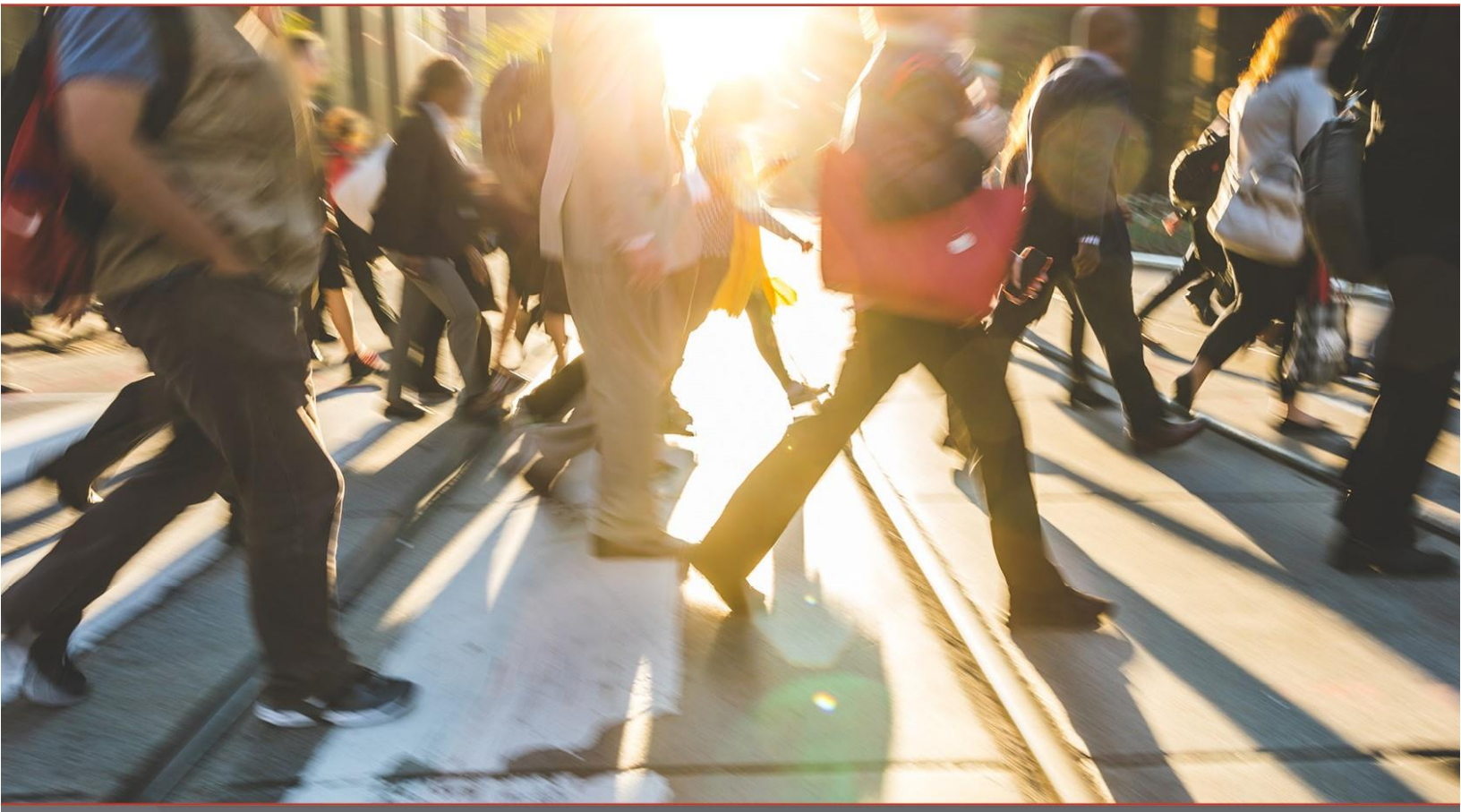
SEATON
PARCEL 24 LANDS

Traffic Sensitivity Analysis
City of Pickering



Prepared For: TACCGATE Developments Inc.

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1.0 INTRODUCTION

BA Group is retained by TACCGATE Developments Inc. to provide transportation consulting services regarding the proposed development of Parcel 24 within residential subdivision SP-2015-05. The development parcel is located on the east side of Peter Matthews Drive and south of Alexander Knox Road. The subdivision is located in Neighbourhood 19 – Wilson Meadows of the City of Pickering's planned Seaton community.

1.1 Residential Subdivision SP-2015-05

The residential subdivision of interest to this study (Parcel 24) is contained within SP-2015-05 and is herein referred to as the "P24 Lands" or the "Site". The P24 Lands are proposed in the vicinity of the Alexander Knox Road / Peter Matthews Drive intersection, south of Alexander Knox Road and east of Peter Matthews Drive. Notably, additional lands within SP-2015-05, located sparsely throughout Neighbourhoods 18 – Mount Pleasant and 19 – Wilson Meadows of the Seaton community are to be assessed in subsequent submissions.

The P24 Lands will include 76 detached dwellings and 28 townhouse dwellings. The location of the P24 Lands within the broader Seaton context is illustrated in **Figure 1**, and the Draft plan is provided in **Figure 2** of **Appendix A**.

1.2 Seaton Transportation Operations Review

In May 2013, BA Group completed a transportation planning exercise on behalf of the Seaton Landowners Group and issued a summary report and technical appendix entitled *Seaton Transportation Operations Review* (the "2013 Report") which examined several transportation-related elements of the entire "full build-out" Seaton community (approximately 61,000 residents and 30,500 jobs).

Utilizing draft plans and assumptions regarding future land uses and transportation facilities, the study derived traffic forecasts to evaluate projected traffic operations throughout the Seaton community. Through this assessment, the 2013 Report identified potential problem areas, recommended mitigation measures, and commented on several long-term transportation considerations relevant to the future full build-out of the Seaton community.

The traffic volume projections presented in the 2013 Report have since been used by both HDR (*Central Pickering Development Class EA Travel Demand Modelling Analysis* – April 29, 2014) and the Region of Durham (*Operational Analysis for Seaton Arterial Development* – April 16, 2014) in their respective evaluations of future traffic operations along regional arterial roads throughout Seaton. Additionally, these volumes constitute the basis from which the traffic volume projections used as part of the current study were derived.

1.3 Purpose of this Report

This report addresses transportation considerations pertaining to the P24 Lands, largely City of Pickering requirements, upon which final approval of residential subdivision SP-2015-05 is conditional. Specifically, these requirements are satisfied through the submission of a Traffic Sensitivity Analysis, including:

- a Traffic Impact Study;
- an Intersection Control Plan;
- a Traffic Signal Implementation Program;
- a Traffic Management Implementation Plan;
- a Transportation Planning Exercise; and,
- a Transportation Demand Management Plan.

Notably, the purpose, scope, methodology, scale, horizon period, findings, and recommendations of the 2013 Report are similar in nature to those typically associated with standard transportation planning exercises. Moreover, the review implicitly considers the transportation-related impacts of the residential subdivisions of interest to the current study. As such, the 2013 Report satisfies the need for a Transportation Planning Exercise required by the City of Pickering as part of the approval process for residential subdivision SP-2015-05.

1.4 Road Network Nomenclature

This report uses street names based on the proposed plans. As a result of the adopted roadway nomenclature, there may be some discrepancy between the labelling of streets in this report and on previously dated submissions.

To provide clarity and consistency in the street naming conventions used in this study, the current and equivalent street nomenclature from the 2013 Report is summarized in **Table 1**.

Table 1 Study Area Street Naming Conventions

BA Group's 2013 Report Nomenclature	Current Nomenclature
Whitevale Bypass	Alexander Knox Road
Whitevale Road	
Sideline 22	Peter Matthews Drive
Street 19FA	Doverwood Avenue / Northern Site Access
Street 19AR	Street A (Southern Site Access)

1.5 Arterial Road Network

Alexander Knox Road is a future four-lane east-west arterial road that will extend from Brock Road in the east to York Durham Line in the west. As part of the build-out of Seaton, Alexander Knox Road will constitute the formerly titled Whitevale Bypass and a segment of Whitevale Road from Brock Road in the east to Peter Matthews Drive in the west and will function as a Type B Arterial Road. Currently, Alexander Knox Road is under construction and does not exist west of its intersection with Peter Matthews Drive.

Peter Matthews Drive is a four-lane north-south arterial road extending from Taunton Road in the south to Alexander Knox Road in the north. As part of the build-out of Seaton, Peter Matthews Drive will connect with Rossland Road at its intersection with Brock Road in the south and will extend to Highway 7 in the north. Peter Matthews Drive constitutes the former Sideline 22 and will function as a Type B Arterial Road. Currently, Peter Matthews Drive exists west of the Site where it terminates at its intersection with Alexander Knox Road and is planned for construction further north to Highway 7 as part of future phases of Seaton development.

1.6 Public Transit

A review of the Region of Durham's *Staged Servicing and Implementation Strategy* (the "SSIS") indicates potential bus service routing near the Site at both the build out of the first phase of development as well as the full build-out of the Seaton community. It is proposed that, under both conditions, transit routes will be located along Alexander Knox Road and Peter Matthews Drive in the vicinity of the Site.

As part of the first phase of the Seaton community and under interim conditions, the following transit routes are proposed along area roads:

- **Alexander Knox Road:** Routes 3 and 4; and,
- **Peter Matthews Drive:** Routes 3 and 4.

As part of the full build-out of the Seaton community and under ultimate conditions, the following transit routes are proposed along area roads:

- **Alexander Knox Road:** Routes 3 and 4; and,
- **Peter Matthews Drive:** Routes 3, 4, and 6.

Under ultimate conditions, far-sided bus stops are planned at signalized intersections along Peter Matthews Drive in both a northerly and southerly direction. The nearest stop is located immediately west of the Site at the Peter Matthews Drive / Doverwood Avenue / Northern Site Access intersection. Near-sided bus stops are planned at signalized intersections along Alexander Knox Road in both an easterly and westerly direction. The nearest stop is located at the Alexander Knox Road / Peter Matthews Drive intersection, approximately a 5-minute walk north of the Site.

The ultimate condition of transit routes and bus stops are illustrated on **Figure 3**.

1.7 Active Transportation

To encourage the use of transit and active modes of transportation, active transportation infrastructure is proposed throughout and in proximity to the Site as a means to connect the proposed community with the abovementioned transit routes.

As part of the build-out of the Seaton community, the following active transportation improvements are proposed:

- A 3.0 metre bi-directional multi-use path is proposed along the east side of Peter Matthews Drive bordering and in the vicinity of the Site;
- 1.5 metre separated on-street bike lanes are proposed along Alexander Knox Road in both an easterly and westerly direction; and,
- Pedestrian sidewalks and crossings will be constructed throughout the Site to provide adequate connections between residential units and the transit infrastructure noted in **Section 1.6**.

2.0 TRANSPORTATION DEMAND MANAGEMENT

Transportation Demand Management ("TDM") is a series of infrastructure, policy or operational measures designed to discourage peak period, single-occupant automobile travel.

BA Group has confirmed that the following TDM measures will be implemented as part of the development of the P24 Lands.

2.1 Transit Infrastructure

The Site will be served by transit routes operated by Durham Region Transit (DRT) along Alexander Knox Road and Peter Matthews Drive. Far-sided bus stops are planned at signalized intersections along Peter Matthews Drive in both a northerly and southerly direction. The nearest stop is located immediately west of the Site at the Peter Matthews Drive / Doverwood Avenue / Northern Site Access intersection. Near-sided bus stops are planned at signalized intersections along Alexander Knox Road in both an easterly and westerly direction. The nearest stop is located at the Alexander Knox Road / Peter Matthews Drive intersection, approximately a 5-minute walk north of the Site.

2.2 Cycling Infrastructure

Cycling infrastructure is proposed proximate to the Site along area arterial roads. Bordering the Site, 1.5 metre separated on-street bike lanes are proposed along Alexander Knox Road in both an easterly and westerly direction. Furthermore, a 3.0 metre bi-directional multi-use path is proposed along the east side of Peter Matthews Drive bordering and in the vicinity of the Site.

2.3 Pedestrian Infrastructure

Smooth and sufficiently wide sidewalks, street crossings, and detectable signs and signals will be provided throughout the Site to provide adequate connections between residential units and surrounding transit infrastructure.

2.4 Provide Walking, Cycling and Transit Information

To encourage the use of non-auto modes of transportation by residents, the developer will have information available in the sales office on walking routes, trails, cycling and transit (e.g., GO and Durham Transit schedules). This will include information on the extensive trail and bikeway system to be constructed within both the public street network and in the natural heritage lands of Seaton.

3.0 VEHICULAR PARKING

3.1 On-Site Parking

Parking for individual dwellings will be provided in accordance with the City of Pickering's Seaton Area Zoning By-law 7364/14. Excerpts from that by-law area are attached in **Appendix B**.

3.2 On-Street Parking

Drawings PK-01 and PK-02 illustrate the potential on-street parking available in the P24 Lands. The Site has been divided into two areas to determine if any specific zone falls beneath our best practices threshold of 0.25 spaces per residential unit for on-street visitor parking.

The overall parking supply is approximately 0.57 spaces per unit. The overall supply is sufficient, and specific issues that are problematic have not been identified. The subject lands have sufficient on-street parking available to meet the recurring needs of residents and visitors.

4.0 PAVEMENT MARKING AND SIGNAGE PLAN

Drawings TC-01 to TC-02 illustrate proposed pavement markings and signage for the subject lands.

Generally speaking, a minimalist approach to the use of on-street parking signage has been adopted for the P24 Lands. Parking signage has been included on roads that would benefit from defined parking zones, such as arterial roads. Local roads which are not anticipated to have parking issues do not have parking signage. These roads are 8.5 metres in width and can accommodate one-way traffic in the unlikely event that vehicles are parked on both sides of the street. As per the City of Pickering's request, no parking signage has been added along local road segments which have road bends or are identified as fire routes. Should parking issues be identified over time, additional signage could be introduced by the municipality as required.

The majority of intersections are proposed as side-street STOP control. All-way STOP control is proposed at the following intersections as a means to provide improved connectivity and to manage traffic volumes across multiple approaches along Street A:

- Street A & Street C; and,
- Street A & Street B (Southern Intersection).

Full size drawings are attached in **Appendix C**.

5.0 TRAFFIC VOLUMES

The projected future traffic volumes at several area intersections were assessed based upon forecasted vehicular traffic volumes in the vicinity of the Site. Due to the planned phased construction of the area roadway network to align with ongoing area development, the forecast of vehicular volumes and the corresponding assessment of traffic operations were performed under two scenarios, referred to as "ultimate" conditions and "interim" conditions.

Both scenarios were assessed for the weekday morning (AM) and afternoon (PM) peak hours. These analysis periods are appropriate in that they reflect the times on the area road network when traffic volumes are at their greatest.

5.1 Ultimate Conditions

5.1.1 Road Network

The future area road network, as well as corresponding lane configurations and intersection controls in the vicinity of the Site under ultimate conditions are shown in **Figure 4**. Future intersection layouts have been generally assumed in accordance with the 2013 Report and the *Central Pickering Development Plan – Class Environmental Assessment for Regional Services in the City of Pickering* (the "Regional EA").

The major roadways providing access to the Site under ultimate conditions are summarized below. A localized copy of the Regional EA within the vicinity of the Site is attached in **Appendix D**.

Alexander Knox Road

Under ultimate conditions, Alexander Knox Road will function as a major east-west arterial road from Brock Road in the east to York-Durham Line in the west. In the vicinity of the Site, Alexander Knox Road will consist of a four-lane bi-directional road, with dedicated left-turn lanes at area signalized intersections. Additionally, the Alexander Knox Road / Peter Matthews Drive intersection will possess channelized right-turns on all approaches, as shown in **Figure 4**.

Peter Matthews Drive

Under ultimate conditions, Peter Matthews Drive will function as a major north-south arterial road from Rossland Road in the south to Highway 7 in the north. In the vicinity of the Site, Peter Matthews Drive will consist of a four-lane bi-directional road, with dedicated right- and left-turn lanes at select area intersections. The configuration of Peter Matthews Drive in the vicinity of the Site is provided in **Figure 4**. Currently, two access points to the Site are proposed along Peter Matthews Drive, including one fully signalized intersection and one side-street stop-controlled unsignalized intersection.

5.1.2 Study Area and Analysis Periods

An assessment of future traffic operations under ultimate conditions was conducted at key future access locations to the P24 Lands as follows:

- Alexander Knox Road / Peter Matthews Drive;
- Peter Matthews Drive / Doverwood Avenue / Northern Site Access;
- Peter Matthews Drive / Street A (Southern Site Access); and,
- Peter Matthews Drive / Street 16AG.

It is noted that the full build-out of Seaton has already been assessed as part of the 2013 Report, with lane configurations and traffic control addressed further in the subsequent Environmental Assessments. On this basis, the intention of this analysis is to focus specifically on the operations for intersections within the vicinity of the Site with updated lane configurations and traffic controls.

5.1.3 Forecasted Traffic Volumes

As part of the modeling exercise conducted to derive full build-out Seaton traffic volumes, a 20% mode split reduction was applied throughout the entire six-neighbourhood study area. Since the current traffic operations assessment has been conducted with respect to local access to the P24 Lands, it was determined that, in order to produce conservative results and recommendations, it would be appropriate to undo this 20% reduction in the case of trips generated by the P24 Lands.

To reintroduce the additional 20% of traffic volumes removed in the 2013 Report, the projected number of vehicle trips generated by the P24 Lands as of the 2013 Report were first disaggregated. That is, traffic originating from the P24 Lands were isolated from corridor (through) traffic. These volumes represent the base future traffic volumes for the Site. This locally generated traffic was then factored up, in order to undo the 20% mode split reduction, and assigned throughout the area road network.

A summary of the projected full build-out trip generation for the P24 Lands is provided in **Table 2**.

Table 2 Projected Full Build-Out Vehicular Trip Generation – P24 Lands

	AM Peak Hour			PM Peak Hour		
	In	Out	2-Way	In	Out	2-Way
Estimated Site Trip Generation per 2013 Report (with 20% mode split reduction)	20	60	80	65	35	100
Estimated Site Trip Generation (with 20% mode split reduction removed)	25	75	100	80	45	125
Additional Site Trip Generation Associated with Removal of 20% Mode Split Reduction	**5**	**15**	**20**	**15**	**10**	**25**

The base future volumes as detailed in the 2013 Report are illustrated on **Figure 5**, and the future volumes inclusive of the previously removed 20% mode split reduction are illustrated on **Figure 6**. It is noted that some adjustments were made to reflect lane configuration changes from the 2013 Report and the subsequent Environmental Assessment processes. The reassignment of volumes as a result of these changes is illustrated on **Figure 7.** The resulting future total traffic volumes were used as inputs to conduct the ultimate conditions intersection capacity analysis and are illustrated on **Figure 8**.

5.2 Interim Conditions

5.2.1 Road Network

As discussed above, the construction of the roadway infrastructure supporting the development is expected to occur in phases. For the purpose of analysis, it is assumed that external road network infrastructure in the vicinity of the Site assumed to be built under interim conditions are consistent with ultimate conditions, with the exception of:

- The extension of Alexander Knox Road from Collector 1 (a north-south collector road under construction approximately 1 kilometre west of Whites Road) in the east to York Durham Line in the west; and,
- The northern extension of Peter Matthews Drive from Alexander Knox Road in the south to Highway 7 in the north.

Area developments constructed as part of the interim condition of the Seaton community have been generally assumed in accordance with Phase 1 of the SSIS.

The future area road network, as well as corresponding lane configurations and intersection controls in the vicinity of the Site under interim conditions are shown in **Figure 9**.

5.2.2 Forecasted Traffic Volumes

Estimates of future traffic volumes in the vicinity of the Site under interim conditions were derived using the following methodology:

- **Step 1:** Two-thirds of the 2013 Report through volumes were assumed along Alexander Knox Road at the Alexander Knox Road / Peter Matthews Drive intersection and carried along the corridors;
- **Step 2:** Two-thirds of the 2013 Report turning movement volumes were assumed for movements applicable to the interim 3-legged intersection of Alexander Knox Road / Peter Matthews Drive and carried along the corridor;
- **Step 3:** 20% of the 2013 Report through volumes along Peter Matthews Drive at Alexander Knox Road were assumed and redistributed as turning movements (in addition to **Step 2** volumes), representative of the interim buildout of the road terminating at Alexander Knox Road. The 20% factor is a conservative measure which considers both the interim build-out of the Seaton community and the diversion of trips away from the corridor as a result of the interim road network.
- **Step 4:** Future traffic volumes generated by the Parcel 8 development directly west of the Site (628 residential units), as distributed within BA Group's report entitled "*Seaton Parcel 8 Lands – Traffic Sensitivity Analysis*" dated May 10, 2023;
- **Step 5:** Trip generation associated with the proposed P24 Lands. Trip generation rates adopted and summarized in **Table 3** are consistent with those outlined in the 2013 Report and the 9th Edition of the Institute of Transportation Engineers (ITE)'s Trip Generation Manual. It is noted that the ITE's Trip Generation Manual is currently in its 11th Edition, however, the residential trip generation rates presented within the 9th Edition are noted to be generally comparable, albeit, more conservative (i.e. greater) than their 11th Edition equivalents[1]. To maintain consistency with the 2013 Report and to conservatively assess the operations of the Site, the ITE's 9th Edition trip generation rates as summarized in **Table 3** have been adopted for the purposes of analysis. The projected interim Site trip generation is summarized in **Table 4**; and,
- **Step 6:** Site trips distributed and assigned to study area intersections based on the distributions outlined in the 2013 Report for Neighbourhoods 16 and 19 and the interim road network condition.

[1] Trip generation rates for Land Use Code (LUC) 210: Single-Family Detached Housing and LUC 230: Residential Townhouse of the 9th Edition of the ITE's Trip Generation Manual have been compared with their equivalent 11th Edition trip generation rates for LUC 210: Single-Family Detached Housing and LUC 215: Single-Family Attached Housing, respectively.

Table 3 Vehicular Trip Generation Rates

Land Use	AM Peak Hour			PM Peak Hour		
	In	Out	2-Way	In	Out	2-Way
Residential Detached Dwelling (per unit)	0.20	0.57	0.77	0.65	0.37	1.02
Residential Townhouse (per unit)	0.11	0.56	0.67	0.46	0.23	0.69

Table 4 Projected Interim Vehicular Trip Generation – P24 Lands

Land Use	Size	AM Peak Hour			PM Peak Hour		
		In	Out	2-Way	In	Out	2-Way
Residential Detached Dwelling	76 units	15	45	60	50	25	75
Residential Townhouse	28 units	0	15	15	10	5	15
Total	**104 units**	**15**	**60**	**75**	**60**	**30**	**90**

Future background volumes under interim conditions, inclusive of **Steps 1 – 4**, are illustrated on **Figure 10.** Projected Site traffic volumes under interim conditions, inclusive of **Steps 5 – 6**, are illustrated on **Figure 11.** Resulting future total traffic volumes, which were used as inputs to conduct the interim conditions intersection capacity analysis are illustrated on **Figure 12.**

6.0 INTERSECTION CAPACITY ANALYSIS

Traffic operations have been assessed based upon the principles and methodology outlined in the Highway Capacity Manual (HCM) 2000. This analysis has been performed using Trafficware's Synchro 11 software, in accordance with *The Regional Municipality of Durham's Traffic Impact Study Guidelines* (dated October 2011) and Chapter 9 of *The Regional Municipally of Durham's Design Specifications for Traffic Control Devices, Pavement Markings, Signage and Roadside Protection* (dated April 2023).

For signalized intersections, the volume-to-capacity ratio (v/c) is an indicator of the capacity utilization for the key movements in the intersection. A v/c of 1.00 indicates that certain governing traffic movements through the intersection are operating at or near maximum capacity. The primary overall level of service (LOS) indicator is delay, both on individual movements and expressed as an average for all vehicles processed. Many busy urban intersections operate at LOS D to E, which reflects average delays in the range of 35 to 80 seconds.

For unsignalized intersections, level of service (LOS) characterizes operational conditions for key movements in terms of delay within the traffic stream. LOS A represents a good level of service with short delays. LOS F represents a poor level of service with long delays. The volume to capacity ratio (v/c) is an indicator of the capacity utilization for key movements at the intersection and resultant residual capacity potential.

An existing signal timing plan provided by the Region of Durham and attached in **Appendix E** for the intersection of Peter Matthews Drive / Alexander Knox Road has been utilized in the development of future signalized intersections within the vicinity of the Site. Interim and Ultimate future total traffic scenarios include optimized signal phasing and timing parameters to respond to changing traffic conditions as appropriate, whilst maintaining cycle lengths.

Detailed Synchro 11 worksheets are attached in **Appendix F**.

Traffic analysis results for area signalized and unsignalized intersections are discussed in the following sections.

6.1 Traffic Signal Warrant

The intersection of Peter Matthews Drive / Doverwood Avenue / Northern Site Access provides access to the Site and was planned to be signalized as part of the initial planning of Seaton. A traffic signal warrant was conducted based on Ontario Traffic Manual methodologies and is attached in **Appendix G**.

Based on the analysis, as part of the interim condition, a traffic signal is not warranted at the Peter Matthews Drive / Doverwood Avenue / Northern Site Access intersection. While a signal is not warranted, it is recommended that the intersection be constructed as a signalized intersection under interim conditions to support active and transit mobility throughout and adjacent to the Site. It is further recommended that this intersection is monitored as development within the area progresses and that reasonable underground signal related infrastructure be installed during the initial construction of the intersection.

6.2 Peter Matthews Drive / Alexander Knox Road

The results of the traffic operations analysis for the Peter Matthews Drive / Alexander Knox Road signalized intersection are provided in **Table 5**.

