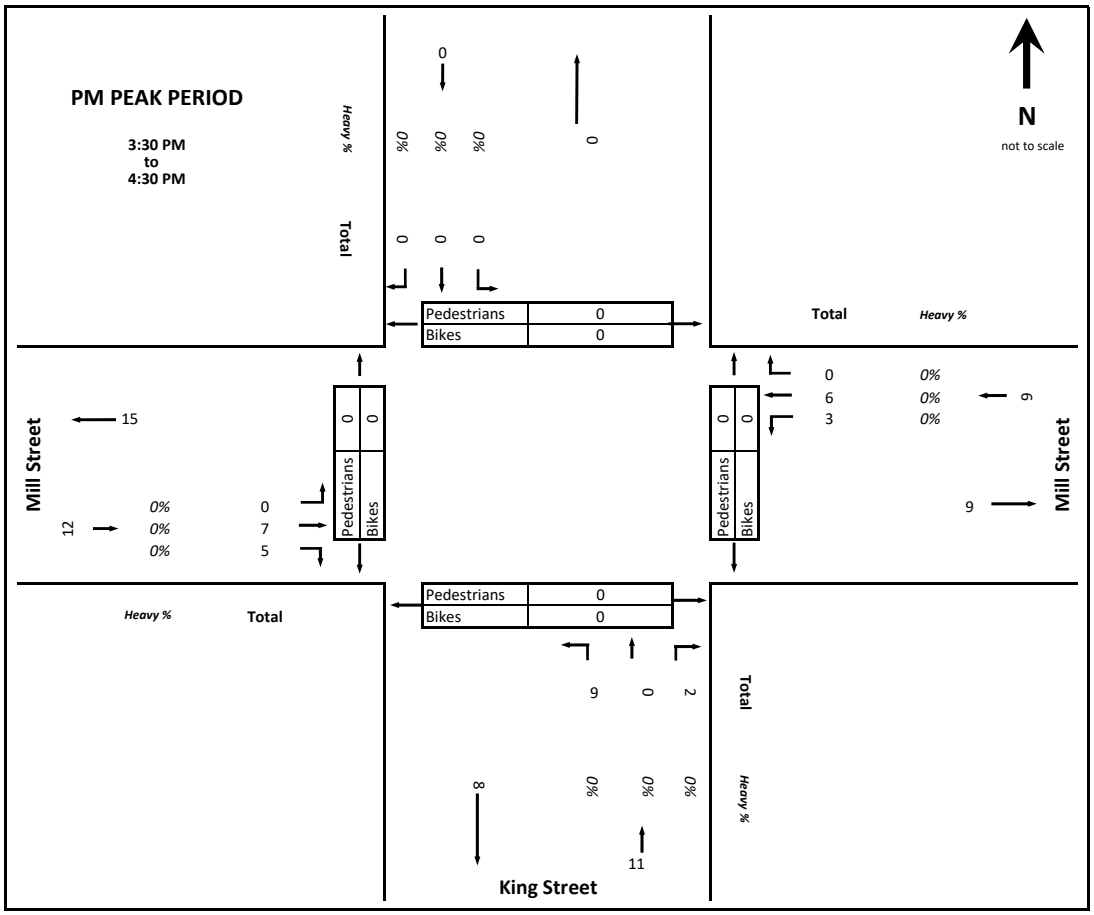
16:00	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	5	0
16:15	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	5	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	9	0
16:30	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	3	2
16:45	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	6	0
17:00	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	5	0
17:15	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	8	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TURNING MOVEMENT DIAGRAMS

South Road: King Street | **Municipality:** Asphodel-Norwood | **Day:** Thursday
East-West Road: Mill Street | **Weather:** Sunny | **Survey Date:** August 10, 2023





15 MINUTE REPORT

North-South Road: Asphodel 10th Line
East-West Road: Mill Street
Municipality: Asphodel-Norwood
Weather: Sunny
Day: Thursday
Survey Date: August 10, 2023