Table 5 Peter Matthews Drive / Alexander Knox Road Traffic Operations

Lane Group	Interim Future Total Conditions			Ultimate Future Total Conditions		
	V/C	LOS	Delay (s)	V/C	LOS	Delay (s)
EBL	–			0.28 (0.43)	B (C)	12.5 (27.5)
EBT	0.22 (0.29)	B (B)	12.6 (15.0)	0.27 (0.54)	B (C)	11.2 (25.6)
EBR	0.02 (0.07)	B (B)	11.1 (13.0)	0.01 (0.03)	A (B)	9.2 (19.3)
WBL	0.24 (0.49)	A (A)	6.6 (7.7)	0.29 (0.47)	B (B)	12.5 (14.7)
WBT	0.18 (0.19)	A (A)	6.6 (6.7)	0.30 (0.33)	B (B)	11.4 (14.1)
WBR	–			0.10 (0.06)	A (B)	10.0 (11.7)
NBL	0.18 (0.13)	D (C)	38.4 (34.9)	0.02 (0.16)	D (C)	39.0 (23.2)
NBR	0.14 (0.12)	F (F)	130.4 (108.5)	0.04 (0.08)	E (D)	69.1 (54.1)
NBT	–			0.76 (0.41)	D (C)	39.9 (25.0)
SBL				0.50 (0.67)	C (D)	34.7 (36.2)
SBT				0.34 (0.79)	C (D)	29.7 (35.0)
SBR				0.06 (0.08)	C (C)	27.3 (24.2)
Overall	**0.24 (0.43)**	**C (C)**	**31.3 (22.7)**	**0.45 (0.63)**	**C (C)**	**23.2 (26.4)**

Notes:
1. 00 (00) – AM Peak (PM Peak)

All movements operate at acceptable levels of service and within capacity. The additional traffic generated by the proposed development can be appropriately accommodated at the Peter Matthews Drive / Alexander Knox Road intersection in the interim and ultimate scenarios.

6.3 Peter Matthews Drive / Doverwood Avenue / Northern Site Access

The results of the traffic operations analysis for the Peter Matthews Drive / Doverwood Avenue / Northern Site Access signalized intersection are provided in **Table 6**.

Table 6 Peter Matthews Drive / Doverwood Avenue / Northern Site Access Traffic Operations

Lane Group	Interim Future Total Conditions			Ultimate Future Total Conditions		
	V/C	LOS	Delay (s)	V/C	LOS	Delay (s)
EBL	0.18 (0.12)	D (D)	36.6 (37.5)	0.14 (0.17)	D (C)	35.1 (34.2)
EBTR	0.02 (0.01)	D (D)	35.3 (36.7)	0.16 (0.47)	D (D)	35.3 (37.2)
WBL	0.05 (0.03)	D (D)	35.6 (36.8)	0.03 (--)[2]	C (--)[2]	34.2 (--)[2]
WBTR	0.01 (0.01)	D (D)	35.3 (36.7)	0.07 (0.03)	C (C)	34.5 (33.0)
NBL	0.02 (0.06)	A (A)	7.0 (7.7)	0.23 (0.73)	A (C)	5.1 (31.6)
NBT	0.09 (0.08)	A (A)	7.1 (7.7)	0.31 (0.23)	A (B)	4.9 (12.7)
NBR	--[2] (0.00)	--[2] (A)	--[2] (4.6)	--[2] (0.00)	--[2] (A)	--[2] (6.1)
SBL	0.01 (0.03)	A (A)	3.5 (2.2)	0.01 (0.04)	A (B)	3.6 (10.5)
SBT	0.07 (0.14)	A (A)	3.6 (2.3)	0.16 (0.34)	A (B)	4.0 (15.6)
SBR	0.00 (0.02)	A (A)	5.2 (4.7)	0.06 (0.19)	A (D)	2.7 (48.0)
Overall	**0.11 (0.14)**	**B (A)**	**11.5 (7.2)**	**0.28 (0.67)**	**B (C)**	**10.2 (24.0)**

Notes:
1. 00 (00) – AM Peak (PM Peak)
2. Zero volumes projected for movement

All movements operate at acceptable levels of service and within capacity. The additional traffic generated by the proposed development can be appropriately accommodated at the Peter Matthews Drive / Doverwood Avenue / Northern Site Access intersection in the interim and ultimate scenarios.

6.4 Peter Matthews Drive / Street 16AG

The results of the traffic operations analysis for the Peter Matthews Drive / Street 16AG signalized intersection are provided in **Table 7**.

Table 7 Peter Matthews Drive / Street 16AG Traffic Operations

Lane Group	Interim Future Total Conditions			Ultimate Future Total Conditions		
	V/C	LOS	Delay (s)	V/C	LOS	Delay (s)
EBL	0.07 (0.06)	D (D)	35.4 (37.0)	0.07 (0.06)	D (D)	35.4 (37.0)
EBTR	0.02 (0.01)	C (D)	35.0 (36.7)	0.02 (0.01)	C (D)	35.0 (36.7)
WBL	0.30 (0.20)	D (D)	37.5 (38.2)	0.30 (0.20)	D (D)	37.5 (38.2)
WBTR	0.00 (0.00)	C (D)	34.9 (36.6)	0.00 (0.00)	C (D)	34.9 (36.6)
NBL	0.03 (0.09)	A (A)	5.5 (5.3)	0.04 (0.18)	A (A)	5.6 (6.4)
NBT	0.08 (0.10)	A (A)	5.7 (5.1)	0.35 (0.33)	A (A)	7.3 (6.4)
NBR	0.01 (0.03)	A (A)	5.3 (4.8)	0.01 (0.03)	A (A)	5.3 (4.8)
SBL	0.01 (0.01)	A (A)	9.3 (8.8)	0.01 (0.03)	A (A)	3.6 (8.2)
SBT	0.09 (0.13)	A (A)	9.5 (9.7)	0.26 (0.38)	A (B)	3.8 (11.9)
SBR	0.00 (0.02)	A (A)	5.3 (4.7)	0.00 (0.02)	A (A)	5.3 (4.7)
Overall	**0.13 (0.14)**	**B (B)**	**13.3 (10.2)**	**0.34 (0.35)**	**A (B)**	**8.0 (10.2)**

Notes:
1. 00 (00) – AM Peak (PM Peak)

All movements operate at acceptable levels of service and within capacity. The additional traffic generated by the proposed development can be appropriately accommodated at the Peter Matthews Drive / Street 16AG intersection in the interim and ultimate scenarios.

6.5 Peter Matthews Drive / Street A (Southern Site Access)

The results of the traffic operations analysis for the Peter Matthews Drive / Southern Site Access unsignalized intersection are provided in **Table 8**.

Table 8 Peter Matthews Drive / Street A (Southern Site Access) Traffic Operations

Lane Group	Interim Future Total Conditions			Ultimate Future Total Conditions		
	V/C	LOS	Delay (s)	V/C	LOS	Delay (s)
WBL	0.02 (0.01)	B (B)	11.1 (12.2)	0.03 (0.04)	D (E)	26.9 (35.8)
WBR	0.03 (0.01)	A (A)	9.2 (9.2)	0.06 (0.04)	B (B)	12.0 (11.7)
SBL	0.00 (0.02)	A (A)	7.7 (7.8)	0.02 (0.05)	A (A)	9.8 (9.8)

Notes:
1. 00 (00) – AM Peak (PM Peak)

All movements operate at acceptable levels of service and within capacity. The additional traffic generated by the proposed development can be appropriately accommodated at the Peter Matthews Drive / Street A (Southern Site Access) intersection in the interim and ultimate scenarios.

7.0 RESPONSE TO COMMENTS

City of Pickering Comments, October 18, 2019

Comment 1

Review intersections for proposed Streets 'C' and 'B' where they intersect with Street 'A' as intersecting angles appear to be less than the allowable 70 degree threshold in accordance with City of Pickering Engineering Design Criteria. Also, confirm that the Region of Durham has no concerns with the Street 'A'/Peter Matthews Drive intersection configuration.

Response

The intersection of the Street 'C' (now known as Street 'B') and Street 'A' and the southerly intersection of Street 'B' and Street 'A' have an angle of intersection of 75 degrees and 80 degrees, respectively. Both angles of intersection satisfy the minimum angle of intersection of 75 degrees as per City of Pickering Engineering Design Criteria for Local roads.

Comment 2

If a centerline radius of 12.0 metre was used for the 90 degree elbows, the property rounding radius should maintain consistent offsets based on approved cross-sections for 17.0 metre and 15.5 metre right-of-ways. Clarify why 4.5 metre radii were provided.

Response

The centreline radius at the 90 degree elbows has been revised to a minimum of 13.5m. The property rounding radius at these locations are consistent offset based on the right-of-way width of 17m and 15.35m.

Comment 3

Continue 15.5 metre right-of-way along Street 'A' to intersection of Street 'A' with Street 'B'.

Response

The right-of-way for Street 'A' between two intersections with Street 'B' have been revised to a right-of-way width of 15.35m.

Comment 4

Turning circle at termination of Street 'A' to be revised in accordance with City of Pickering Engineering Design Criteria.

Response

The turning circle at the termination of Street 'A' has been designed as per City of Pickering Engineering Design Standard P-711 with a radius of 13.0m.

City of Pickering Pre-Con Comment, March 19, 2024

Comment 1

Review the angle of Street A at the first bend, and at both intersections with Street B to confirm compliance with the City's geometric design criteria;

Response

The northerly intersection of Street 'B' and Street 'A' and the southerly intersection of Street 'B' and Street 'A' have an angle of intersection of 75 degrees and 80 degrees, respectively. Both angles of intersection satisfy the minimum angle of intersection of 75 degrees as per City of Pickering Engineering Design Criteria for Local roads.

Comment 2

The turning circle design must comply with the City's Engineering Design Guidelines;

Response

The turning circle at the termination of Street 'A' has been designed as per City of Pickering Engineering Design Standard P-711 with a radius of 13.0m.

Comment 3

Submit a Traffic Impact Study (TIS) will be required. There is concern that the proposed 15.35-metre-wide right-of-way is too narrow for traffic circulation and a 17-metre-wide right-of-way is preferred. The submitted traffic study must demonstrate that the Street A and Street B intersection can operate appropriately as proposed. Detail the turning radii at the Street A and Street B intersection on the plans.

Response

The proposed 15.35m right-of-way is a standard City of Pickering cross section that provides an 8.5m pavement with a sidewalk on one side. The 8.5m pavement, which is the same pavement width as in the 17.0m cross section, accommodates two-way traffic and on-street parking on one side. The sidewalk along the sections of 15.35m ROW for Street 'A' has been located on the residential side to provide a provide a protected walkway for pedestrians. In addition, pedestrian crossings as provided at locations where the sidewalk switches sides. At these crossings, pavement markings and signage are provided according OTM Book 15. As such the proposed 15.35 m right-of-way can accommodate the transportation needs of the Site.

8.0 SUMMARY AND CONCLUSIONS

Overview

1. This study examines transportation aspects related to the proposed development of Parcel 24 ("P24 Lands" or the "Site") within residential subdivision SP-2015-05.

2. The Site is located in the vicinity of the Alexander Knox Road / Peter Matthews Drive intersection, south of Alexander Knox Road and east of Peter Matthews Drive. Additionally lands within SP-2015-05, located sparsely throughout Neighbourhoods 18 – Mount Pleasant and 19 – Wilson Meadows of the Seaton community are to be assessed in a subsequent submission.

3. The P24 Lands will include 76 detached dwellings and 28 townhouse dwellings.

4. In May 2013, BA Group completed a transportation planning exercise on behalf of the Seaton Landowners Group and issued a summary report and technical appendix entitled Seaton Transportation Operations Review (the "2013 Report") which examined several transportation-related elements of the entire "full build-out" Seaton community. The conclusions drawn from this report in-part guided the development of the ultimate and interim conditions utilized in this study.

Transportation Demand Management

5. The following Transportation Demand Management ("TDM") measures will be implemented as part of the development of the Site:

    a) The Site will be served by transit routes operated by Durham Region Transit (DRT) along Alexander Knox Road and Peter Matthews Drive in the vicinity of the Site;

    b) A 3.0 metre bi-directional multi-use path along the east of Peter Matthews Drive bordering and in the vicinity of the Site;

    c) 1.5 metre separated on-street bike lanes along Alexander Knox Road in both an easterly and westerly direction;

    d) Pedestrian sidewalks and crossings will be constructed throughout the Site to provide adequate connections between residential units and surrounding transit infrastructure; and,

    e) Provision of information in the sales office on walking routes, trails, cycling and transit.

Vehicular Parking

6. The overall parking supply is approximately 0.57 spaces per unit. The overall supply is sufficient, and specific issues that are problematic have not been identified. The subject lands have sufficient on-street parking available to meet the recurring needs of residents and visitors.

Traffic Volumes – Ultimate Conditions

7. Future intersection layouts have been generally assumed in accordance with the 2013 Report and the *Central Pickering Development Plan – Class Environmental Assessment for Regional Services in the City of Pickering* (the "Regional EA").

8. The full build-out of Seaton has already been assessed as part of the 2013 Report, with lane configurations and traffic control addressed further in the subsequent Environmental Assessments. On this basis, the intention of the ultimate analysis is to focus specifically on the operations for intersections within the vicinity of the Site with updated lane configurations and traffic controls.

9. Traffic forecasts used in the evaluation of future intersection operations were based on projections obtained from future total volumes outlined in the 2013 Report.

10. As part of the modeling exercise conducted to derive full build-out Seaton traffic volumes, a 20% mode split reduction was applied throughout the entire six-neighbourhood study area. Since the current traffic operations assessment has been conducted with respect to local access to the P24 Lands, it was determined that, in order to produce conservative results and recommendations, it would be appropriate to undo this 20% reduction in the case of trips generated by the P24 Lands.

11. Removal of the 20% mode split reduction for the Site resulted in an estimated 20 and 25 additional two-way trips generated by the P24 Lands during the morning and afternoon peak hours, respectively.

Traffic Volumes – Interim Conditions

12. The construction of the roadway infrastructure supporting the development is expected to occur in phases.

13. For the purposes of analysis, it is assumed that external road network infrastructure in the vicinity of the Site assumed to be built under interim conditions are consistent with ultimate conditions, with the exception of:

    a) The extension of Alexander Knox Road from Collector 1 (a north-south collector road under construction approximately 1 kilometre west of Whites Road) in the east to York Durham Line in the west; and,

    b) The northern extension of Peter Matthews Drive from Alexander Knox Road in the south to Highway 7 in the north.

14. Area developments constructed as part of the interim condition of the Seaton community have been generally assumed in accordance with Phase 1 of the Region of Durham's *Staged Servicing and Implementation Strategy* (the "SSIS").

15. Traffic forecasts used in the evaluation of future intersection operations were based on projections obtained from future total volumes outlined in the 2013 Report and utilized under ultimate conditions with some additional adjustments made to represent interim conditions.

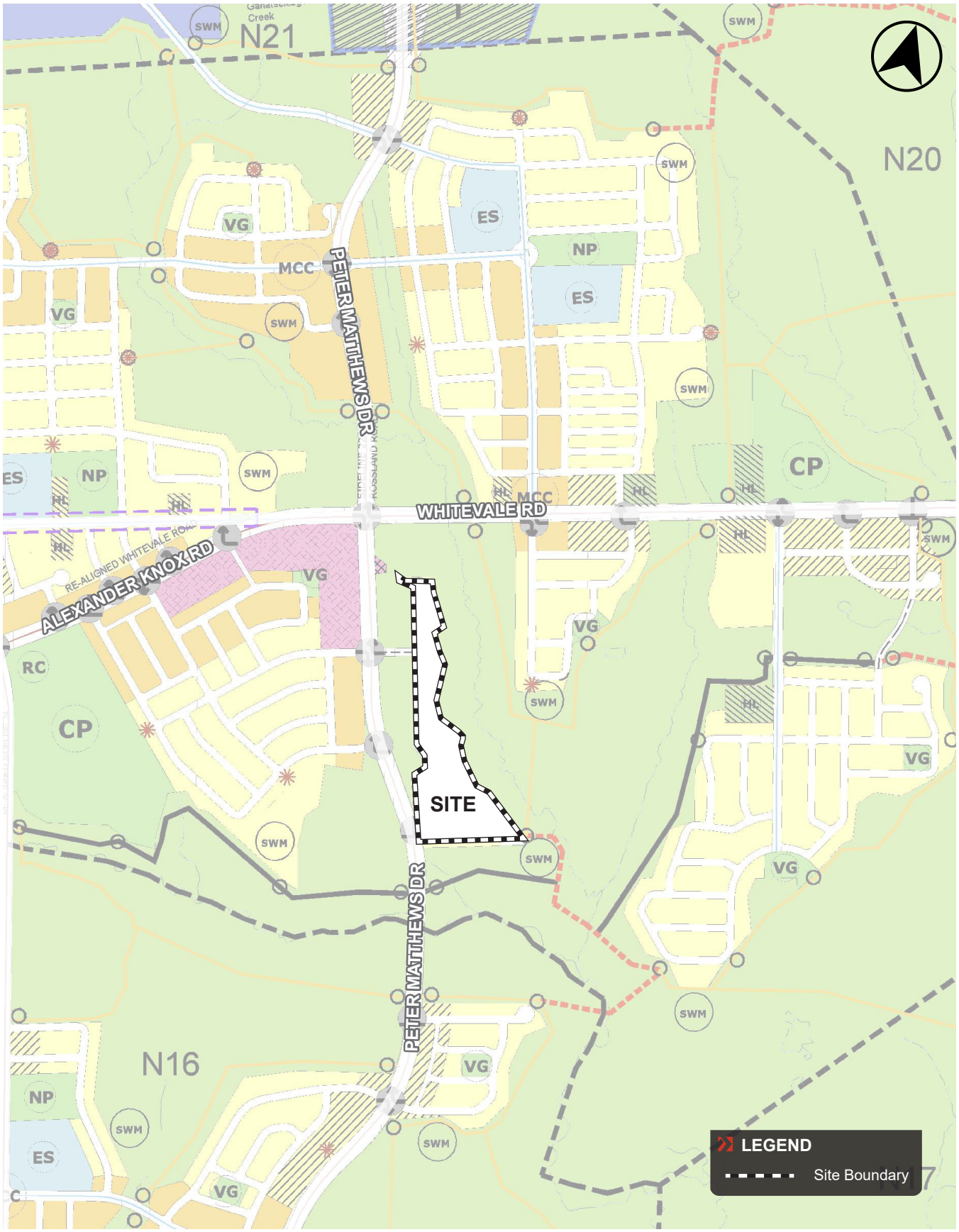
16. Under these conditions, the P24 Lands are projected to generate in the order of 75 and 90 two-way vehicular trips during the morning and afternoon peak hours, respectively.

Traffic Operations

17. A capacity analysis has been completed using the principles and methodologies outlined in the Highway Capacity Manual (HCM) 2000 and Trafficware's Synchro 11 software for intersections within the study area.

18. The results of the traffic operations analysis indicates that all intersections within the study area operate at acceptable levels of service and within capacity under interim and ultimate conditions.

Appendix A:
Figures



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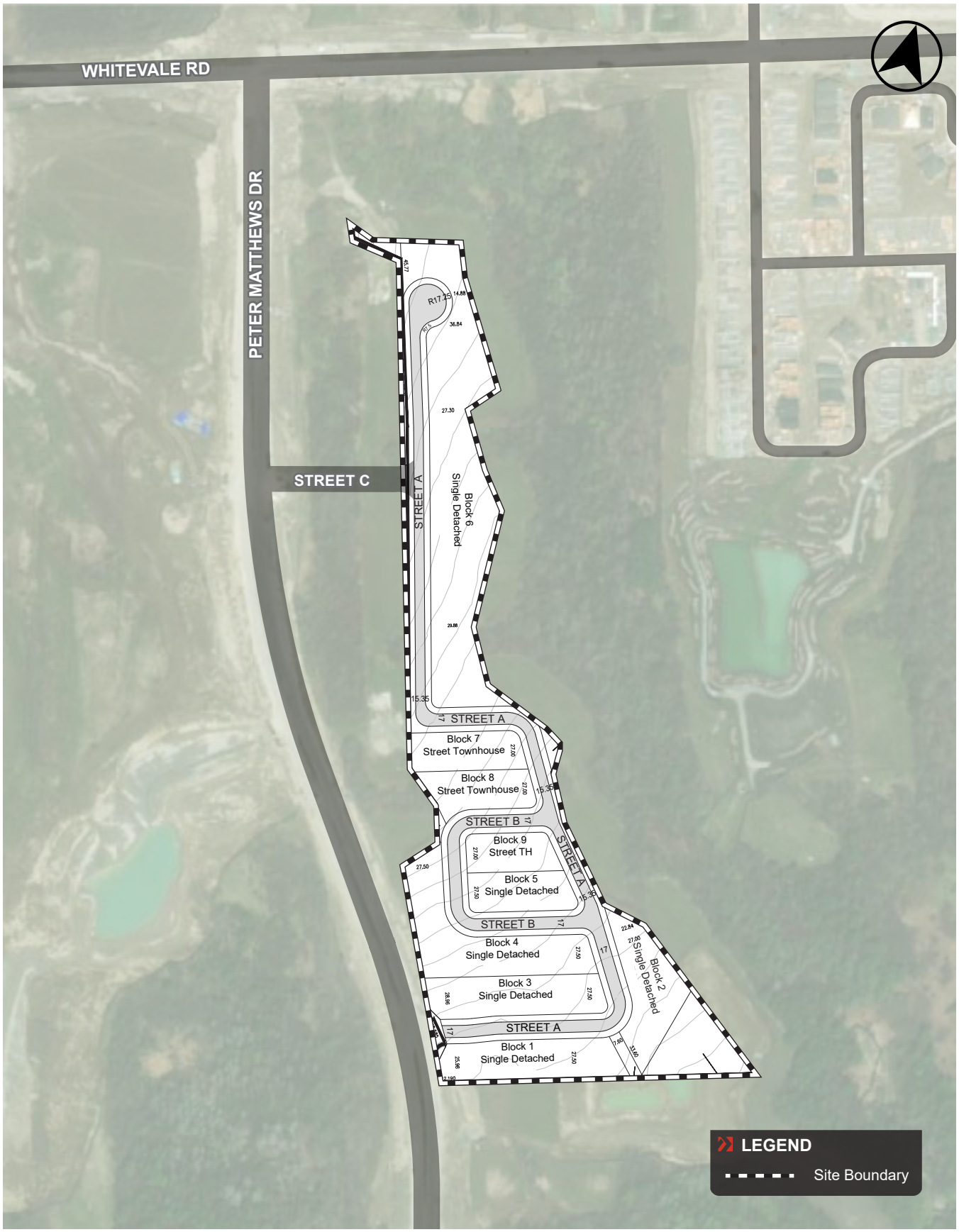
Aerial maps provided courtesy of: Esri, DigitalGlobe, GeoEye, Earthstar Geographies, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, the GIS User Community and/or Google Earth/Maps.

FIGURE 1 SITE LOCATION



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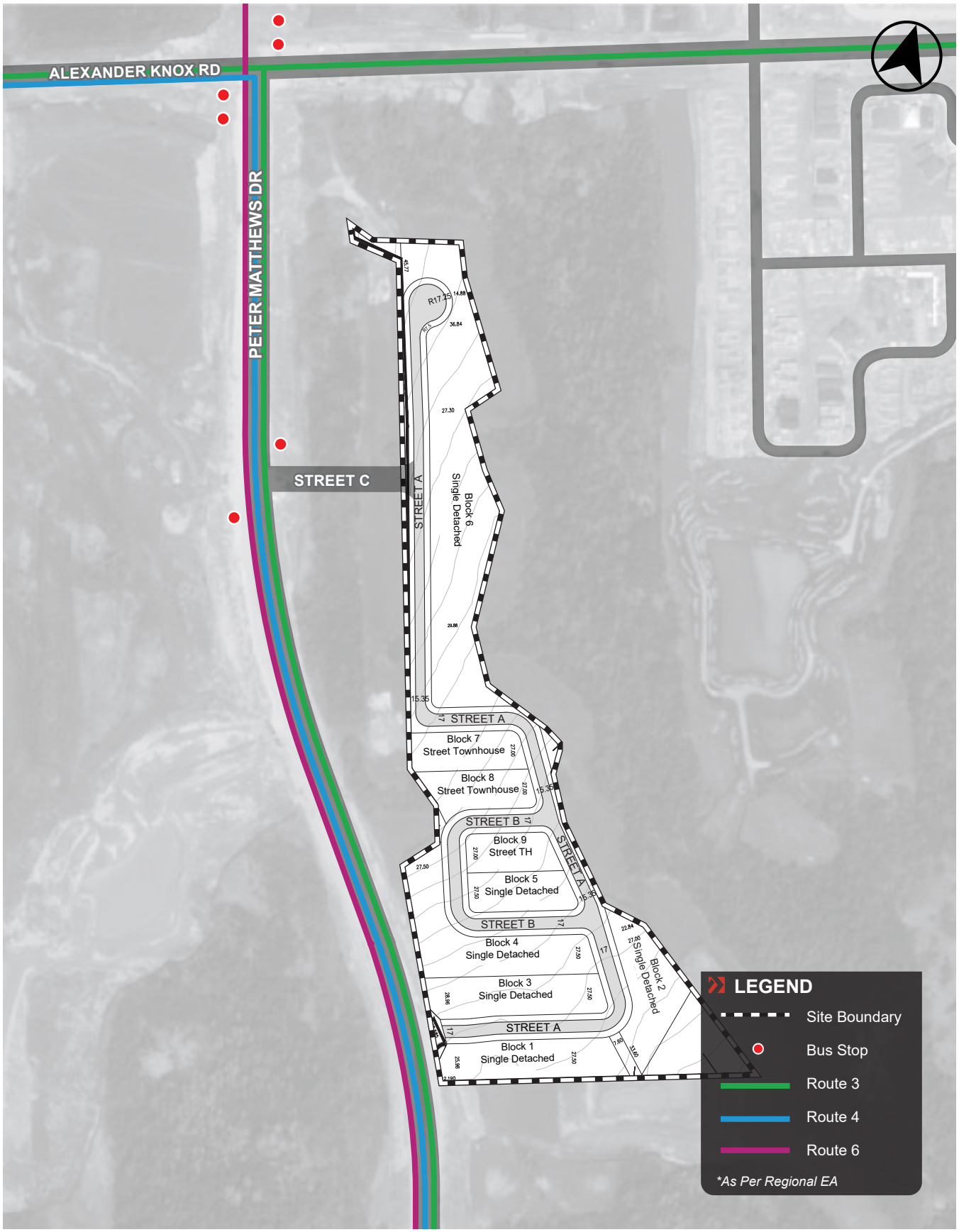
Aerial maps provided courtesy of: Esri, DigitalGlobe, GeoEye, Earthstar Geographies, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, the GIS User Community and/or Google Earth/Maps.

FIGURE 2 DRAFT PLAN



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Aerial maps provided courtesy of: Esri, DigitalGlobe, GeoEye, Earthstar Geographies, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, the GIS User Community and/or Google Earth/Maps.

FIGURE 3 PLANNED TRANSIT NETWORK

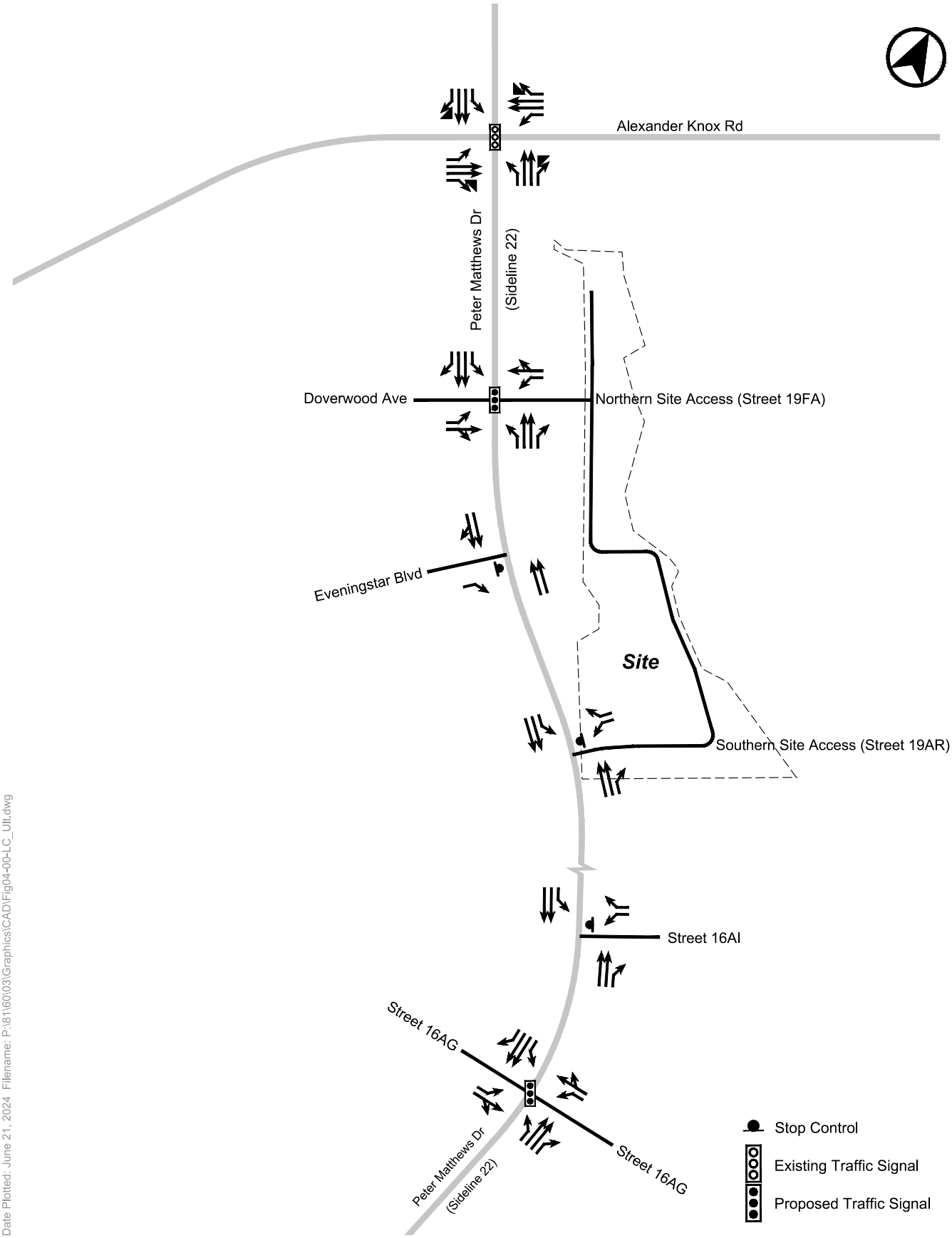

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FIGURE 4 ROAD NETWORK - ULTIMATE CONFIGURATION

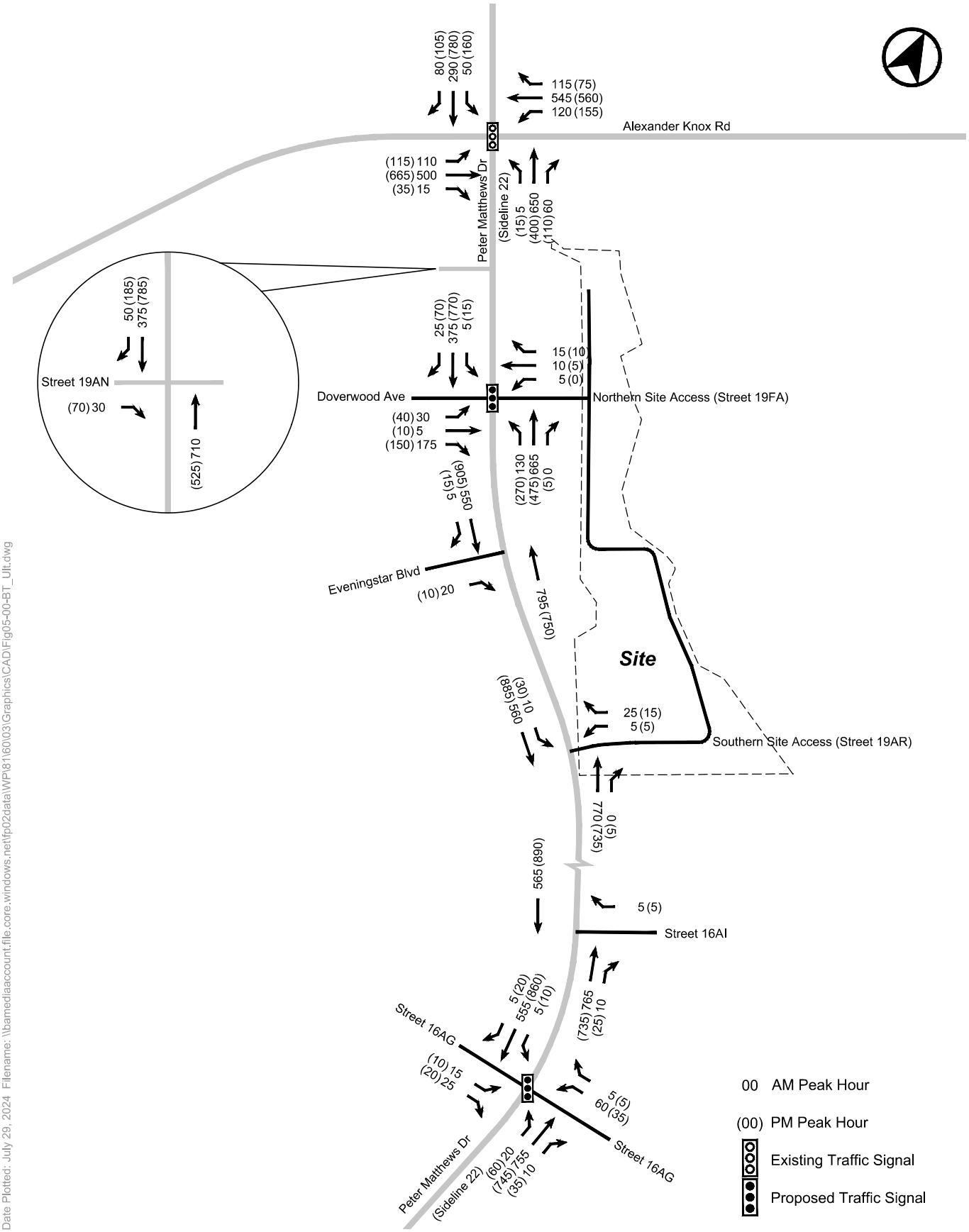

FIGURE 5 BASE TRAFFIC VOLUMES - ULTIMATE CONFIGURATION

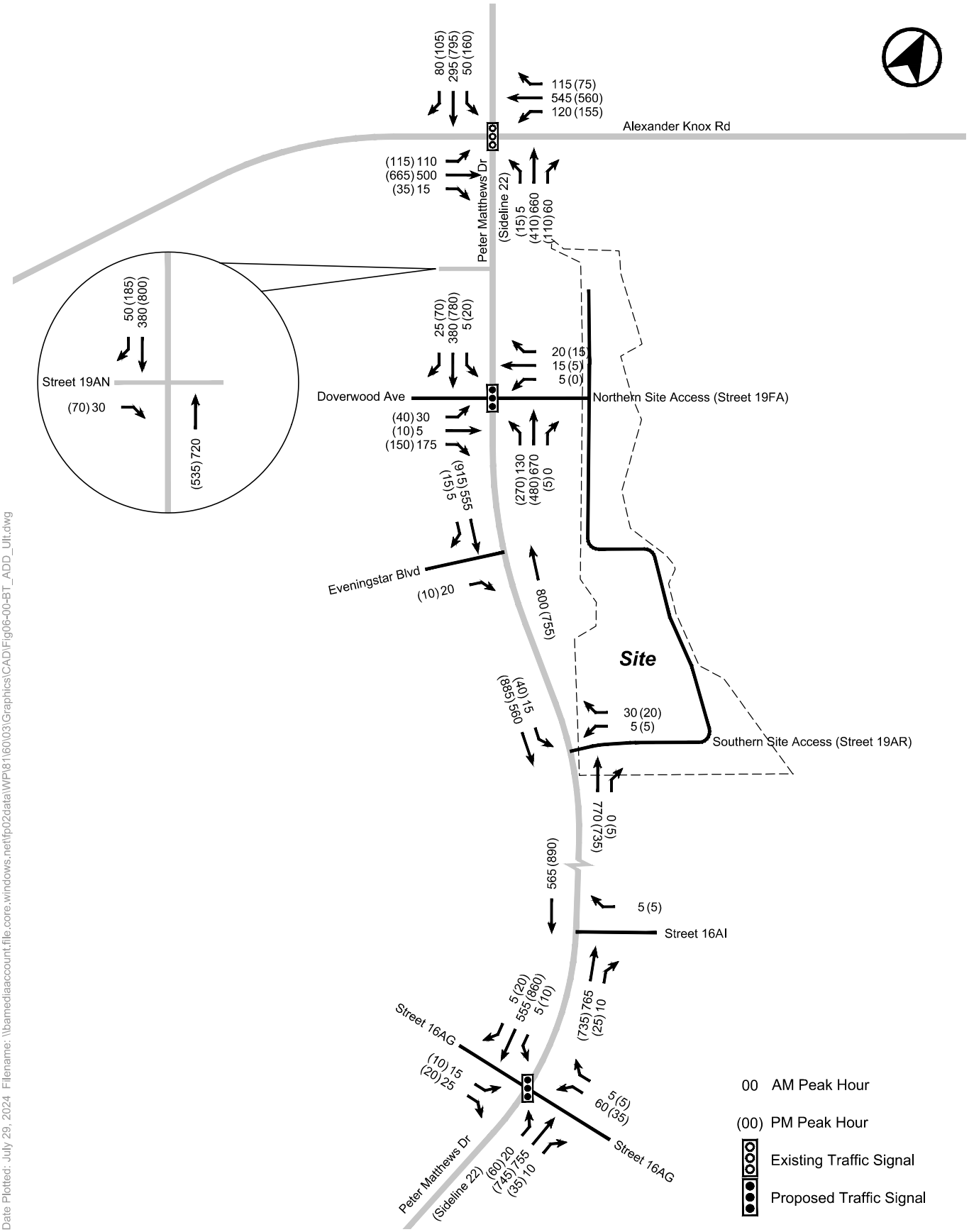

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FIGURE 6 BASE TRAFFIC VOLUMES AND RE-ADDITION OF 20% REDUCTION - ULTIMATE CONDITIONS

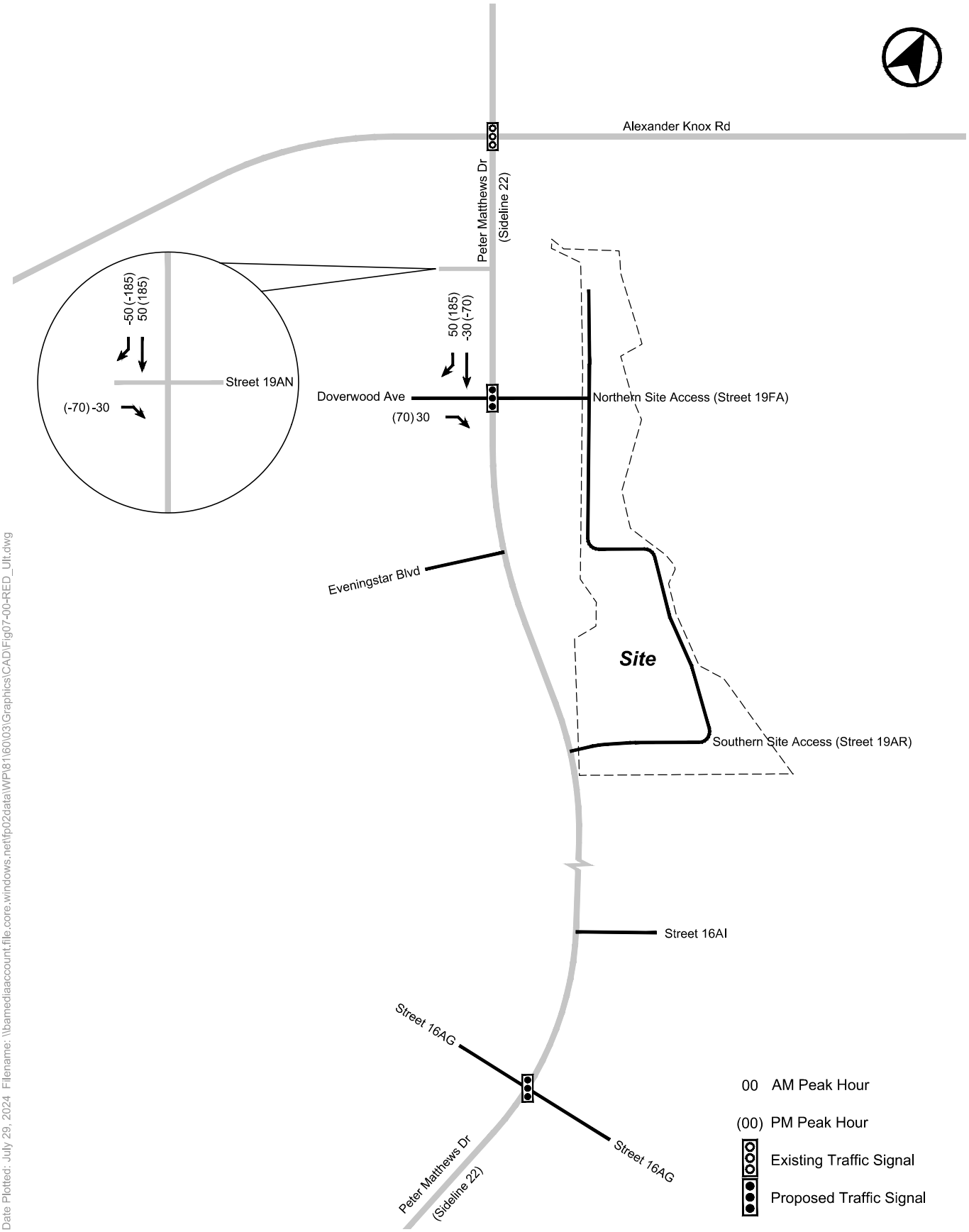

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FIGURE 7 STREET 19AN TRAFFIC VOLUMES REDISTRIBUTION - ULTIMATE CONDITIONS