TIME BEGINNING	NORTH APPROACH								EAST APPROACH								SOUTH APPROACH								WEST APPROACH								Total Vehicular Traffic	Total PED/BIKE Traffic
	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike		
	Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right				
7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
7:15	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
7:30	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
8:00	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	1	0	1	0	0	0	0	0	7	0
8:15	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	5	0
8:30	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	8	0
8:45	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	2	0	0	0	0	0	7	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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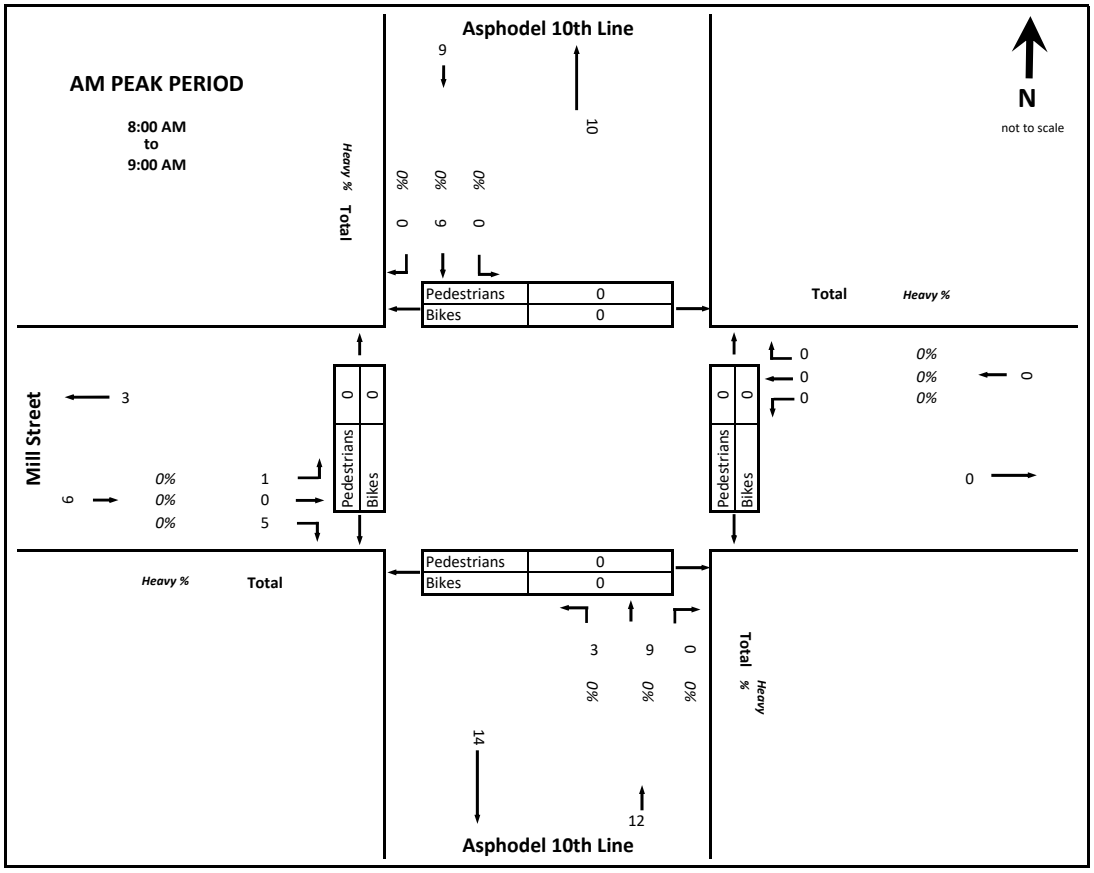
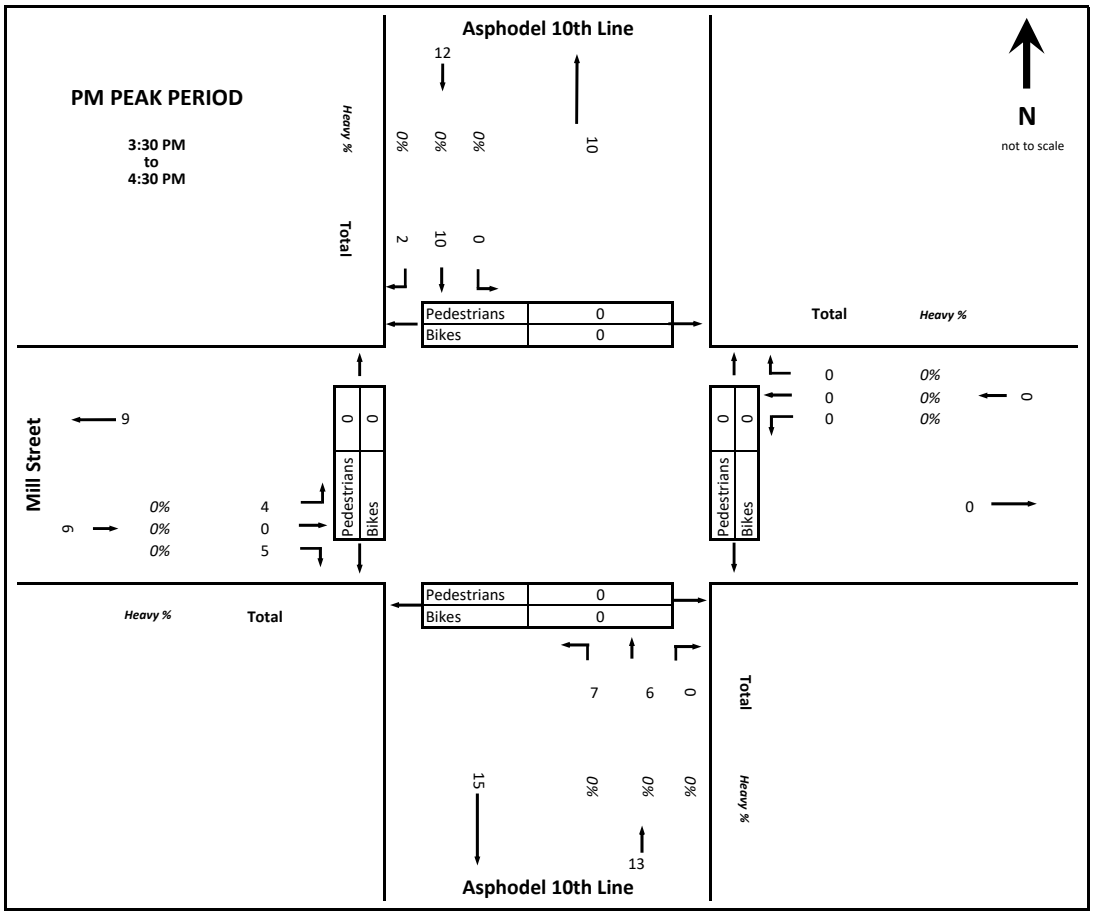
13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	6	0
15:45	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	7	0
16:00	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	1	0	1	0	0	0	0	0	13	0
16:15	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	1	0	2	0	0	0	0	0	8	0
16:30	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	1
16:45	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	4	0
17:00	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	6	0
17:15	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
17:30	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