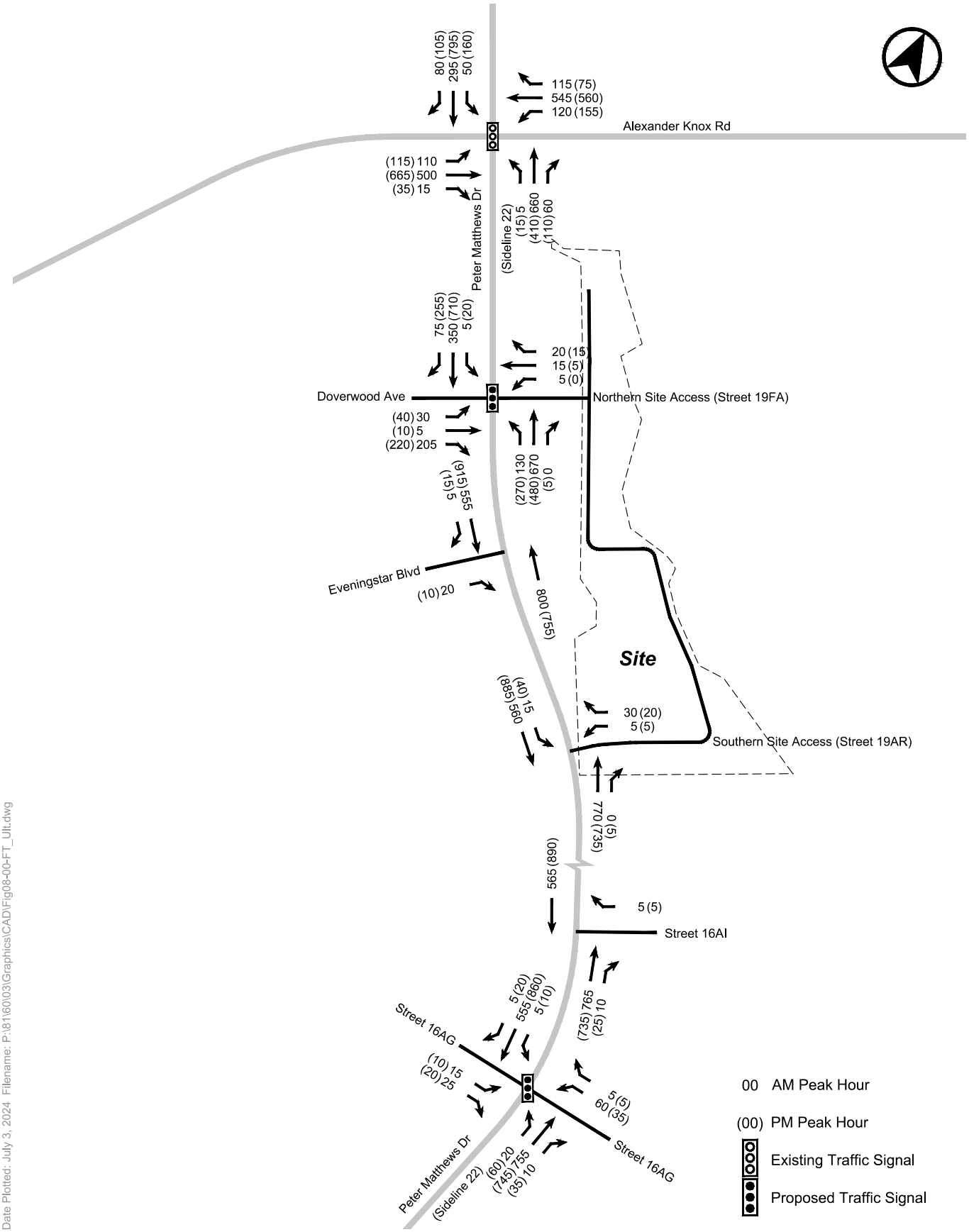

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FIGURE 8 FUTURE TRAFFIC VOLUMES - ULTIMATE CONDITIONS

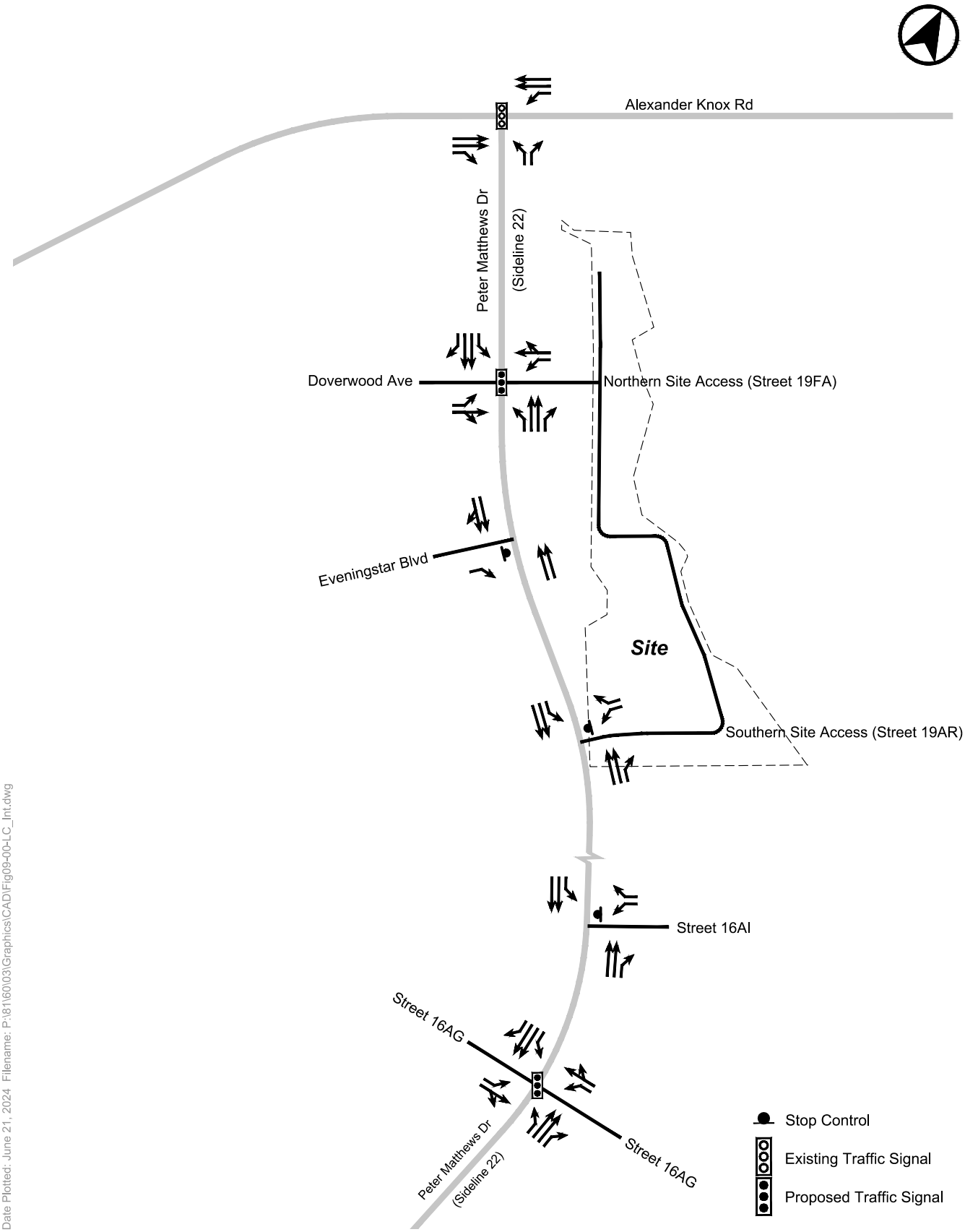

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FIGURE 9 ROAD NETWORK - INTERIM CONFIGURATION

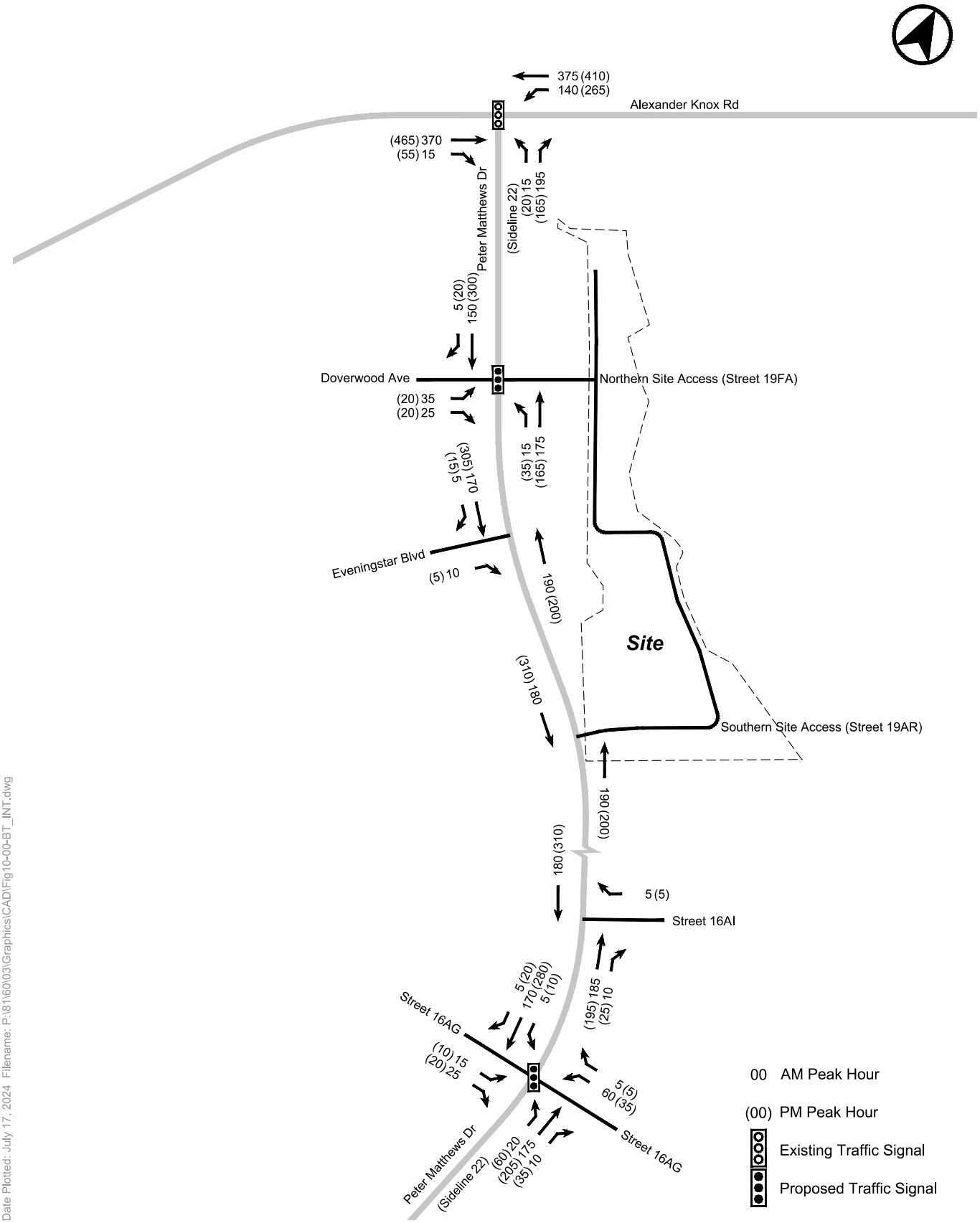

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FIGURE 10 BASE TRAFFIC VOLUMES - INTERIM CONDITIONS

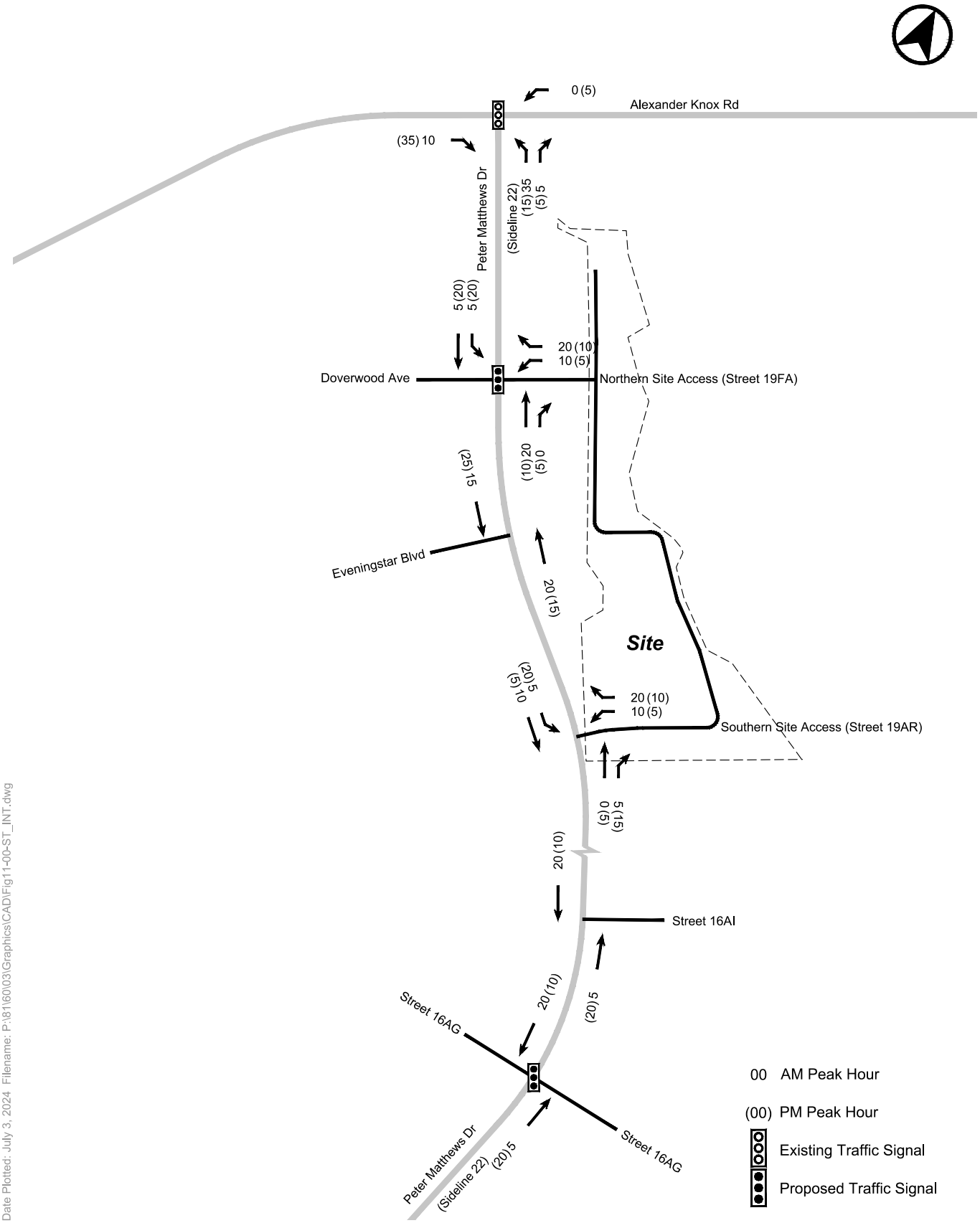

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FIGURE 11 SITE TRAFFIC VOLUMES - INTERIM CONDITIONS

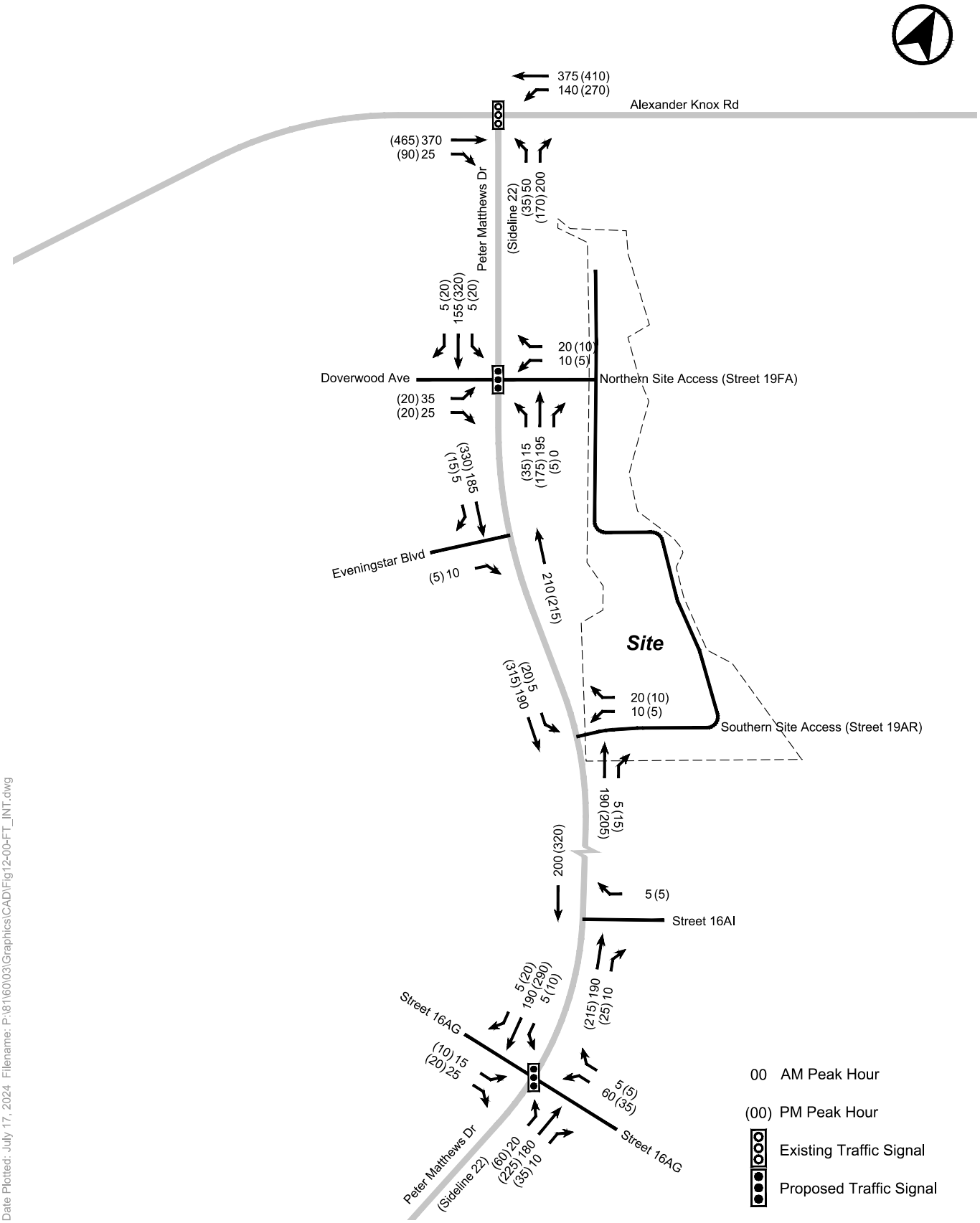

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FIGURE 12 FUTURE TRAFFIC VOLUMES - INTERIM CONDITIONS

Appendix B:
City of Pickering Zoning By-law 7364/14

December 2, 2013

The Corporation of the City of Pickering

Zoning By-law 7364/14

Seaton Zoning By-law

Approved by Ontario Municipal Board Decisions dated:
December 17, 2013, and
January 24, 2014

Ontario Municipal Board Decisions Confirmed
By Order in Council 470/2014 dated March 26, 2014

h) External changes or alterations required for or relating to a *home-based business,* which would change the overall residential character of the *dwelling,* are not permitted.

i) Despite the uses prohibited in a *home-based business* as specified in Section 2.14 b), the selling of products assembled or developed on the premises is a permitted use in a *home-based business*, and the sale and distribution of catalogue items is a permitted use in a *home-based business* provided that no catalogue items are stored on the premises.

2.15 *Accessory Buildings* and *Structures*

a) *Accessory buildings* and *structures* are permitted on a *lot* where a *principal building* housing a principal permitted use, already exists or is under construction.

b) Except as may be provided *herein*, *accessory buildings* and *structures* are only permitted to be *erected* in the *rear yard*.

c) *Elementary school* or *secondary school* class room portables may be permitted within an *interior side yard* subject to an approved site plan.

d) *Accessory buildings* and *accessory structures* must be set back a minimum of 1.2 metres from all *lot lines* except that the *setback* from the interior *side lot line* may be reduced to 0.6 metres if there are no doors or windows on the wall facing the interior *side lot line*.

e) No *accessory building* shall exceed a *building height* of 3.5 metres except for:

   i) *elementary school* or *secondary school* class room portables, which shall not exceed a *building height* of 4.5 metres; and

   ii) a detached *private garage,* which for a flat roof shall not exceed a *building height* of 3.5 metres and for a pitched roof shall not exceed a *building height* of 4.5 metres.

f) The total *lot coverage* of all *accessory buildings,* excluding detached *private garages*, shall not exceed 5 percent of the *lot area*. Where a detached *private garage* is also provided on the *lot*, the total *lot coverage* of all *accessory buildings* and detached *private garages* shall not exceed 15 percent of the *lot area*. Where *elementary school* or *secondary school* class room portables are provided, the total *lot coverage* of all *accessory buildings* shall not exceed 15 percent of the *lot area.*

g) Human Habitation is not permitted in an *accessory building or accessory structure* except for a *coach house*.

2.16 Standards for Detached Private Garages Accessed by a *Driveway* from a *Street*

Detached *private garages* associated with a residential use that are accessed only by a *driveway* from a *street* are subject to the following requirements.

a) Permitted locations and *setbacks* from *lot lines*:

Detached *private garages* accessed only by a *private driveway* from a *street* shall be located:

i) a minimum distance from an exterior lot line equal to the *flankage yard* requirement for the *main building*;

ii) a minimum of 1.2 metres from the interior *side lot line*, but notwithstanding this provision:

A) the *setback* from the interior *side lot line* may be reduced to 0.6 metres if there are no doors or windows on the wall facing the interior *side lot line*; and

B) a detached *private garage* may share a common wall with another detached *private garage* on an abutting *lot* and no *setback* from the interior *side lot line* is required on that side of the *lot*.

iii) a minimum of 0.6 metres from the *rear lot line* except on a *through lot* in which case Section 2.16 a) iv) applies;

iv) no closer than 6.0 metres to the *lot line* abutting the *street* where the wall of the *private garage* containing the opening for vehicular access faces the *lot line* abutting the *street*;

v) where the *private garage* faces the *front lot line*, no closer than 2.0 metres to the *main building* on the *lot* other than a *private garage* connected to the *main building* by an enclosed or covered walkway.

vi) where the *private garage* faces the *rear lot line* on a *through lot*, no closer than 5.0 metres to the *main building* on the *lot*. The parking of *motor vehicles* is not permitted between the *private garage* and the *main building*.

b) *Driveway* width:

i) The maximum *driveway* width accessed from a *street* abutting the *front lot line* shall:

A) for *lots* having a *lot frontage* of less than 15.0 metres, be no more than 6.0 metres and tapered so that the maximum width is 3.0 metres at the *street line*;

B) for *lots* having a *lot frontage* between 15.0 metres and less than 18.0 metres, be no more than 6.0 metres;

C) for *lots* greater than 18.0 metres, be no wider than the width of the garage door and tapered so that the maximum width is 6.0 metres at the *street line*; and

ii) The maximum *driveway* width accessed from a *street* abutting the *rear lot line* on a *through lot* shall:

A) for *lots* having a *lot frontage* of less 6.0 metres, be no more than 3.0 metres;

B) for *lots* having a *lot frontage* between 6.0 and 9.0 metres, be no more than 4.6 metres;

C) for *lots* between 9.0 metres and less than 15.0 metres, be no more than 6.0 metres;

D) for *lots* greater than 15.0 metres, be no more than 9.0 metres and tapered so that the maximum width is 6.0 metres at the *street line*.

c) Garage door width:

The total width of all garage doors shall be no wider than the permitted width of the *driveway*.

2.17 Standards for Detached Private Garages Accessed by a Lane

Detached *private garages* associated with residential uses that are accessed only by a *lane* are subject to the following requirements.

a) Permitted locations and *setbacks* from *lot lines:*

Detached *private garages* are permitted in a *rear yard* and *interior side yard* only, and shall be located:

i) a minimum distance of 0.6 metres from the *rear lot line*; and

ii) a minimum of 1.2 metres from the interior *side lot line*, but notwithstanding this provision:

A) the *setback* from the interior *side lot line* may be reduced to 0.6 metres if there are no doors or windows on the wall facing the *interior side lot line*; and,

B) a detached *private garage* may share a common wall with another detached *private garage* on an abutting *lot* and no *setback* from the *interior side lot line* is required on that side of the *lot*.

iii) no closer than 5.0 metres to the *main building* on the *lot*. The parking of *motor vehicles* is not permitted in the *setback* area.

b) *Driveway* width:

The maximum *driveway* width that faces a *lane* shall be no wider than the total width of all garage doors.

2.18 Standards for Attached Private Garages on Lots Accessed by Lanes

Attached *private garages* associated with a residential use that are only accessed by a *lane* are subject to the following requirements.

a) Permitted locations and *setbacks* from *lot lines*:

Attached *private garages*, which are deemed to be part of the *main building* on the *lot*, are permitted provided that the wall of the *private garage* facing the *lane*:

i) is located no further than 7.5 metres from the *rear lot line*; and,

ii) is located no closer than 0.6 metres to the *rear lot line*.

b) *Driveway* width:

The maximum *driveway* width that faces a *lane* shall be no wider than the total width of all garage doors.

2.19 Standards for Attached Private Garages Accessed by a Driveway from a Street

Attached *private garages* associated with a residential use that are accessed only by a *driveway* from a *street* are subject to the following requirements.

a) Permitted locations and *setbacks* from *lot lines:*

Attached *private garages* accessed only by a *driveway* from a *street* shall be located:

i) a minimum distance from a *side lot line* equal to the minimum *side yard* requirement for the *main building*;

ii) no closer than 6.0 metres to the *lot line* abutting the *street* where the wall of the *private garage* containing the opening for vehicular access faces the *lot line* abutting the *street;* and

iii) no closer than 3.0 metres to the *lot line* abutting the *street* where the wall of the *private garage* containing the opening for vehicular access faces an *interior side lot line.*

b) Projections of *private garages*:

No part of a *private garage* shall project beyond the *front wall* of the *first storey* of the *dwelling* except:

i) where a *porch* is provided, in which case the *private garage* shall not project beyond the front of the *porch*; and

ii) on a *corner lot* where the wall of the *dwelling* facing the *flankage lot line* is treated as the *front wall* of the *dwelling* and the *private garage* projects no more than 1.5 metres beyond the remainder of the wall facing the *front lot line*; and

iii) where the wall of the *private garage* containing the opening for vehicular access faces an *interior side lot line*.

c) *Driveway* width:

The maximum *driveway* width shall:

i) for *lots* having a *lot frontage* of less than 9.0 metres, be no more than 3.0 metres;

ii) for *lots* having a *lot frontage* between 9.0 metres and less than 11.0 metres, be no more than 4.6 metres;

iii) for *lots* between 11.0 metres and less than 18.0 metres, be no more than 6.0 metres;

iv) for *lots* greater than 18.0 metres, be no wider than the width of the garage door and tapered so that the maximum width is 6.0 metres at the *street line*; and

v) for lots greater than 15.0 metres, where the wall of a *private garage* containing the opening for vehicular access faces an *interior side lot line,* be no wider than 7.5 metres and tapered so that the maximum width is 6.0 metres at the *street line*.

d) Garage door width:

The total width of all garage doors shall be no wider than the permitted width of the *driveway*.

2.20 Coach Houses

A *coach house* shall be permitted on a *corner lot* with a *lot frontage* of 10.0 metres or greater where the *corner lot* has access to a rear *lane* or on a *through lot* with a *lot frontage* of 10.0 metres or greater provided there is not an *accessory dwelling unit* in the *detached*, *semi-detached* or *street townhouse dwelling* and provided the *coach house*:

a) is located a minimum distance of 0.6 metres from the *rear lot line*;

b) is located a minimum of 1.2 metres from the interior *side lot line*;

c) is *setback* a minimum of 5.0 metres from the *main building* on the *lot*. The parking of *motor vehicles* is not permitted in the *setback* area; and

d) has a maximum *height* of 8.0 metres.

2.21 Live Work Unit

a) The following specific uses are permitted in a *live work unit*:

i) *dwelling unit;*
ii) *art gallery*;
iii) *café;*
iv) *restaurant*;
v) *medical office*;
vi) *convenience store*;
vii) *dry-cleaner's distribution station*;
viii) *office*;
ix) *personal service establishment*; and
x) *retail store*.

2.22 Model Homes

a) Up to 10 percent of the homes proposed in a plan of subdivision to a maximum of 20 *model homes* together with not fewer than two parking spaces per may be constructed on each draft plan of subdivision submitted to the City of Pickering, prior to registration of that plan of subdivision.

2.23 Lots on Public and Private Streets

Where the *lot* and *setback* requirements in a zone apply to freehold *lots* abutting a *street*, such provisions shall equally apply to freehold *lots* abutting a *private street*.

2.24 Yards abutting Daylighting Triangles

a) Where a lot abuts a *daylighting triangle*, the *setback* provisions and minimum *front landscaped open space* provisions shall be measured as if the *daylighting triangle* did not exist provided all *buildings* are setback 0.6 metres from the *daylighting triangle* with the exception of window sills, belt courses, cornices, eaves, and eave troughs which may project to within 0.3 metres of the *daylighting triangle*.

2.25 Primary Entrance Door Location on a Through Lot

For a detached dwelling, *semi-detached dwelling*, *street townhouse dwelling*, or *duplex dwelling* on a *through lot*, the *primary entrance door* shall face or nearly face the *front lot line* or in the case of a *corner lot* the *flankage lot line*.

3.0 Parking Regulations

3.1 Parking Space Requirements

Every *building* or *structure erected*, enlarged or *used* in accordance with the provisions of this By-law shall be provided with the minimum required number of *parking space*s specified in Table 1 on the same *lot*.

Table 1: Minimum Parking Requirements

Residential Uses	
Detached dwelling	2 spaces per dwelling unit
Semi-detached dwelling	2 spaces per dwelling unit
Accessory dwelling unit	1 space per dwelling unit
Street townhouse dwelling	2 spaces per dwelling unit
Duplex dwelling	2 spaces per dwelling unit
Multiple attached dwelling	1.25 spaces per dwelling unit for residents and 0.25 of a space per dwelling unit for visitors
Block townhouse dwelling	2 spaces per dwelling unit plus 0.25 of a space per dwelling unit for visitors
Back-to-back townhouse dwelling	2 spaces per dwelling unit
Apartment dwelling	1.25 spaces per dwelling unit for residents and 0.25 of a space per dwelling unit for visitors
Live work unit	2 spaces per live work unit
Bed and Breakfast establishment	2 spaces per dwelling unit plus 1.0 parking space per guest room
Retirement Home	0.3 spaces per living unit for residents and 0.05 spaces per living unit for visitors
Nursing Home or Long-Term Care	1.0 spaces per 3 resident bed
Commercial Uses:	
Animal Care Establishment	4.5 spaces per 100 square metres of gross leasable floor area
Arena	1.0 space per 4 fixed seats, but where permanent fixed seating is open-style bench or pew, each 0.5 metres of bench or pew space is equal to one (1) seat for the purpose of calculating required parking
Art Gallery	4.0 spaces per 100 square metres of gross leasable floor area
Assembly Hall, Convention Hall or Conference Hall	10.0 spaces per 100 square metres of gross leasable floor area
Bake Shop	6.0 spaces per 100 square metres of gross leasable floor area

Commercial Uses: (continued)	
Café	6.0 spaces per 100 square metres of gross leasable floor area
Car Washing E*stablishment*	4.5 spaces per 100 square metres of gross leasable floor area
Commercial Fitness/Recreation Centre	5.0 spaces per 100 square metres of gross leasable floor area
Commercial School	4.5 spaces per 100 square metres of gross leasable floor area
Convenience Store	4.5 spaces per 100 square metres of gross leasable floor area
Day Care Centre	3.5 spaces per 100 square metres of gross leasable floor area
Dry-Cleaner's Distributing Station	4.5 spaces per 100 square metres of gross leasable floor area
Financial Institution	5.0 spaces per 100 square metres of gross leasable floor area
Funeral Home	5.5 spaces per 100 square metres of gross leasable floor area
Garden Centre	3.2 spaces per 100 square metres of gross leasable floor area for retail sales and display of products and/or office; and 1.1 spaces per 100 square metres of gross leasable floor area for warehousing and/or wholesaling
Gas bar, including an Accessory Convenience Store and/or C*afé*	4.5 spaces per 100 square metres of gross leasable floor area
Home Improvement Centre	3.0 spaces per 100 square metres of gross leasable floor area
Hotel	1.0 space per guest room; plus 10.0 spaces per 100 square metres non-residential gross floor area used for public use including meeting rooms, conference rooms, recreational facilities, dining and lounge areas and other commercial facilities, but excluding bedrooms, kitchens, laundry rooms, washrooms, lobbies, hallways, elevators, stairways and recreational facilities directly related to the function of the overnight accommodation
Medical Office	6.5 spaces per 100 square metres of gross leasable floor area
Nightclub and *Tavern/Bar/Pub*	10.0 spaces per 100 square metres of gross leasable floor area
Office	3.5 spaces per 100 square metres of gross leasable floor area
Personal Service Establishment	5.0 spaces per 100 square metres of gross leasable floor area

Commercial Uses: (continued)	
Place of Amusement other than a bowling alley	5.5 spaces per 100 square metres of gross leasable floor area
Place of Worship	1.0 space per 5 fixed seats or 4.0 metres of bench space, or 10.0 spaces per 100 square metres of gross leasable floor area of assembly floor area whichever is the greater
Private Club	5.0 spaces per 100 square metres of gross leasable floor area
Retail Store	4.5 spaces per 100 square metres of gross leasable floor area
Restaurant	6.0 spaces per 100 square metres of gross leasable floor area
Service and Repair Shop (non-vehicle)	4.5 spaces per 100 square metres of gross leasable floor area
Supermarket	5.0 spaces per 100 square metres of gross leasable floor area
Vehicle Dealership	3.0 spaces per 100 square metres of gross leasable floor area
Vehicle Repair Shop	4 spaces per repair bay
Veterinary Clinic	4.5 spaces per 100 square metres of gross leasable floor area
Industrial Uses	
Ancillary retail sales	3.5 spaces per 100 square metres of gross leasable floor area
Business services: such as industrial supply, industrial equipment repair, contractor shop, service and repair shop	3.5 spaces per 100 square metres of gross leasable floor area
Data and communications: such as film, radio and television studio, call centre, data centre, programming and software development, phone, phone and internet provider	3.5 spaces per 100 square metres of gross leasable floor area
Educational: such as community college, university, trade school, training centre, adult education	15 spaces per classroom
Food processing: such as industrial bakery, dairy, cannery, distillery, brewery, meat processor	1.0 space per 100 square metres of gross leasable floor area up to 3,000 square metres of gross leasable floor area plus 0.5 spaces per 100 square metres of gross leasable floor area over 3,000 square metres of gross leasable floor area
Graphics and design: such as printing, publishing, graphic design, web design	3.5 spaces per 100 square metres of gross leasable floor area

Industrial Uses: (continued)	
Light manufacturing: such as assembly, processing, packaging and fabricating wholly within an enclosed building	1.0 space per 100 square metres of gross leasable floor area up to 3,000 square metres of gross leasable floor area plus 0.5 spaces per 100 square metres of gross leasable floor area over 3,000 square metres of gross leasable floor area
Research/laboratory and research and development facility	3.5 spaces per 100 square metres of gross leasable floor area
Storage and warehousing as an accessory use	1.0 space per 100 square metres of gross leasable floor area up to 2,000 square metres of gross leasable floor area plus 0.5 spaces per 100 square metres of gross leasable floor area over 2,000 square metres of gross leasable floor area
Community/Open Space Uses	
Community Centre	1 space per 4 persons capacity or 3.5 spaces per 100 square metres of gross leasable floor area, whichever is greater
Community Gardens	1 space per garden plot
Curling rinks, tennis courts, bowling alleys or similar recreational facilities	4 spaces per ice sheet, court or lane or similar recreational facility provided that, where facilities for a *tavern/bar/pub* or *assembly hall* are provided, the greater parking requirement for either the recreational facilities or for the assembly floor area shall apply
Emergency Service Facility	3.5 spaces per 100 square metres of gross floor area
Elementary School	1.5 spaces per classroom plus day care centre requirements if applicable
Golf Course	50 spaces for every 9 holes
Library	3.0 spaces per 100 square metres of gross leasable floor area
Private School	3 spaces per classroom
Secondary School	3 spaces per classroom

3.2 Part Spaces

Where *parking spaces* are calculated by *gross floor area*, or similar calculation, and the required parking is a fraction, the number of *parking spaces* shall be rounded up to the nearest whole number.