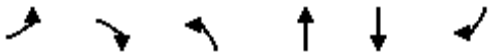
TURNING MOVEMENT DIAGRAMS

North-South Road: Asphodel 10th Line
East-West Road: Mill Street
Municipality: Asphodel-Norwood
Weather: Sunny
Day: Thursday
Survey Date: August 10, 2023





APPENDIX B: Intersection Analysis Summaries



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	5	3	9	9	0
Future Volume (Veh/h)	1	5	3	9	9	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	5	3	10	10	0
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	26	10	10			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	26	10	10			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	988	1071	1610			

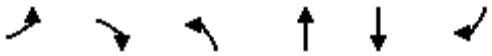
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	6	13	10
Volume Left	1	3	0
Volume Right	5	0	0
cSH	1056	1610	1700
Volume to Capacity	0.01	0.00	0.01
Queue Length 95th (m)	0.1	0.0	0.0
Control Delay (s)	8.4	1.7	0.0
Lane LOS	A	A	
Approach Delay (s)	8.4	1.7	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	4	2	0	5	1	2
Future Volume (Veh/h)	4	2	0	5	1	2
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)	4	2	0	5	1	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)						
pX, platoon unblocked						
vC, conflicting volume			6		10	5
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			6		10	5
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1615		1010	1078

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	6	5	3
Volume Left	0	0	1
Volume Right	2	0	2
cSH	1700	1615	1054
Volume to Capacity	0.00	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.1
Control Delay (s)	0.0	0.0	8.4
Lane LOS			A
Approach Delay (s)	0.0	0.0	8.4
Approach LOS			A

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	5	7	6	10	2
Future Volume (Veh/h)	4	5	7	6	10	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	5	8	7	11	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)						
pX, platoon unblocked						
vC, conflicting volume	35	12	13			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	35	12	13			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	973	1069	1606			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	9	15	13
Volume Left	4	8	0
Volume Right	5	0	2
cSH	1024	1606	1700
Volume to Capacity	0.01	0.00	0.01
Queue Length 95th (m)	0.2	0.1	0.0
Control Delay (s)	8.5	3.9	0.0
Lane LOS	A	A	
Approach Delay (s)	8.5	3.9	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	16.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	7	5	3	6	9	2
Future Volume (Veh/h)	7	5	3	6	9	2
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)	8	5	3	7	10	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)						
pX, platoon unblocked						
vC, conflicting volume			13		24	10
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			13		24	10
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	100
cM capacity (veh/h)			1606		991	1071

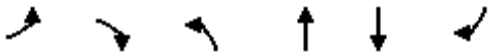
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	13	10	12
Volume Left	0	3	10
Volume Right	5	0	2
cSH	1700	1606	1003
Volume to Capacity	0.01	0.00	0.01
Queue Length 95th (m)	0.0	0.0	0.3
Control Delay (s)	0.0	2.2	8.6
Lane LOS		A	A
Approach Delay (s)	0.0	2.2	8.6
Approach LOS			A