3.3 Parking for Multiple Uses on One Lot

a) Despite Section 3.1, where there are multiple retail, service commercial and personal service uses on a lot within a Minor Commercial Cluster "MCC", Local Node "LN", Community Node "CN", Community Node – Pedestrian Predominant Area "CN-PP", Mixed Corridor Type 2 "MC2", Mixed Corridor Type 3 "MC3" and Employment Service "ES" zone, the minimum required parking shall be as follows:

   i) on a lot with less than 2,800 square metres of gross leasable area: 4.5 spaces per 100 square metres of *gross leasable floor area* provided that where a *restaurant, supermarket*, *nightclub*, *tavern/bar/pub* or *assembly hall, convention hall or conference hall* occupies ten percent or more of the *gross leasable floor area*, the individual parking requirements for that use shall apply to the *gross leasable floor area* devoted that that use;

   ii) on a lot with between 2,800 square metres to 28,000 square metres of *gross leasable floor area*: 4.5 spaces per 100 square metres of *gross leasable floor area*;

   iii) on a lot with more than 28,000 square metres of *gross leasable floor area*: 5.0 spaces per 100 square metres of *gross leasable floor area*.

b) For all other uses in all other zones, where more than one *use* is being *used* on a *lot*, the required *parking space* will be the sum of the parking required for all *uses* on the *lot*.

3.4 Size of Parking Spaces and Aisles

a) *Parking spaces* shall be a minimum of 2.6 metres in width and 5.3 metres in length, exclusive of any land *used* for access, manoeuvring, *driveway* or similar purpose.

b) *Parking lot* aisles shall be a minimum of 3.8 metres in width for one way traffic and a minimum of 6.5 metres in width for two way traffic.

3.5 Setbacks of Parking Spaces and Lots

a) No *parking lot* or *parking space* shall be permitted within 3.0 metres of a *street line* or within any *daylighting triangle*.

b) No *parking lot* or *parking space* shall be permitted within 3.0 metres of a property line abutting a residential zone.

c) Notwithstanding Section 3.5 a) and b), individual *parking spaces* for a *detached dwelling*, *semi-detached dwelling, street townhouse dwelling, duplex dwelling, multiple attached dwelling, and back-to-back townhouse dwelling* may be located:

   i) within 3.0 metres of a *street line* but not within a *daylighting triangle*;

   ii) in a *rear yard* of a residential zone a minimum of 1.0 metre from the nearest *rear lot line* except where the *rear lot line* abuts a *lane* in which case the *parking space* shall be set back a minimum of 0.6 metres; and

iii) in an *interior side yard* of a residential zone to a minimum of 0.6 metres to the nearest *interior side lot line*, except where the *driveway* is a mutual *driveway* in which case no set back is required to the *interior side lot line*.

3.6 Standards for Parking Pads

a) One *parking pad* shall be permitted on a *lot* instead of, or in addition to, a detached *private garage* where:

i) an attached *private garage* does not form part of the *dwelling* on the *lot*; and,

ii) the *parking pad* is located in accordance with the regulations for detached *private garages*.

b) In addition, one *parking pad* shall be permitted in addition to an attached or detached *private garage* on a *lot* accessed by a *lane* and can be located in the *yard* adjacent to the *private garage* provided the *parking pad* is located in accordance with the regulations for detached and attached *private garages* accessed by a *lane*.

c) A driveway leading to a parking pad shall be no wider than the parking pad.

3.7 Parking and Loading within yards

a) In the Community Node – Pedestrian Predominant Area "CN-PP" Zone, no *parking lot* shall be located in the *front yard or* between a *building* and the *street line* or between a *building* and the edge of a *private street*.

b) No *loading space* shall be permitted in the *front yard* of any *zone*.

3.8 Parking Space Uses

The storage of goods, including for sale or display, is not permitted within required *parking spaces*. The storage of *motor vehicles* for sale and display is not exempt from this provision.

3.9 Restrictions on Vehicles in a Residential Zone

No *person* shall, in any Residential Zone, use any *lot*, *building* or *structure* for the parking or storage of *vehicle*s except in accordance with the following provisions:

a) Number of Vehicles

A maximum of four (4) *vehicle*s, only one of which may be a *trailer*, are permitted to park on the driveway of any *lot* in a residential zone.

b) Size of Vehicles

i) For those *vehicles* parked on any *lot*, the maximum permissible *height* is 2.6 metres, and the maximum permissible length is 6.7 metres;

ii) Notwithstanding section (i), one *vehicle* parked on a *driveway* in a *side yard* or *rear yard* can be of a size up to a maximum permissible *height* of 3.5 metres, and a maximum permissible length of 8.0 metres; and

iii) *Height* is measured from the *established grade* immediately beside the *vehicle* up to the *vehicle's* highest point, which excludes lights, antennas and other such items ancillary to the *vehicle's* body.

c) Location of Vehicles

No part of any *front yard* or *flankage yard* except a *driveway* is to be used for the parking or storage of *vehicles* and no *vehicle* is to encroach onto any road allowance.

d) Inoperative vehicles:

The parking or storage of an *inoperative vehicle* is not permitted on any *lot* in a residential zone, unless it is entirely within a fully enclosed *building* or *structure*.

e) Construction *Vehicle*s

The parking or storage of a *construction vehicle* or a *commercial vehicle* is not permitted on any *lot* in a residential zone, unless it is entirely within a fully enclosed *building* or *structure*.

f) Oversize *Vehicle*s:

A *vehicle* that exceeds the maximum permissible *vehicle* size provisions of Section 3.9b), is permitted to park temporarily on a *lot* in a residential zone for the sole purpose of delivering to, servicing or constructing the premises on that *lot*.

3.10 Loading Standards

a) For every *building* or *structure* to be erected for, altered for, or its use converted to a commercial or industrial use, involving the frequent shipping, loading or unloading of persons, animals, goods, wares or merchandise, off-street *loading spaces* shall be provided and maintained upon the same *lot* on which the principal use is located and in accordance with the following:

b) Any required off-street *loading space* shall:

i) not be used for the purpose of offering commodities for sale or display;

ii) provide for the temporary parking of one *commercial vehicle*;

iii) not be not less than 3.5 metres in width nor less than 9.0 metres in length, nor less than 4.5 metres in clear and unobstructed *height*, exclusive of any land used for access, maneuvering, *driveway* or a similar purpose;

iv) not be upon or partly upon any *street*, *lane* or alley; and,

v) have adequate access to permit ingress and egress of a *commercial vehicle* from a *street* by means of *driveways*, aisles, maneuvering areas or similar areas, no part of which access is to be used for the temporary parking or storage of any motor vehicle.

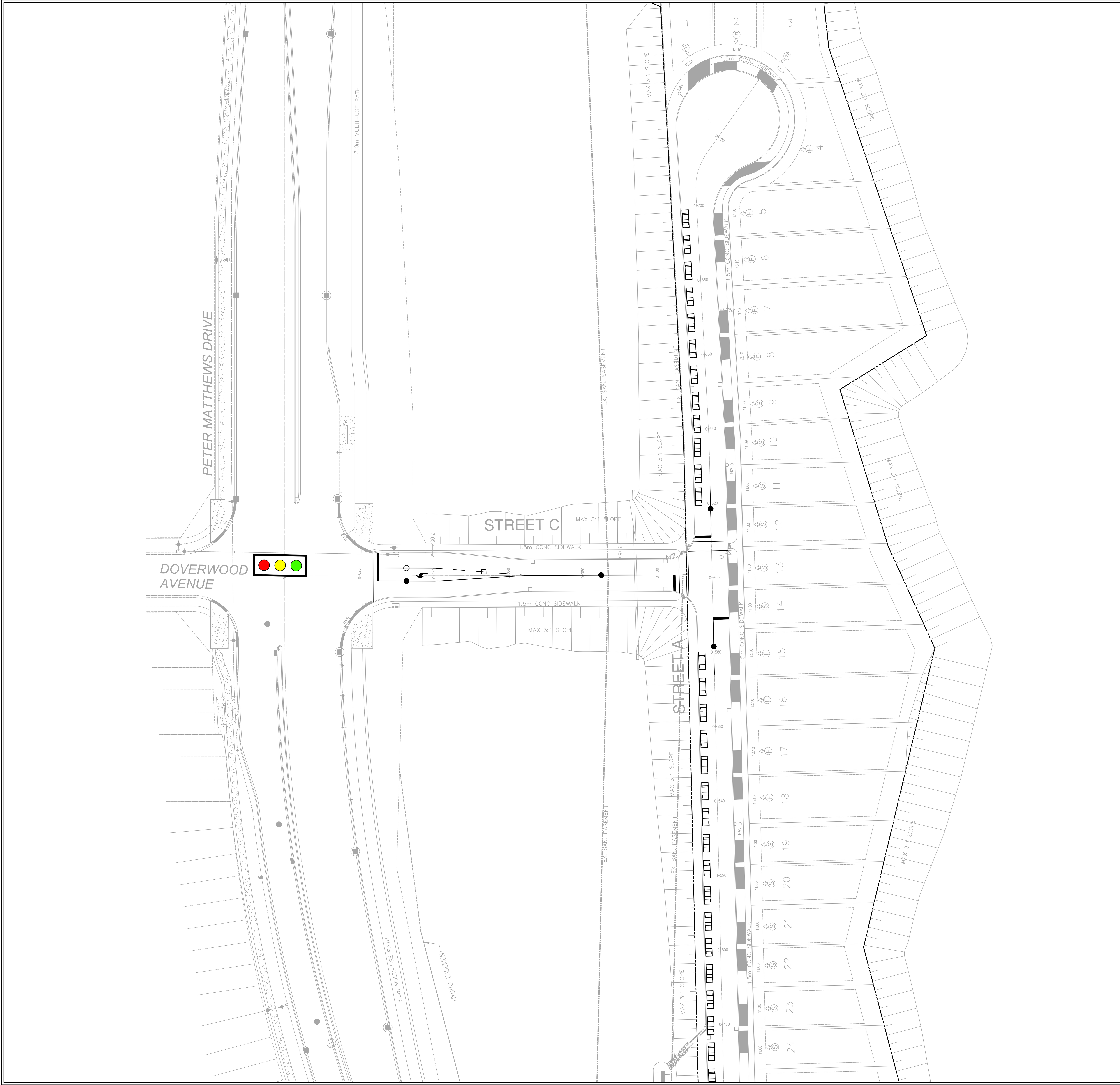
3.11 Tandem Parking

The required *parking spaces* for a *dwelling unit*, *live work unit* and / or a *bed and breakfast establishment* on an individual *lot* may be provided in a tandem configuration.

3.12 Private Garage Parking Size

Each *parking space* within a *private garage* shall have a minimum width of 2.9 metres and a minimum depth of 6.0 metres provided, however, that the minimum required width may include one interior step, and the minimum required depth may include two interior steps.

Appendix C:
Full Sized Drawings



PARKING SUPPLY

AREA	LOTS	PARKING	RATIO PARKING/LOT
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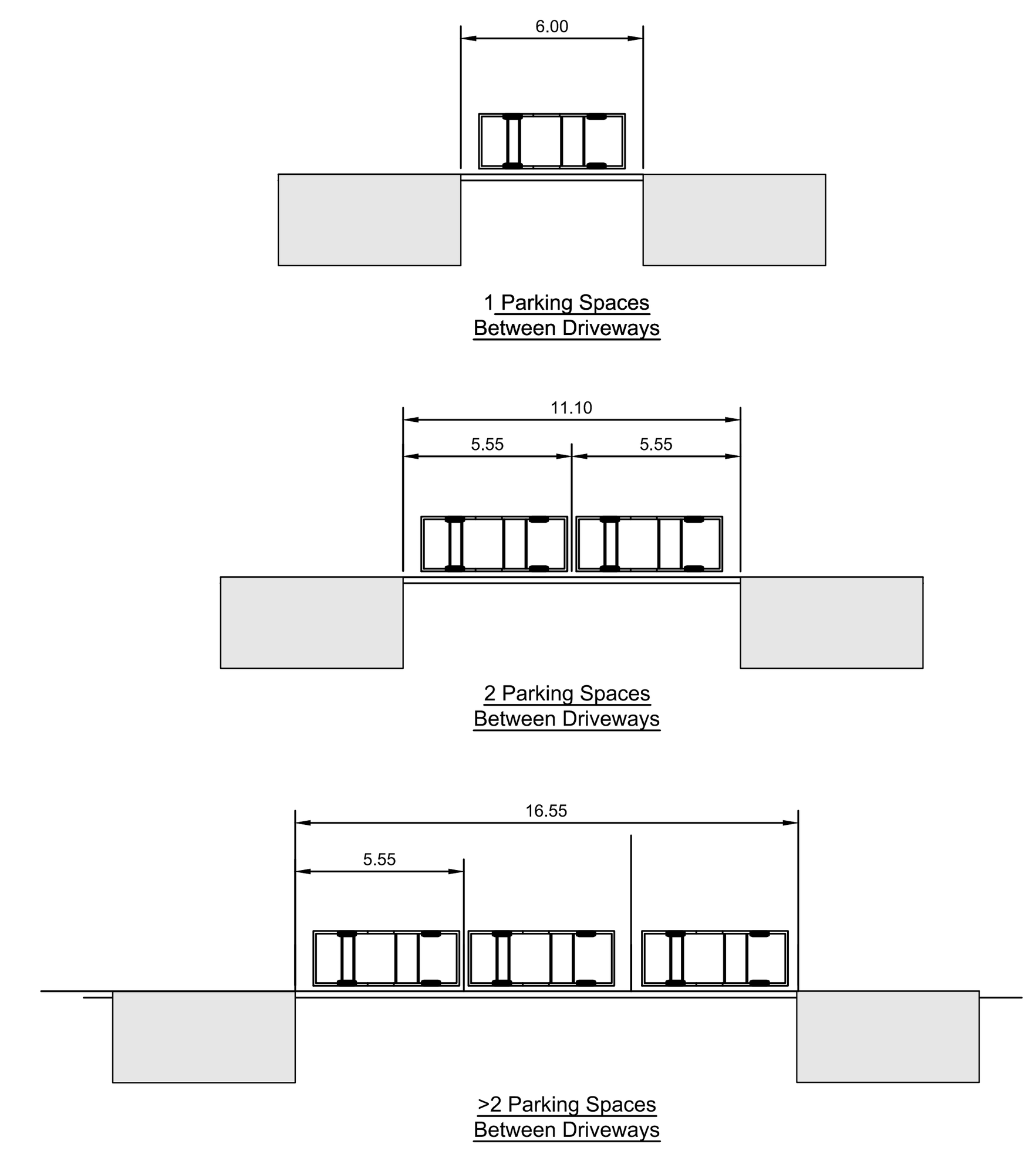
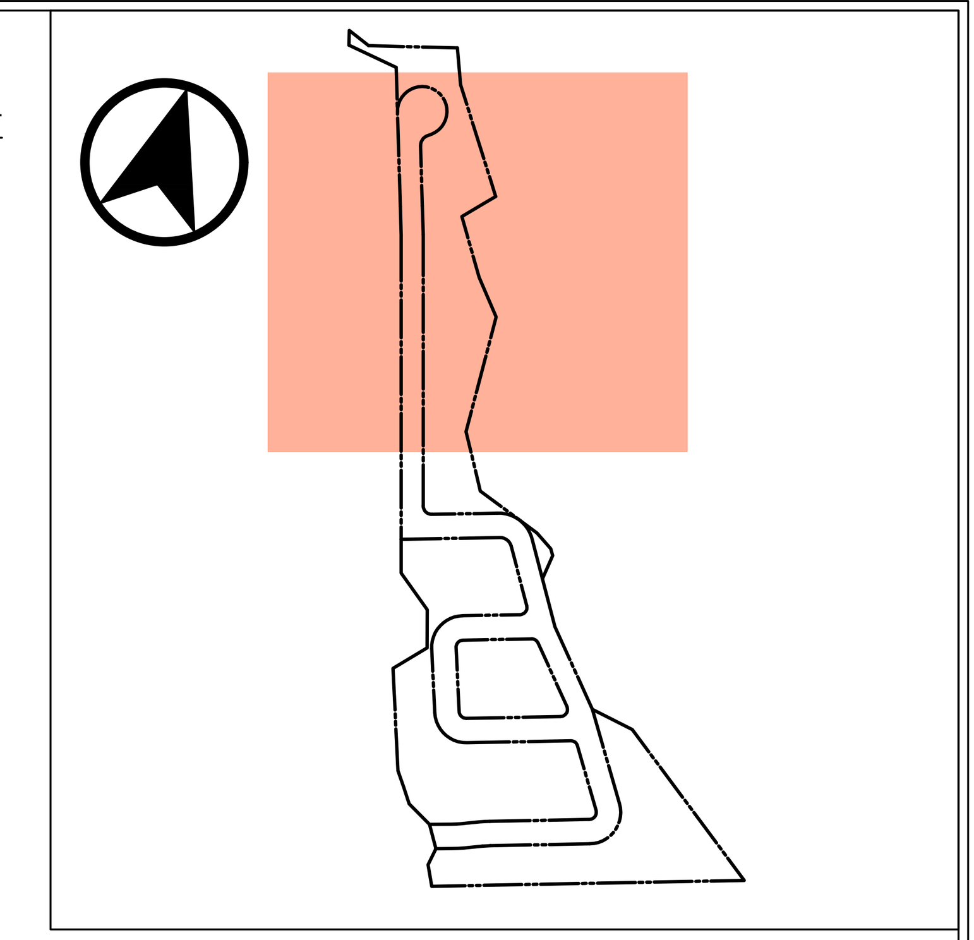


TYPICAL ON STREET PARKING CONFIGURATION
NTS



BENCHMARK INFO - 4-034
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APPROVED

____________________ P. Eng.
Engineering & Services Department
Approval of works required by City of Pickering and as defined in the Pre-Servicing Agreement. The City is relying on the technical skill and ability of the P. Eng sealing and signing this drawing.
Date:________________

THE CORPORATION OF THE CITY OF PICKERING
Engineering & Services Department

No.	Issue / Revision	Date	Auth.	Appr.
0	ISSUED FOR SUBMISSION	12/6/24	MSB	

LICENSED PROFESSIONAL ENGINEER
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Dec 6/24
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Drawing Title
WHITEVALE SUBDIVISION
PARCEL 24
ON-STREET PARKING PLAN
AREA 1

Drawn	Checked	Designed	Checked	Date	Drawing No.
LC	MSB	LC	MSB	12/06/24	PK01
Project No. 8160-03		Draft Plan of Subdivision No. SP-2015-05		Revision No. 0	
Scale 1:500		0 5.0 10.0 20.0 30.0m			

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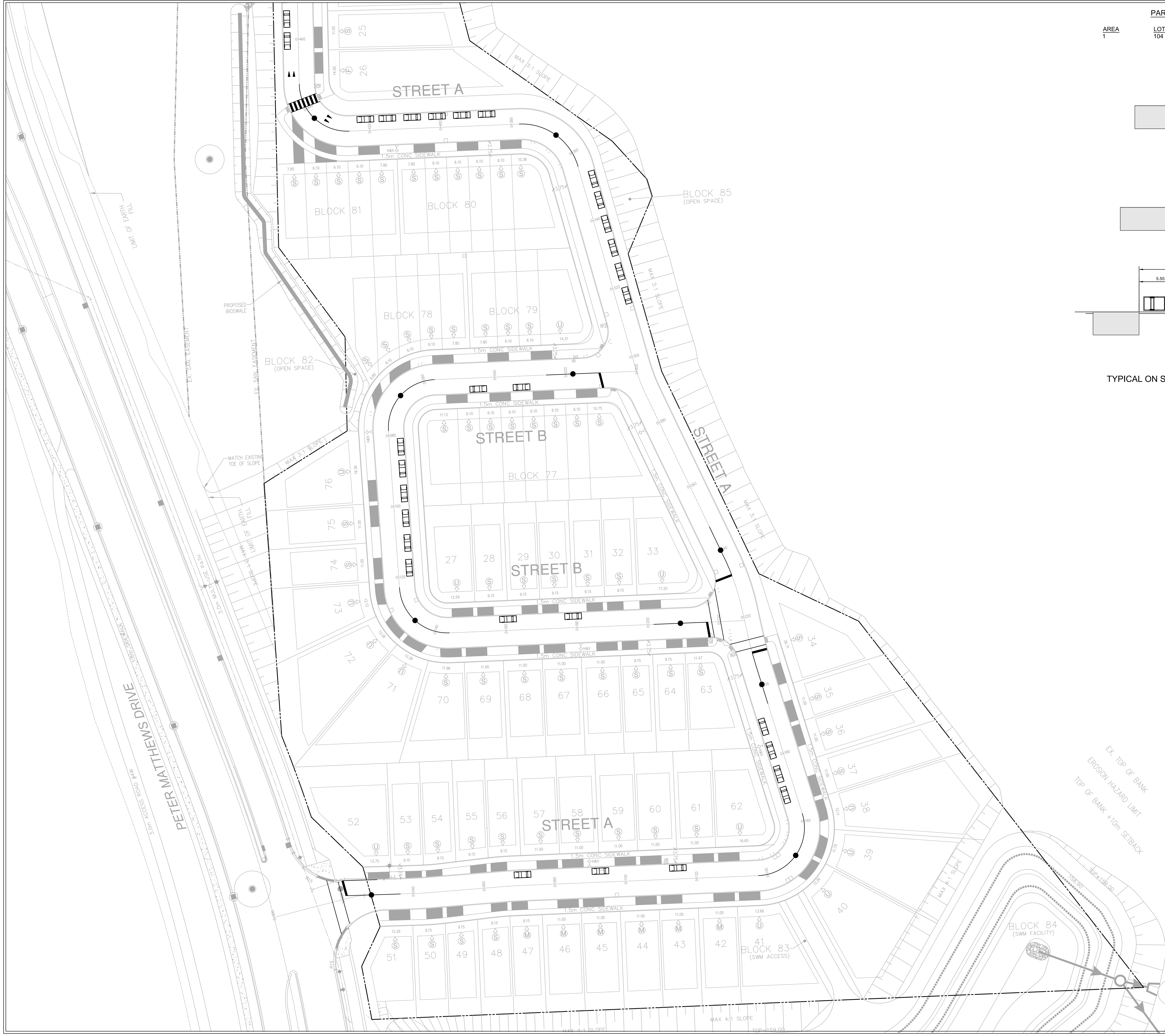

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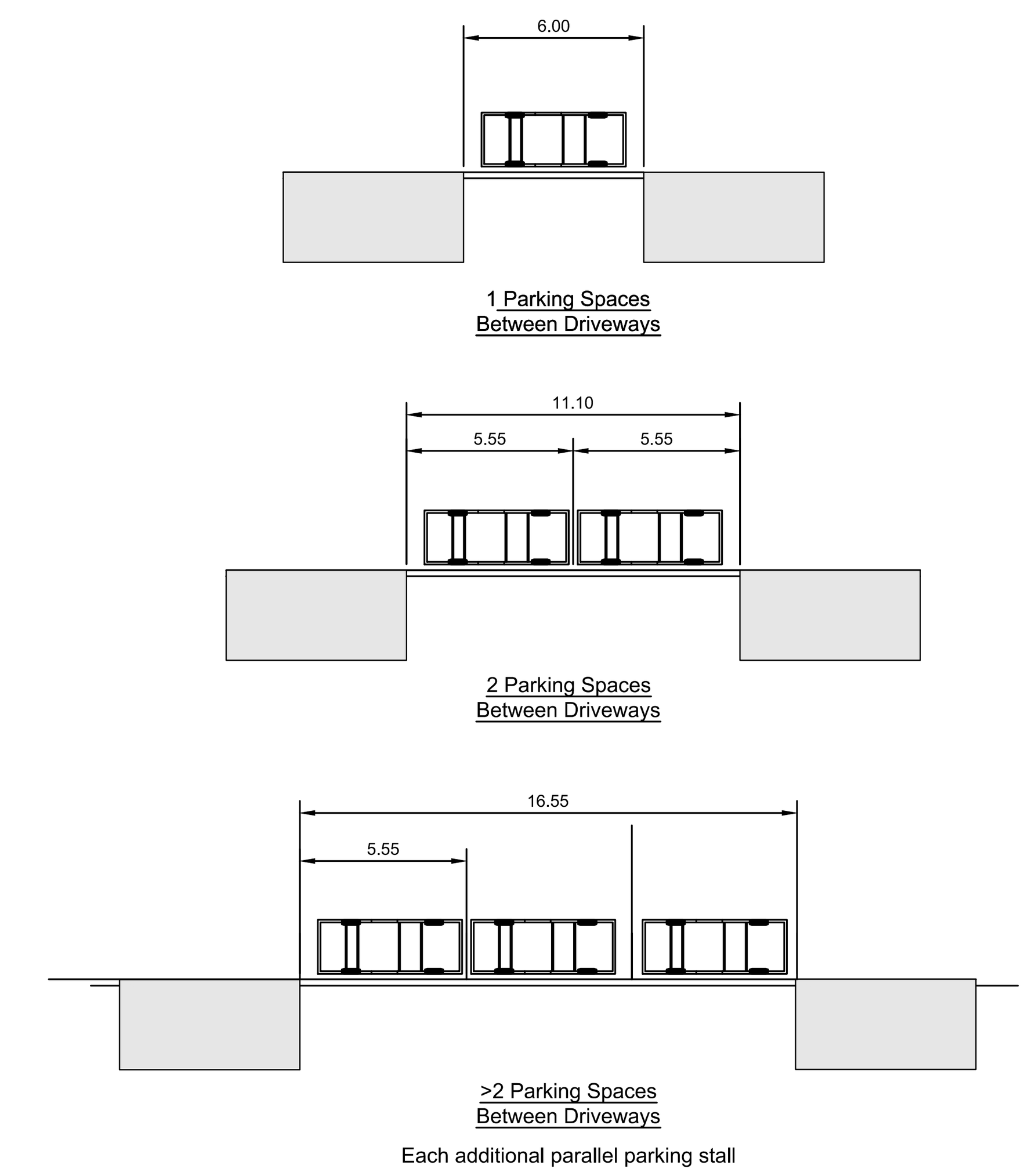
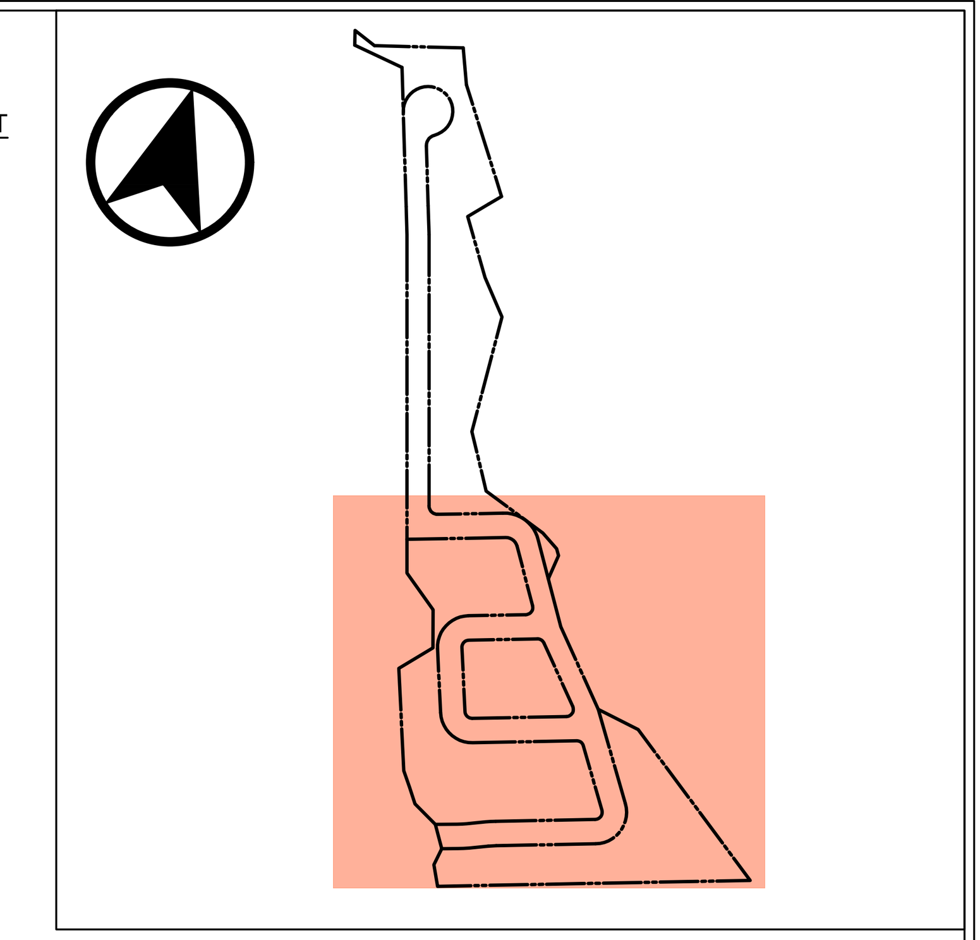


TYPICAL ON STREET PARKING CONFIGURATION

NTS



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Engineering & Services Department

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Date:________________

THE CORPORATION OF THE CITY OF PICKERING

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LICENSED PROFESSIONAL ENGINEER
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Drawing Title
WHITEVALE SUBDIVISION
PARCEL 24
ON-STREET PARKING PLAN
AREA 1

Drawn	Checked	Designed	Checked	Date	Drawing No.
LC	MSB	LC	MSB	12/06/24	PK02

Project No.	Draft Plan of Subdivision No.	Revision No.
8160-03	SP-2015-05	0

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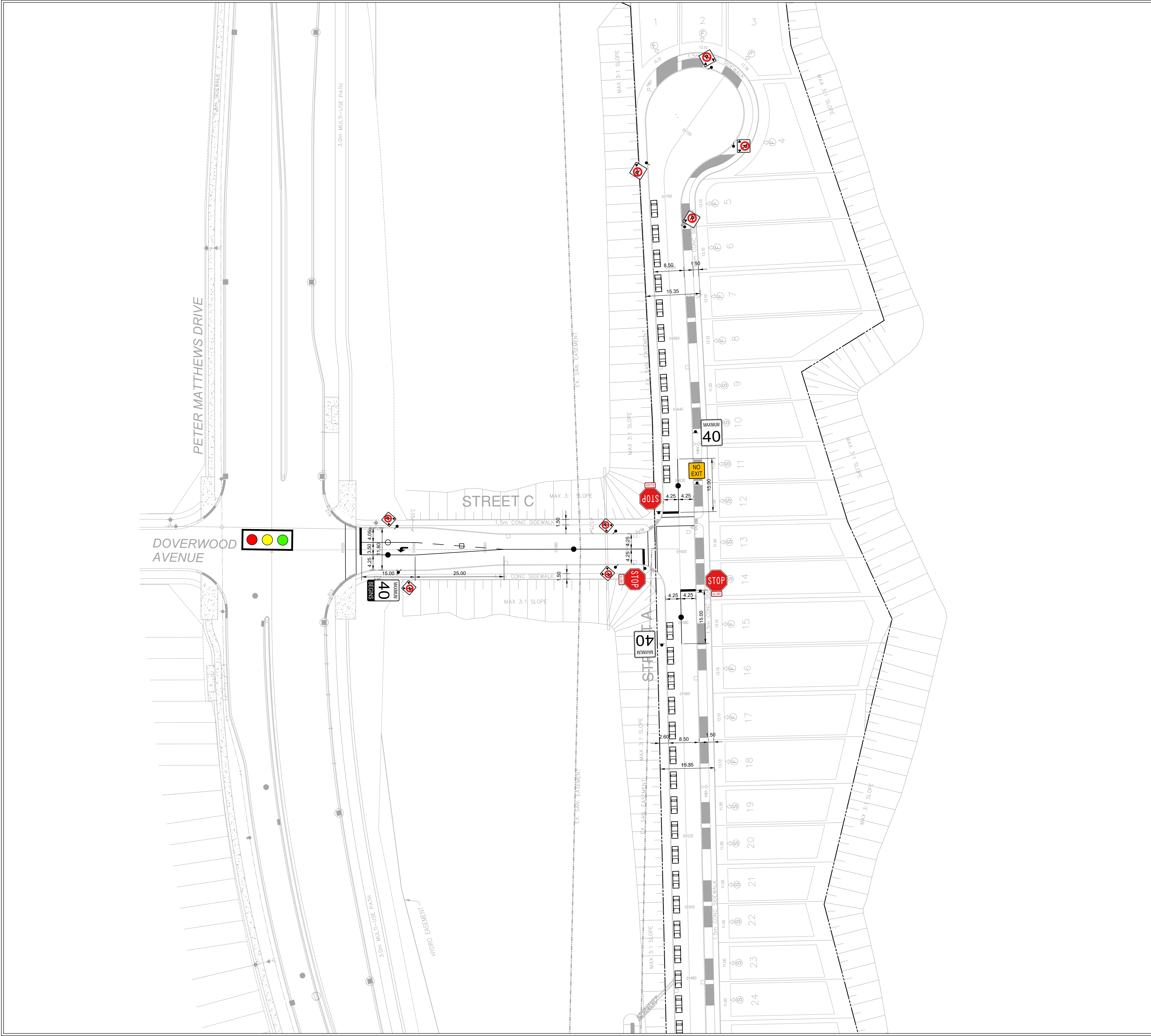

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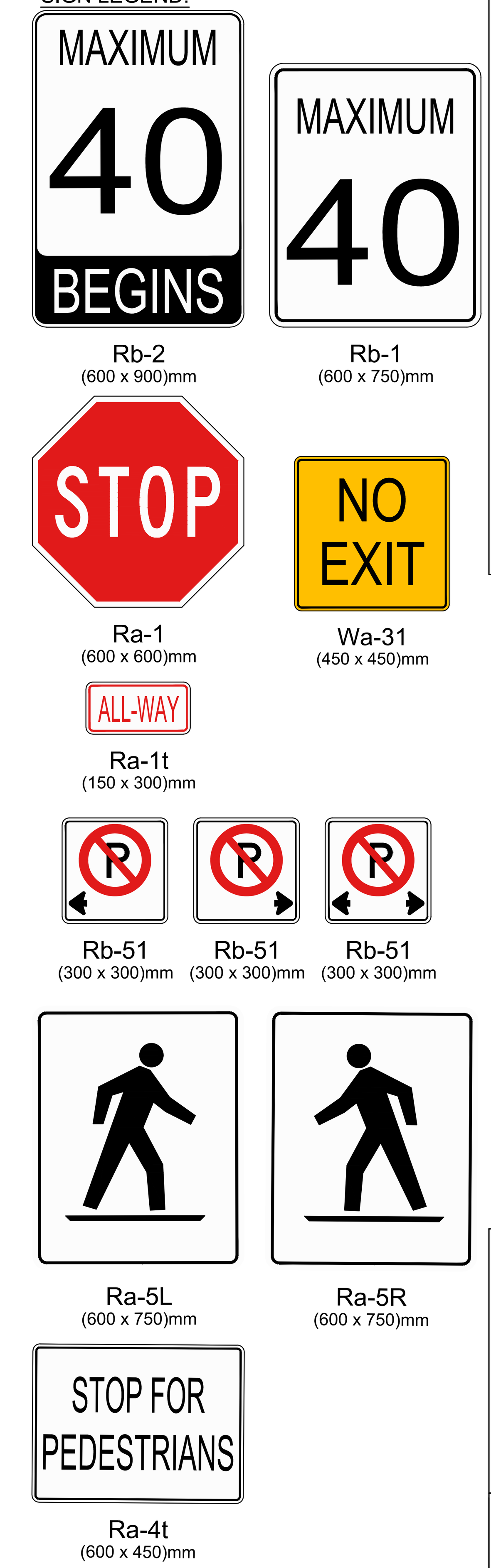

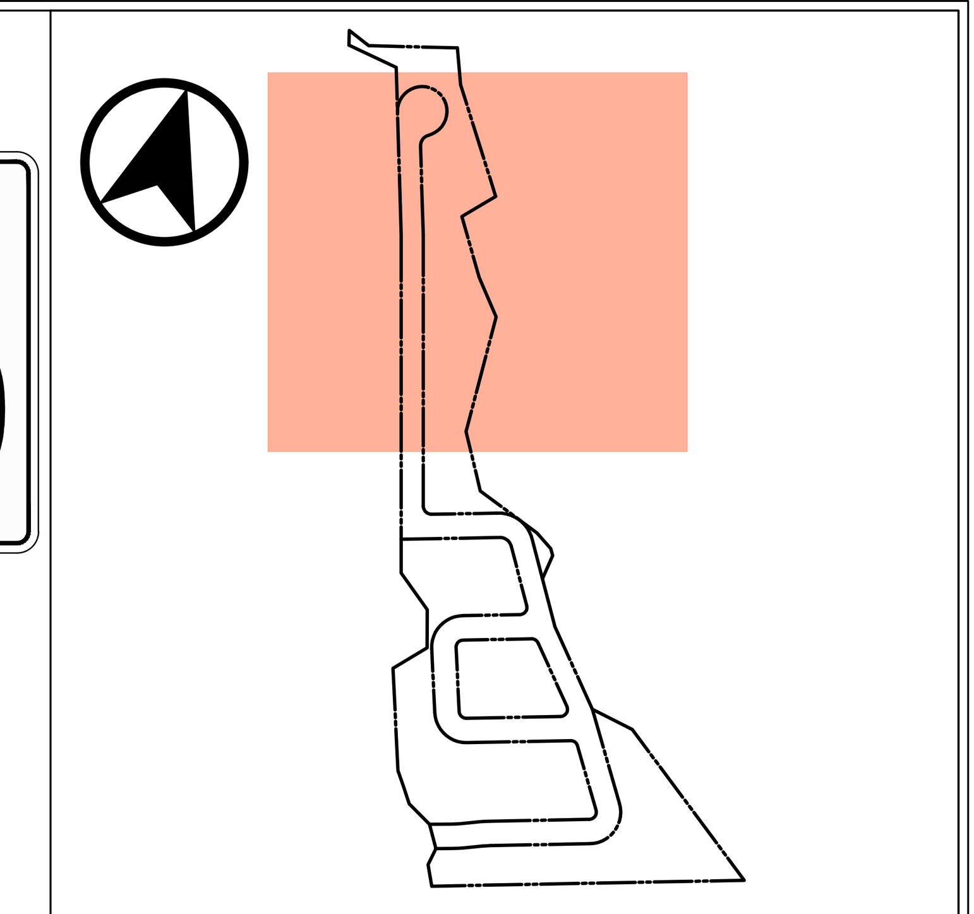

SIGN MOUNT LEGEND

ALL SIGNS ARE SHOWN IN APPROXIMATE LOCATIONS AND TO BE DETERMINED ON SITE. SIGNS MUST BE VISIBLE TO DRIVER AND NOT OBSTRUCTED BY LANDSCAPE.

- PROPOSED SIGN POST
- PROPOSED POST PERPENDICULAR SIGN

PAVEMENT MARKING:

(NOTE-ALL MARKINGS MUST CONFORM TO THE ONTARIO TRAFFIC MANUAL (OTM) BOOK 11

- 10cm (4 in.) WHITE SOLID
- 10cm (4 in.) YELLOW SOLID
- 10cm (4 in.) WHITE (3m (10 ft.) LINE, 3m (10 ft.) GAP)
- LEFT TURN ARROW (3m (10 ft.))
- RIGHT TURN ARROW (3m (10 ft.))
- ALL STOP BARS TO BE 60cm (2 ft.) WHITE SOLID

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Drawing Title
WHITEVALE SUBDIVISION
PARCEL 24
PAVEMENT MARKING AND TRAFFIC CONTROL SIGNAGE PLAN

Drawn	Checked	Designed	Checked	Date	Drawing No.
LC	MSB	LC	MSB	12/06/24	TC01
Project No. 8160-03		Draft Plan of Subdivision No. SP-2015-05		Revision No. 0	
Scale 1:500		0 5.0 10.0 20.0 30.0m			

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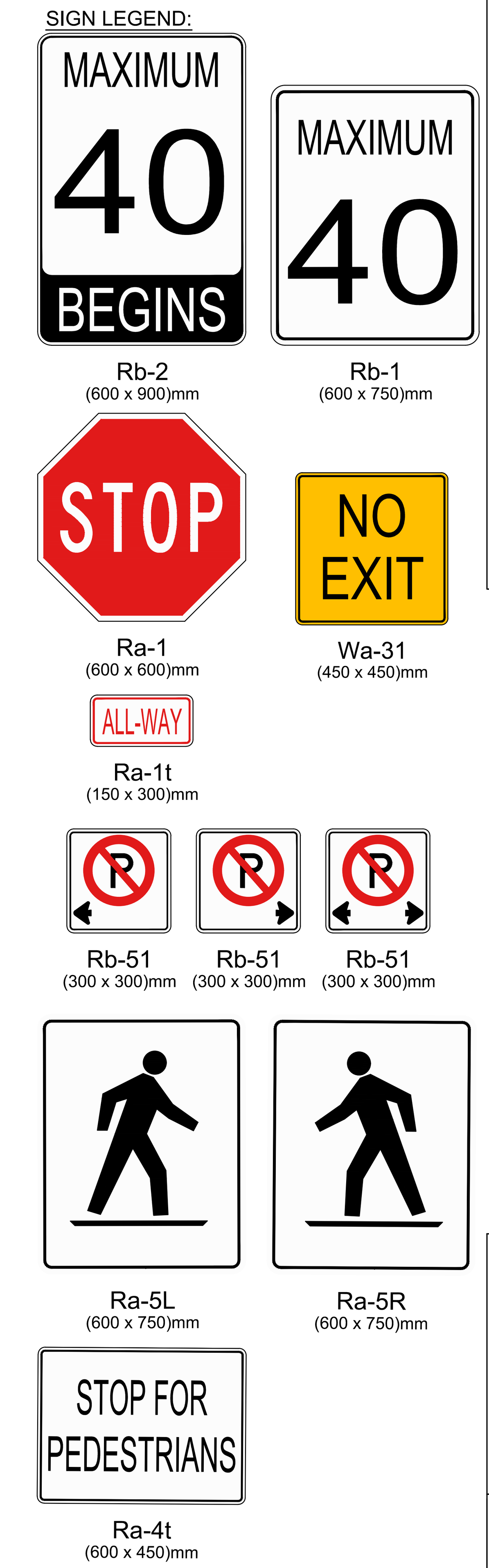

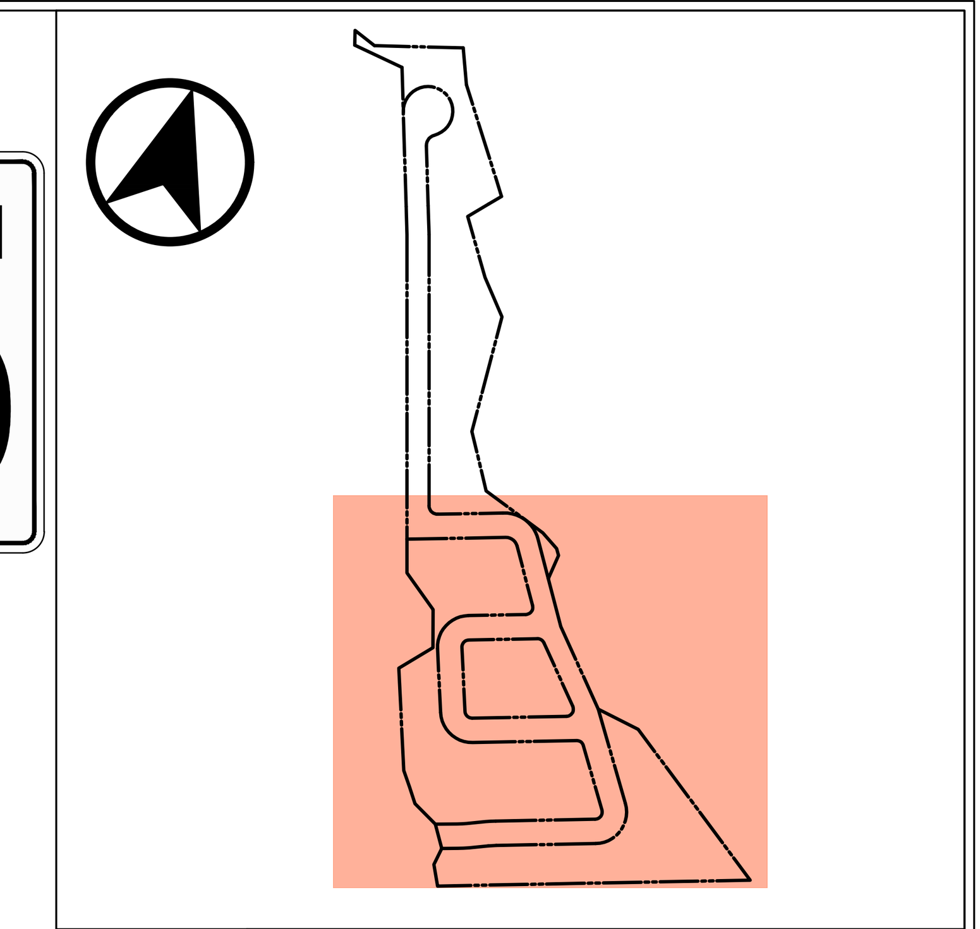

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Client
TACCGATE DEVELOPMENTS
600 APPLEWOOD CRESCENT
CONCORD, ONTARIO
L4K 4B4

Drawing Title
WHITEVALE SUBDIVISION
PARCEL 24
PAVEMENT MARKING AND TRAFFIC CONTROL SIGNAGE PLAN

Drawn	Checked	Designed	Checked	Date	Drawing No.
LC	MSB	LC	MSB	12/06/24	TC02
Project No. 8160-03		Draft Plan of Subdivision No. SP-2015-05		Revision No. 0	
Scale 1:500	0 5.0 10.0 20.0 30.0m				

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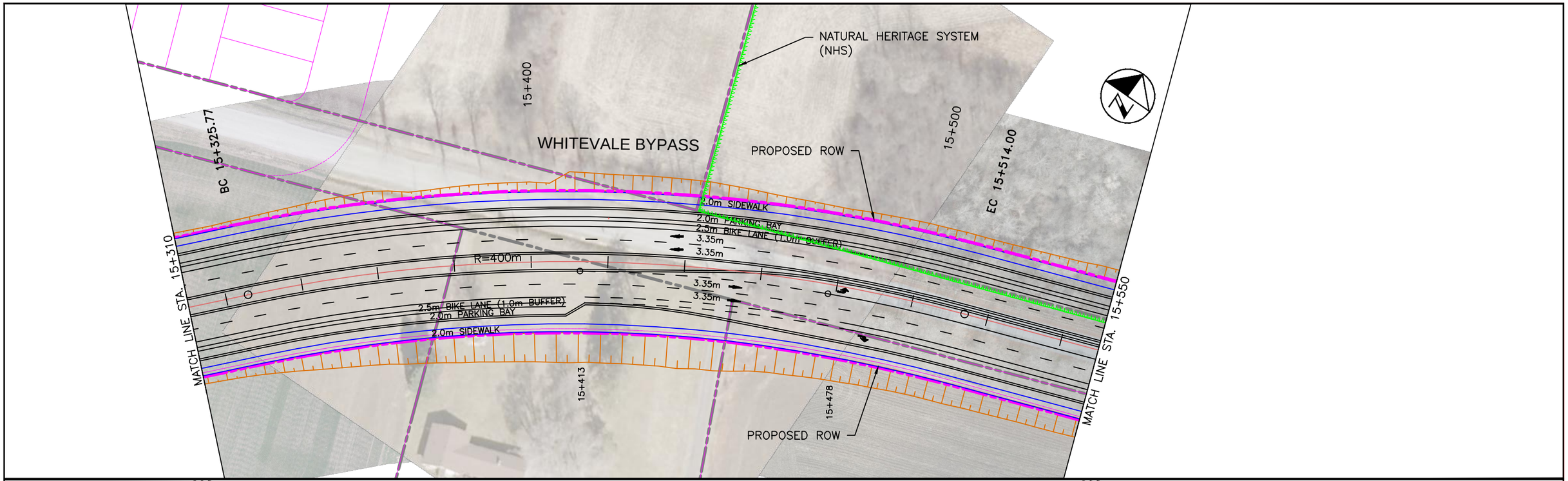
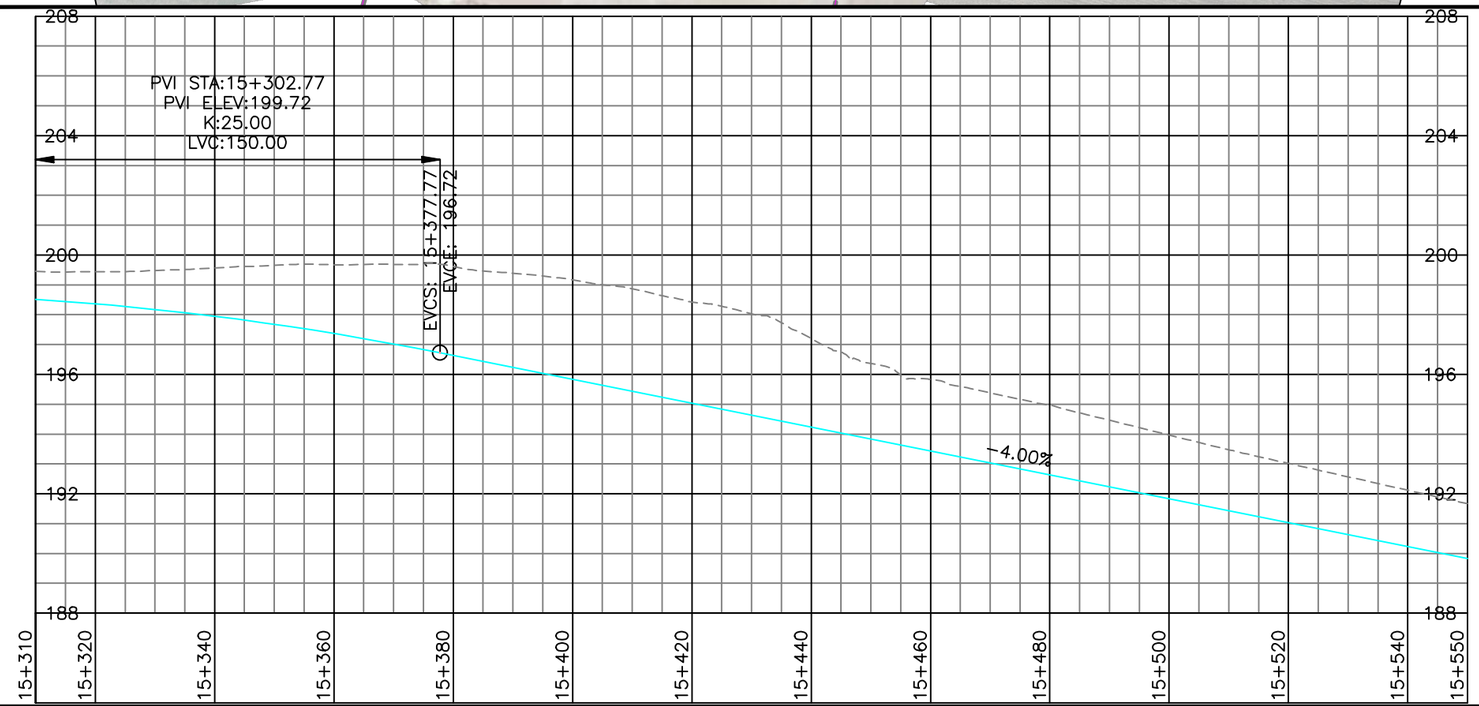
Appendix D:
Regional Road EA Design