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	0	0	0
Volume Left (vph)	0	0	0
Volume Right (vph)	0	0	0
Hadj (s)	0.00	0.00	0.00
Departure Headway (s)	3.9	3.9	3.9
Degree Utilization, x	0.00	0.00	0.00
Capacity (veh/h)	917	917	917
Control Delay (s)	6.9	6.9	6.9
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A	A	A

Intersection Summary			
Delay	0.0		
Level of Service	A		
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	15	6	9	9	2
Future Volume (Veh/h)	6	15	6	9	9	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	16	7	10	10	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)						
pX, platoon unblocked						
vC, conflicting volume	35	11	12			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	35	11	12			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	974	1070	1607			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	23	17	12
Volume Left	7	7	0
Volume Right	16	0	2
cSH	1039	1607	1700
Volume to Capacity	0.02	0.00	0.01
Queue Length 95th (m)	0.5	0.1	0.0
Control Delay (s)	8.5	3.0	0.0
Lane LOS	A	A	
Approach Delay (s)	8.5	3.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	15.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	7	2	39	51	1	28
Future Volume (Veh/h)	7	2	39	51	1	28
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)	8	2	42	55	1	30
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			10		148	9
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			10		148	9
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		100	97
cM capacity (veh/h)			1610		822	1073

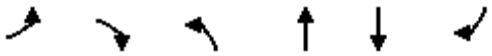
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	10	97	31
Volume Left	0	42	1
Volume Right	2	0	30
cSH	1700	1610	1062
Volume to Capacity	0.01	0.03	0.03
Queue Length 95th (m)	0.0	0.6	0.7
Control Delay (s)	0.0	3.3	8.5
Lane LOS		A	A
Approach Delay (s)	0.0	3.3	8.5
Approach LOS			A

Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	21.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	6	30	5	5	86	15
Future Volume (Veh/h)	6	30	5	5	86	15
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)	7	33	5	5	93	16
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			40		38	24
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			40		38	24
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		90	98
cM capacity (veh/h)			1570		970	1053

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	40	10	109
Volume Left	0	5	93
Volume Right	33	0	16
cSH	1700	1570	982
Volume to Capacity	0.02	0.00	0.11
Queue Length 95th (m)	0.0	0.1	3.0
Control Delay (s)	0.0	3.7	9.1
Lane LOS		A	A
Approach Delay (s)	0.0	3.7	9.1
Approach LOS			A

Intersection Summary			
Average Delay		6.5	
Intersection Capacity Utilization		17.1%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	11	18	6	10	7
Future Volume (Veh/h)	7	11	18	6	10	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	12	20	7	11	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	62	15	19			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	62	15	19			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	932	1065	1597			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	27	19
Volume Left	8	20	0
Volume Right	12	0	8
cSH	1007	1597	1700
Volume to Capacity	0.02	0.01	0.01
Queue Length 95th (m)	0.5	0.3	0.0
Control Delay (s)	8.6	5.4	0.0
Lane LOS	A	A	
Approach Delay (s)	8.6	5.4	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	18.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	18	5	28	35	9	84
Future Volume (Veh/h)	18	5	28	35	9	84
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)	20	5	30	38	10	91
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			25		120	22
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			25		120	22
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		99	91
cM capacity (veh/h)			1589		858	1054

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	25	68	101
Volume Left	0	30	10
Volume Right	5	0	91
cSH	1700	1589	1031
Volume to Capacity	0.01	0.02	0.10
Queue Length 95th (m)	0.0	0.5	2.6
Control Delay (s)	0.0	3.3	8.9
Lane LOS		A	A
Approach Delay (s)	0.0	3.3	8.9
Approach LOS			A

Intersection Summary			
Average Delay	5.8		
Intersection Capacity Utilization	22.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	9	93	16	9	54	10
Future Volume (Veh/h)	9	93	16	9	54	10
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)	10	101	17	10	59	11
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			111		104	60
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			111		104	60
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		93	99
cM capacity (veh/h)			1479		883	1005

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	111	27	70
Volume Left	0	17	59
Volume Right	101	0	11
cSH	1700	1479	900
Volume to Capacity	0.07	0.01	0.08
Queue Length 95th (m)	0.0	0.3	2.0
Control Delay (s)	0.0	4.7	9.3
Lane LOS		A	A
Approach Delay (s)	0.0	4.7	9.3
Approach LOS			A

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	18.3%	ICU Level of Service	A
Analysis Period (min)	15		