CENTRAL PICKERING DEVELOPMENT PLAN
CLASS ENVIRONMENTAL ASSESSMENT
FOR REGIONAL SERVICES IN
THE CITY OF PICKERING

- NATURAL HERITAGE SYSTEM (NHS)
- PROPOSED RIGHT OF WAY
- EXISTING RIGHT OF WAY
- LIMIT OF CUT
- LIMIT OF FILL
- CENTRE ALIGNMENT
- WATER COURSE

HDR

THE REGIONAL MUNICIPALITY OF DURHAM

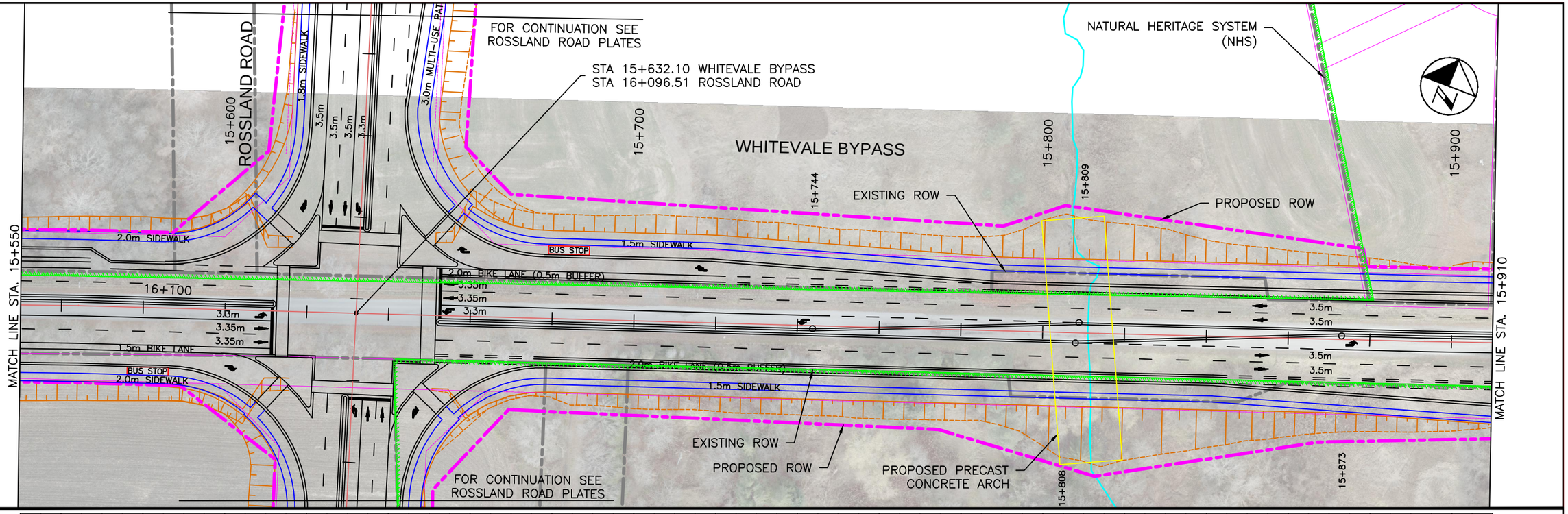
MAY 22, 2014

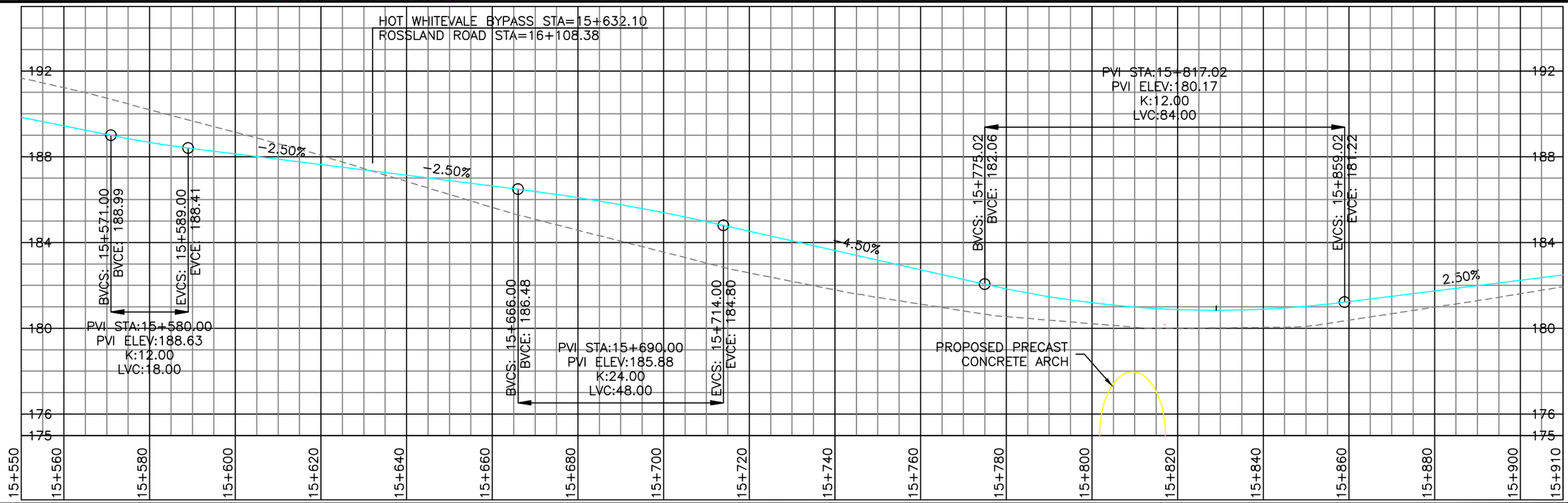
SCALE
HORIZONTAL 10m 0 10m
VERTICAL 2m 0 2m

WHITEVALE BYPASS

STATION 15+310 TO 15+550

SHEET NO.
16





CENTRAL PICKERING DEVELOPMENT PLAN
CLASS ENVIRONMENTAL ASSESSMENT
FOR REGIONAL SERVICES IN
THE CITY OF PICKERING

- NATURAL HERITAGE SYSTEM (NHS)
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HDR

THE REGIONAL MUNICIPALITY OF DURHAM

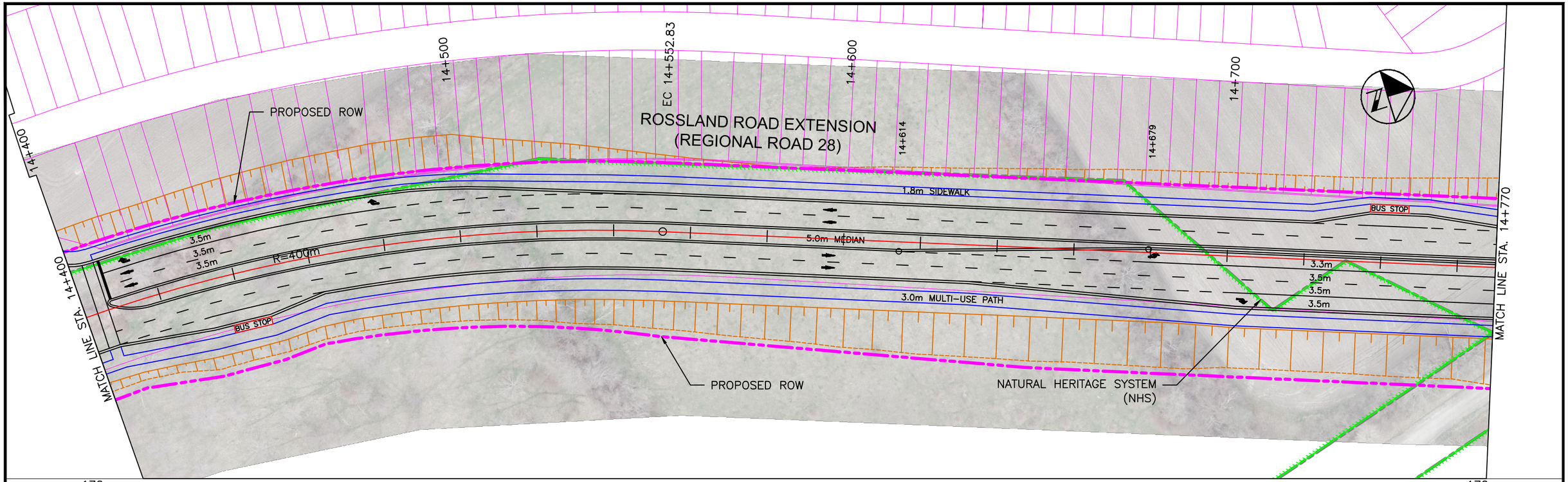
MAY 22, 2014

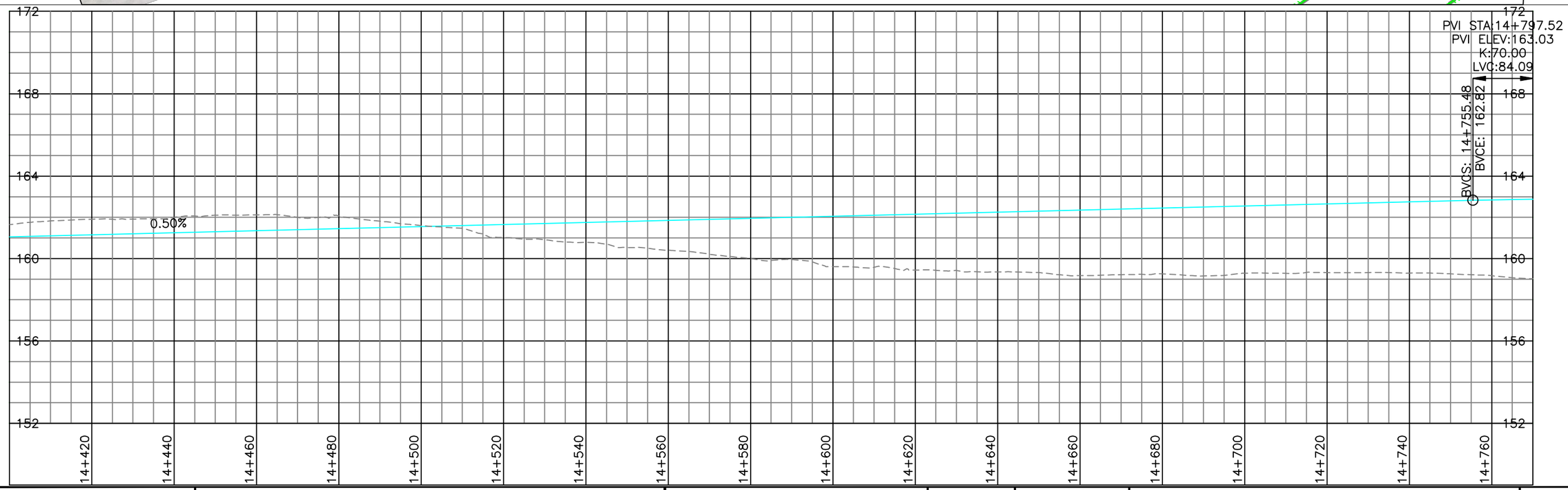
SCALE
HORIZONTAL 10m 0 10m
VERTICAL 2m 0 2m

WHITEVALE BYPASS

STATION 15+550 TO 15+910

SHEET NO. 17





CENTRAL PICKERING DEVELOPMENT PLAN
CLASS ENVIRONMENTAL ASSESSMENT
FOR REGIONAL SERVICES IN
THE CITY OF PICKERING

NATURAL HERITAGE SYSTEM (NHS)
PROPOSED RIGHT OF WAY
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WATER COURSE
EXISTING PROFILE
PROPOSED PROFILE

HDR

THE REGIONAL MUNICIPALITY OF DURHAM

MAY 22, 2014

SCALE
HORIZONTAL 10m 0 10m
VERTICAL 2m 0 2m

ROSSLAND ROAD EXTENSION (REGIONAL ROAD 28)

STATION 14+400 TO 14+770

SHEET NO. 13

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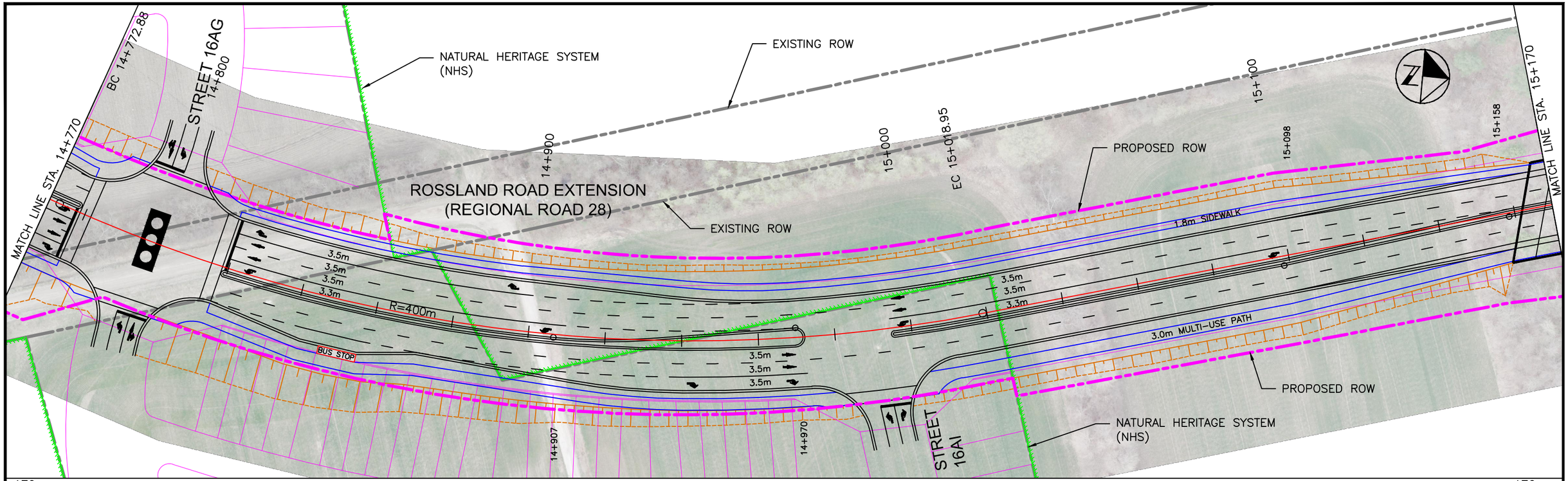
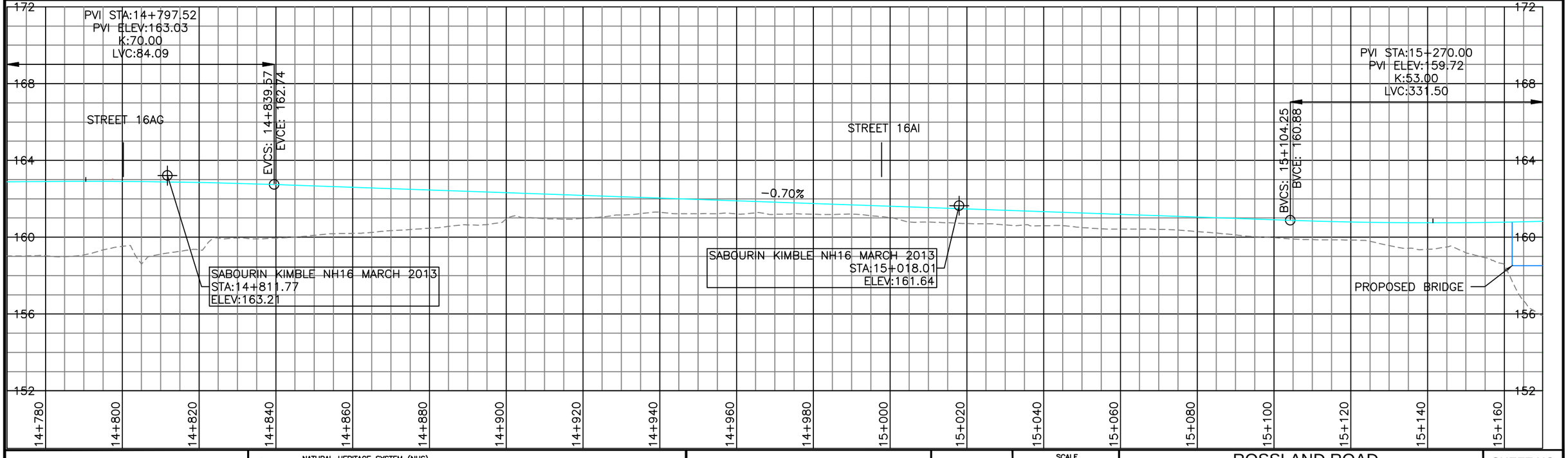
PLOTTED BY: mhul





CENTRAL PICKERING DEVELOPMENT PLAN
CLASS ENVIRONMENTAL ASSESSMENT
FOR REGIONAL SERVICES IN
THE CITY OF PICKERING

NATURAL HERITAGE SYSTEM (NHS)
PROPOSED RIGHT OF WAY
EXISTING RIGHT OF WAY
LIMIT OF CUT
LIMIT OF FILL
CENTRE ALIGNMENT
WATER COURSE

HDR

THE REGIONAL MUNICIPALITY OF DURHAM

MAY 22, 2014

SCALE
HORIZONTAL 10m 0 10m
VERTICAL 2m 0 2m

ROSSLAND ROAD EXTENSION (REGIONAL ROAD 28)

STATION 14+770 TO 15+170

SHEET NO. 14

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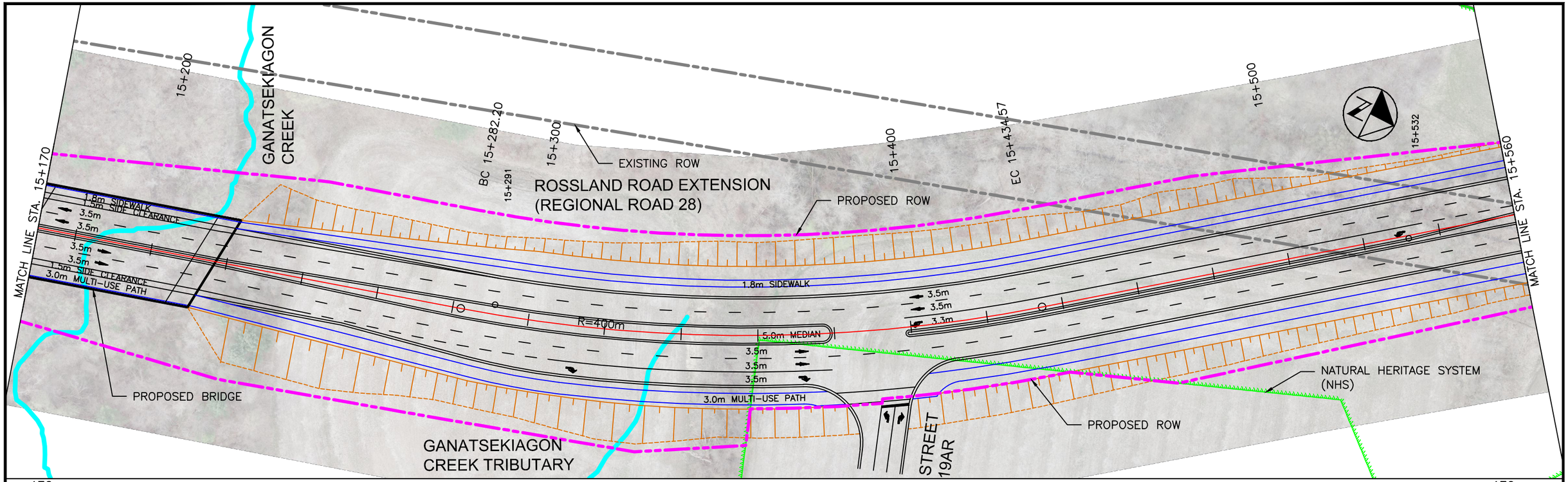
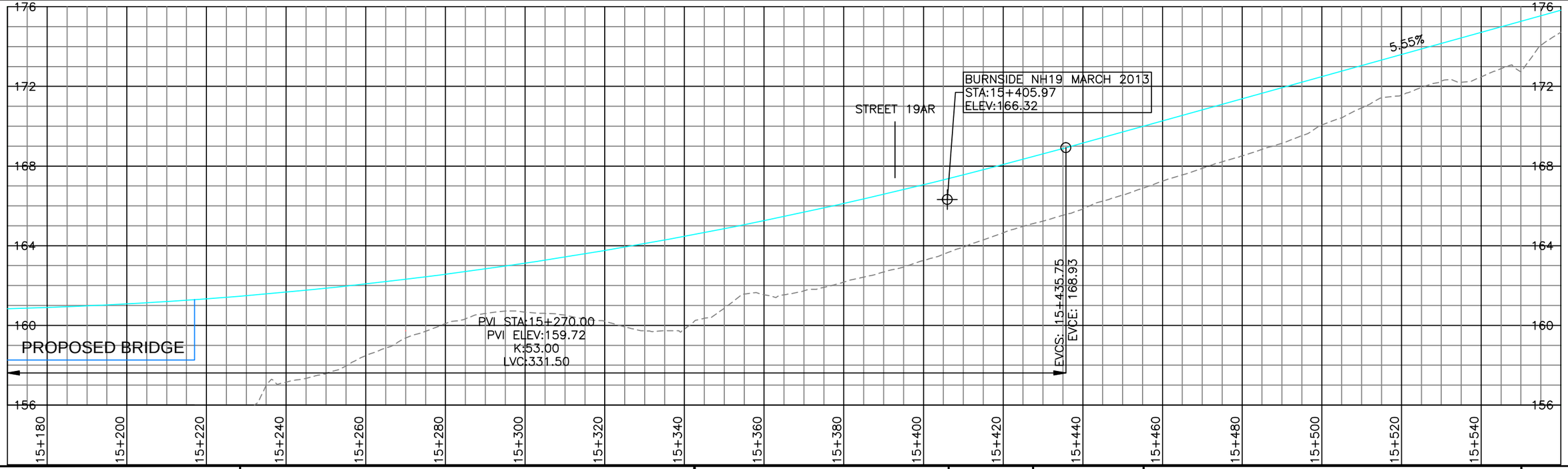
PLOTTED BY: mhui





CENTRAL PICKERING DEVELOPMENT PLAN
CLASS ENVIRONMENTAL ASSESSMENT
FOR REGIONAL SERVICES IN
THE CITY OF PICKERING

NATURAL HERITAGE SYSTEM (NHS)
PROPOSED RIGHT OF WAY
EXISTING RIGHT OF WAY
LIMIT OF CUT
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WATER COURSE
EXISTING PROFILE
PROPOSED PROFILE

HDR
THE REGIONAL MUNICIPALITY OF DURHAM

MAY 22, 2014

SCALE
HORIZONTAL 10m 0 10m
VERTICAL 2m 0 2m

ROSSLAND ROAD EXTENSION (REGIONAL ROAD 28)
STATION 15+170 TO 15+560

SHEET NO. 15

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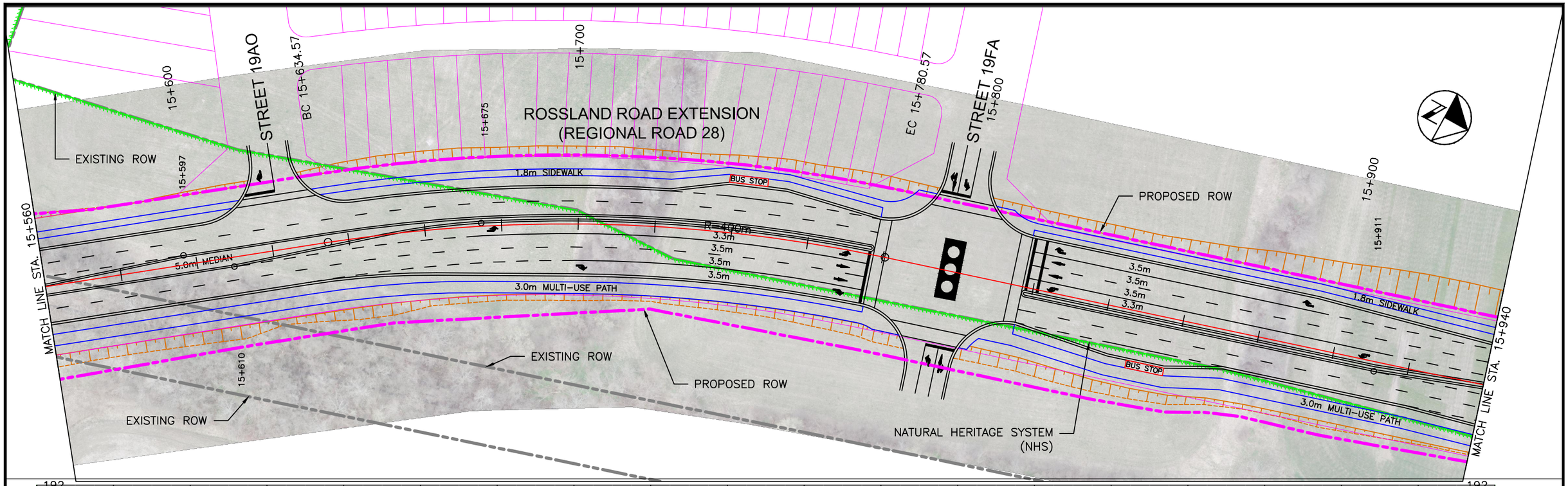

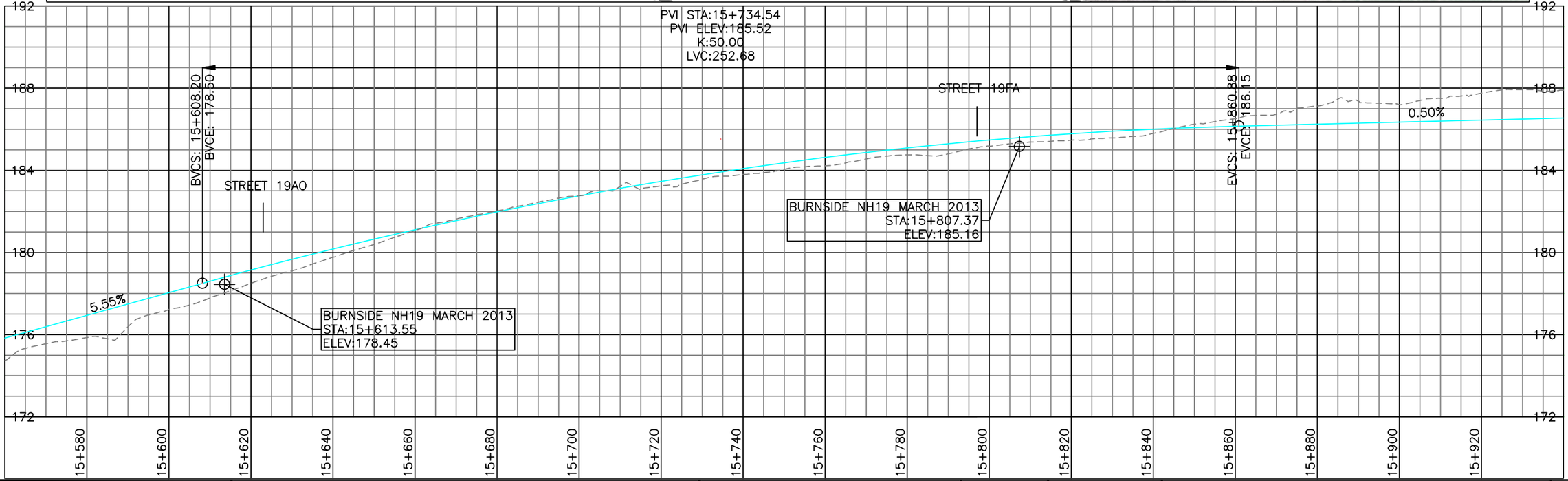

CENTRAL PICKERING DEVELOPMENT PLAN
CLASS ENVIRONMENTAL ASSESSMENT
FOR REGIONAL SERVICES IN
THE CITY OF PICKERING

NATURAL HERITAGE SYSTEM (NHS)
PROPOSED RIGHT OF WAY
EXISTING RIGHT OF WAY
LIMIT OF CUT
LIMIT OF FILL
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HDR

THE REGIONAL MUNICIPALITY OF DURHAM

MAY 22, 2014

SCALE
HORIZONTAL 10m 0 10m
VERTICAL 2m 0 2m

ROSSLAND ROAD EXTENSION (REGIONAL ROAD 28)

STATION 15+560 TO 15+940

SHEET NO. 16

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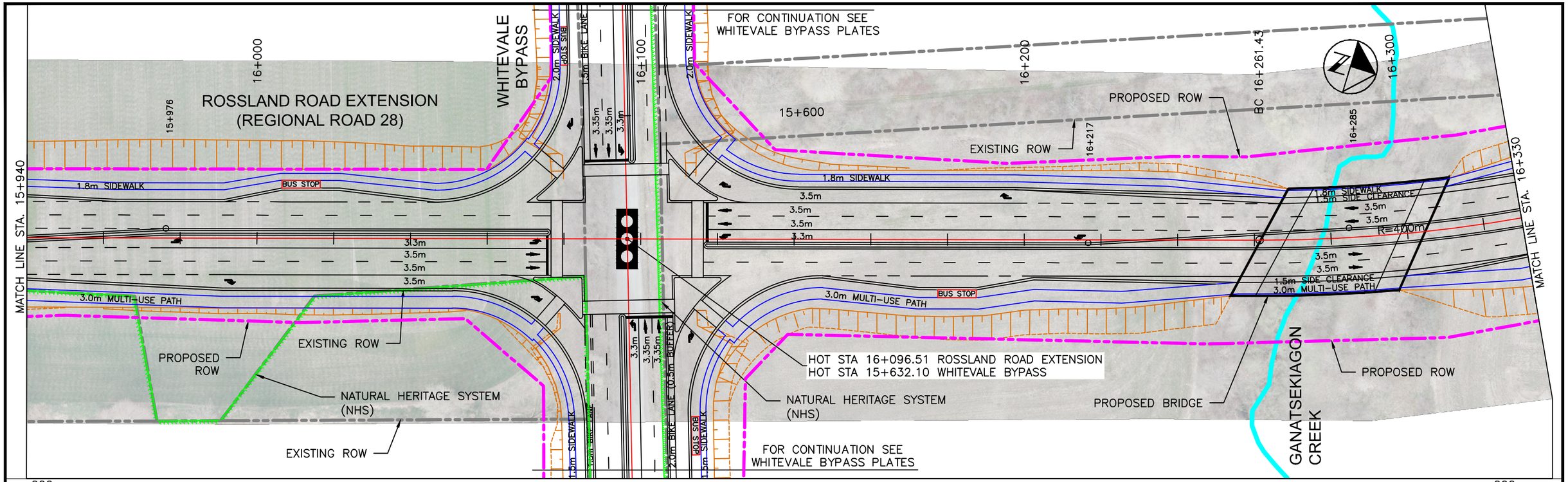

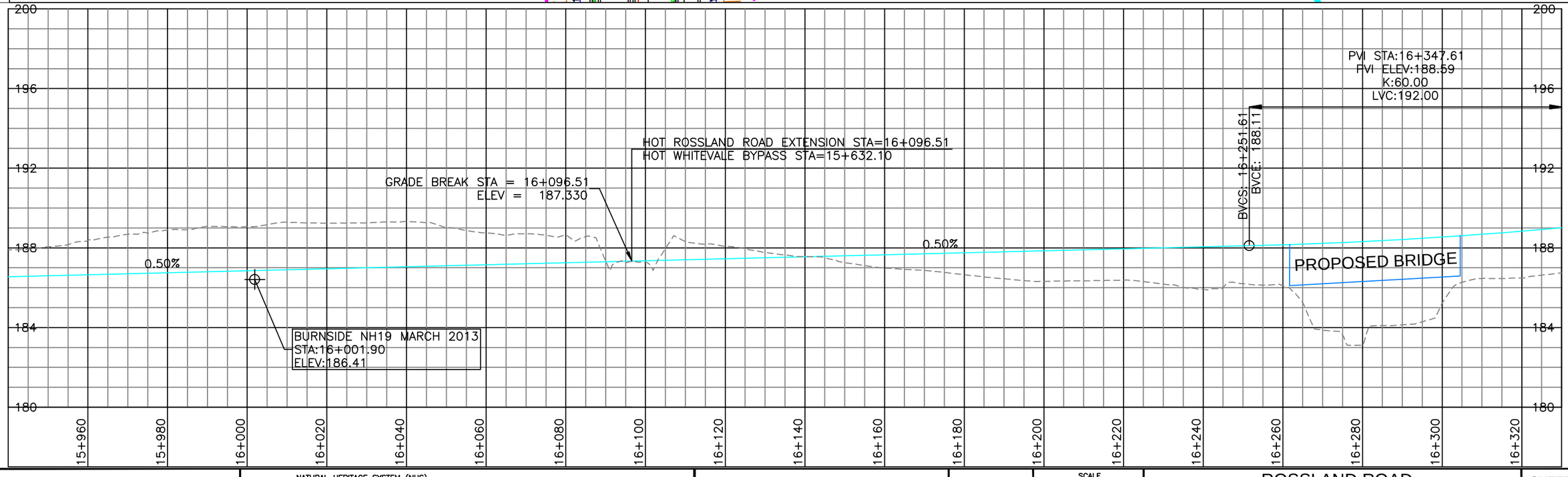

CENTRAL PICKERING DEVELOPMENT PLAN
CLASS ENVIRONMENTAL ASSESSMENT
FOR REGIONAL SERVICES IN
THE CITY OF PICKERING

NATURAL HERITAGE SYSTEM (NHS)
PROPOSED RIGHT OF WAY
EXISTING RIGHT OF WAY
LIMIT OF CUT
LIMIT OF FILL
CENTRE ALIGNMENT
WATER COURSE

HDR

THE REGIONAL MUNICIPALITY OF DURHAM

MAY 22, 2014

SCALE
HORIZONTAL 10m 0 10m
VERTICAL 2m 0 2m

ROSSLAND ROAD EXTENSION (REGIONAL ROAD 28)
STATION 15+940 TO 16+330

SHEET NO. 17

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PLOTDATE: May 19, 2014 - 6:16pm
PLOTTED BY: mhui

Appendix E:
Signal Timing Plan

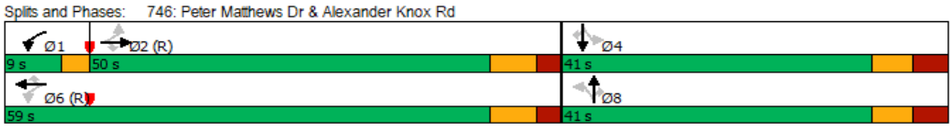
INTERSECTION SIGNAL TIMING REPORT

Location	Alexander Knox Rd @ Peter Matthews Dr				
Date	2024-06-19	**C&E No.**	57149288	**Prepared by**	M. Patel
Prepared for	BA Group				

AM Peak (5:30-9:00)

Phase Number	1	2	4	6	8
Movement	WBL	EBTL	SBTL	WBTL	NBTL
Lead/Lag	Lead	Lag			
Lead-Lag Optimize	Yes	Yes			
Recall Mode	None	C-Max	None	C-Max	None
Maximum Split (s)	9	50	41	59	41
Maximum Split (%)	9.0%	50.0%	41.0%	59.0%	41.0%
Minimum Split (s)	8	41	41	41	41
Yellow Time (s)	3	4.9	4.6	4.9	4.6
All-Red Time (s)	0	2.7	3.8	2.7	3.8
Minimum Initial (s)	5	20	8	20	8
Vehicle Extension (s)	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)		7	7	7	7
Flash Dont Walk (s)		25	25	25	25
Intersection Summary					
Cycle Length			100		
Control Type			Actuated-Coordinated		
Natural Cycle			90		
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green					

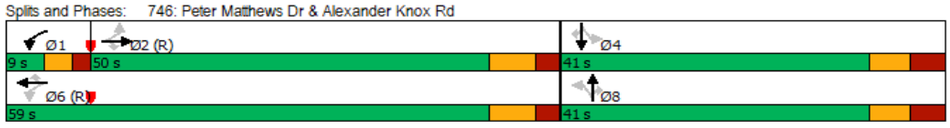
Splits and Phases: 746: Peter Matthews Dr & Alexander Knox Rd



PM Peak (14:30-20:00)

Phase Number	1	2	4	6	8
Movement	WBL	EBTL	SBTL	WBTL	NBTL
Lead/Lag	Lead	Lag			
Lead-Lag Optimize	Yes	Yes			
Recall Mode	None	C-Max	None	C-Max	None
Maximum Split (s)	9	50	41	59	41
Maximum Split (%)	9.0%	50.0%	41.0%	59.0%	41.0%
Minimum Split (s)	8	41	41	41	41
Yellow Time (s)	3	4.9	4.6	4.9	4.6
All-Red Time (s)	2	2.7	3.8	2.7	3.8
Minimum Initial (s)	3	20	8	20	8
Vehicle Extension (s)	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)		7	7	7	7
Flash Dont Walk (s)		25	25	25	25
Intersection Summary					
Cycle Length			100		
Control Type			Actuated-Coordinated		
Natural Cycle			90		
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green					

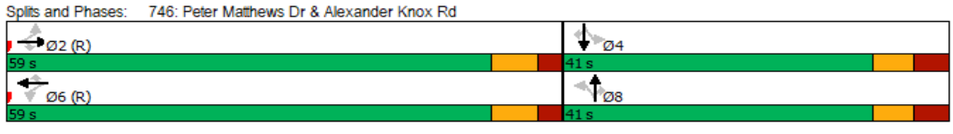
Splits and Phases: 746: Peter Matthews Dr & Alexander Knox Rd



Weekend Peak (9:00-22:00)

Phase Number	2	4	6	8
Movement	EBTL	SBTL	WBTL	NBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	C-Max	None	C-Max	None
Maximum Split (s)	59	41	59	41
Maximum Split (%)	59.0%	41.0%	59.0%	41.0%
Minimum Split (s)	41	41	41	41
Yellow Time (s)	4.9	4.6	4.9	4.6
All-Red Time (s)	2.7	3.8	2.7	3.8
Minimum Initial (s)	20	8	20	8
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7	7	7	7
Flash Dont Walk (s)	25	25	25	25
Intersection Summary				
Cycle Length			100	
Control Type			Actuated-Coordinated	
Natural Cycle			85	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green				

Splits and Phases: 746: Peter Matthews Dr & Alexander Knox Rd



**Please note a concerted effort has been made to ensure the accuracy and completeness of the data provided, however, inadvertent errors or omissions can still occur. Please bring any errors or omissions to the Region's attention.*

Appendix F:
Synchro Sheets

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	402	27	152	408	54	217
v/c Ratio	0.22	0.03	0.23	0.18	0.18	0.48
Control Delay	15.5	7.6	8.7	8.6	34.3	17.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.5	7.6	8.7	8.6	34.3	17.4
Queue Length 50th (m)	16.5	0.0	5.9	10.0	11.1	0.0
Queue Length 95th (m)	42.3	5.6	25.3	31.7	20.7	41.7
Internal Link Dist (m)	207.0			193.2	101.9	
Turn Bay Length (m)		135.0	115.0			
Base Capacity (vph)	1865	807	651	2320	596	669
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.03	0.23	0.18	0.09	0.32

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	370	25	140	375	50	200
Future Volume (vph)	370	25	140	375	50	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.3	3.3	3.5	3.5	3.5
Total Lost time (s)	7.6	7.6	5.0	7.6	8.4	8.4
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00	0.97	1.00	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3500	1491	1705	3500	1725	1525
Flt Permitted	1.00	1.00	0.47	1.00	0.95	1.00
Satd. Flow (perm)	3500	1491	846	3500	1725	1525
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	402	27	152	408	54	217
RTOR Reduction (vph)	0	13	0	0	0	179
Lane Group Flow (vph)	402	14	152	408	54	38
Confl. Peds. (#/hr)		15	15		15	15
Turn Type	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	2		1	6		
Permitted Phases		2	6		8	8
Actuated Green, G (s)	53.3	53.3	66.3	66.3	17.7	17.7
Effective Green, g (s)	53.3	53.3	66.3	66.3	17.7	17.7
Actuated g/C Ratio	0.53	0.53	0.66	0.66	0.18	0.18
Clearance Time (s)	7.6	7.6	5.0	7.6	8.4	8.4
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1865	794	629	2320	305	269
v/s Ratio Prot	0.11		c0.02	0.12		
v/s Ratio Perm		0.01	c0.14		c0.03	0.03
v/c Ratio	0.22	0.02	0.24	0.18	0.18	0.14
Uniform Delay, d1	12.3	11.0	6.4	6.4	35.0	34.7
Progression Factor	1.00	1.00	1.00	1.00	1.09	3.75
Incremental Delay, d2	0.3	0.0	0.2	0.2	0.3	0.2
Delay (s)	12.6	11.1	6.6	6.6	38.4	130.4
Level of Service	B	B	A	A	D	F
Approach Delay (s)	12.5			6.6	112.1	
Approach LOS	B			A	F	

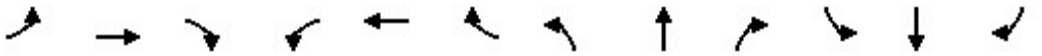
Intersection Summary			
HCM 2000 Control Delay	31.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	38	27	11	22	16	212	5	168	5
v/c Ratio	0.16	0.04	0.05	0.03	0.02	0.09	0.01	0.07	0.00
Control Delay	31.3	0.1	27.2	0.1	13.5	10.4	7.2	5.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.3	0.1	27.2	0.1	13.5	10.4	7.2	5.4	0.0
Queue Length 50th (m)	7.5	0.0	2.1	0.0	0.7	4.8	0.2	3.6	0.0
Queue Length 95th (m)	13.2	0.0	5.7	0.0	7.2	25.3	m1.0	6.2	m0.0
Internal Link Dist (m)		69.5		62.7		160.2		153.9	
Turn Bay Length (m)	50.0		50.0		130.0		110.0		100.0
Base Capacity (vph)	535	980	533	935	809	2490	776	2490	1054
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.03	0.02	0.02	0.02	0.09	0.01	0.07	0.00

Intersection Summary

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	0	25	10	0	20	15	195	0	5	155	5
Future Volume (vph)	35	0	25	10	0	20	15	195	0	5	155	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.3	3.5	3.3	3.3	3.5	3.3	3.3	3.5	3.3
Total Lost time (s)	8.4	8.4		8.4	8.4		7.6	7.6		7.6	7.6	7.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.97		1.00	1.00		1.00	1.00	0.95
Flpb, ped/bikes	0.99	1.00		0.99	1.00		0.98	1.00		0.98	1.00	1.00
Frt	1.00	0.85		1.00	0.85		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1687	1525		1687	1525		1673	3500		1675	3500	1458
Flt Permitted	0.74	1.00		0.74	1.00		0.65	1.00		0.62	1.00	1.00
Satd. Flow (perm)	1320	1525		1314	1525		1137	3500		1092	3500	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	0	27	11	0	22	16	212	0	5	168	5
RTOR Reduction (vph)	0	23	0	0	18	0	0	0	0	0	0	2
Lane Group Flow (vph)	38	4	0	11	4	0	16	212	0	5	168	3
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8		8	4		4
Actuated Green, G (s)	16.1	16.1		16.1	16.1		67.9	67.9		67.9	67.9	67.9
Effective Green, g (s)	16.1	16.1		16.1	16.1		67.9	67.9		67.9	67.9	67.9
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.68	0.68		0.68	0.68	0.68
Clearance Time (s)	8.4	8.4		8.4	8.4		7.6	7.6		7.6	7.6	7.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	212	245		211	245		772	2376		741	2376	989
v/s Ratio Prot		0.00			0.00			c0.06			0.05	
v/s Ratio Perm	c0.03			0.01			0.01			0.00		0.00
v/c Ratio	0.18	0.02		0.05	0.01		0.02	0.09		0.01	0.07	0.00
Uniform Delay, d1	36.2	35.3		35.5	35.3		5.2	5.5		5.2	5.4	5.2
Progression Factor	1.00	1.00		1.00	1.00		1.33	1.29		0.68	0.66	1.00
Incremental Delay, d2	0.4	0.0		0.1	0.0		0.0	0.1		0.0	0.1	0.0
Delay (s)	36.6	35.3		35.6	35.3		7.0	7.1		3.5	3.6	5.2
Level of Service	D	D		D	D		A	A		A	A	A
Approach Delay (s)		36.1			35.4			7.1			3.7	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.11		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

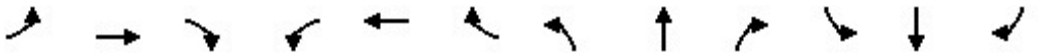
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	20	190	5	5	190
Future Volume (Veh/h)	10	20	190	5	5	190
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	22	207	5	5	207
Pedestrians	15		15			15
Lane Width (m)	3.4		3.4			3.4
Walking Speed (m/s)	1.2		1.2			1.2
Percent Blockage	1		1			1
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	350	134			227	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	350	134			227	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	97			100	
cM capacity (veh/h)	604	870			1323	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	11	22	104	104	5	5	104	104
Volume Left	11	0	0	0	0	5	0	0
Volume Right	0	22	0	0	5	0	0	0
cSH	604	870	1700	1700	1700	1323	1700	1700
Volume to Capacity	0.02	0.03	0.06	0.06	0.00	0.00	0.06	0.06
Queue Length 95th (m)	0.4	0.6	0.0	0.0	0.0	0.1	0.0	0.0
Control Delay (s)	11.1	9.2	0.0	0.0	0.0	7.7	0.0	0.0
Lane LOS	B	A				A		
Approach Delay (s)	9.9		0.0			0.2		
Approach LOS	A							

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	22.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	16	27	65	5	22	196	11	5	207	5
v/c Ratio	0.07	0.03	0.27	0.01	0.03	0.08	0.01	0.01	0.08	0.00
Control Delay	27.7	0.1	33.9	0.0	10.1	8.2	0.0	18.6	13.8	1.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.7	0.1	33.9	0.0	10.1	8.2	0.0	18.6	13.8	1.0
Queue Length 50th (m)	3.0	0.0	12.7	0.0	1.0	4.9	0.0	0.2	5.0	0.0
Queue Length 95th (m)	7.2	0.0	20.0	0.0	6.0	16.1	0.0	4.0	29.3	0.2
Internal Link Dist (m)		181.2		257.7		214.3			148.3	
Turn Bay Length (m)	50.0		50.0		120.0		110.0	110.0		110.0
Base Capacity (vph)	428	902	420	913	775	2473	1047	783	2473	1047
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.03	0.15	0.01	0.03	0.08	0.01	0.01	0.08	0.00

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	0	25	60	0	5	20	180	10	5	190	5
Future Volume (vph)	15	0	25	60	0	5	20	180	10	5	190	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.3	3.5	3.3	3.3	3.5	3.3	3.3	3.5	3.3
Total Lost time (s)	8.4	8.4		8.4	8.4		7.6	7.6	7.6	7.6	7.6	7.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.97		1.00	1.00	0.95	1.00	1.00	0.95
Flpb, ped/bikes	0.99	1.00		0.99	1.00		0.98	1.00	1.00	0.98	1.00	1.00
Frt	1.00	0.85		1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1687	1525		1687	1525		1675	3500	1458	1674	3500	1458
Flt Permitted	0.75	1.00		0.74	1.00		0.62	1.00	1.00	0.63	1.00	1.00
Satd. Flow (perm)	1340	1525		1314	1525		1097	3500	1458	1108	3500	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	0	27	65	0	5	22	196	11	5	207	5
RTOR Reduction (vph)	0	23	0	0	4	0	0	0	4	0	0	2
Lane Group Flow (vph)	16	4	0	65	1	0	22	196	7	5	207	3
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8		8	4		4
Actuated Green, G (s)	16.5	16.5		16.5	16.5		67.5	67.5	67.5	67.5	67.5	67.5
Effective Green, g (s)	16.5	16.5		16.5	16.5		67.5	67.5	67.5	67.5	67.5	67.5
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.68	0.68	0.68	0.68	0.68	0.68
Clearance Time (s)	8.4	8.4		8.4	8.4		7.6	7.6	7.6	7.6	7.6	7.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	221	251		216	251		740	2362	984	747	2362	984
v/s Ratio Prot		0.00			0.00			0.06			c0.06	
v/s Ratio Perm	0.01			c0.05			0.02		0.01	0.00		0.00
v/c Ratio	0.07	0.02		0.30	0.00		0.03	0.08	0.01	0.01	0.09	0.00
Uniform Delay, d1	35.3	35.0		36.7	34.9		5.4	5.6	5.3	5.3	5.6	5.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.75	1.69	1.00
Incremental Delay, d2	0.1	0.0		0.8	0.0		0.1	0.1	0.0	0.0	0.1	0.0
Delay (s)	35.4	35.0		37.5	34.9		5.5	5.7	5.3	9.3	9.5	5.3
Level of Service	D	C		D	C		A	A	A	A	A	A
Approach Delay (s)		35.2			37.3			5.6			9.4	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	505	98	293	446	38	185
v/c Ratio	0.29	0.12	0.47	0.19	0.12	0.44
Control Delay	18.6	5.6	10.9	8.7	30.4	15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.6	5.6	10.9	8.7	30.4	15.7
Queue Length 50th (m)	22.7	0.0	12.2	10.7	7.9	0.0
Queue Length 95th (m)	58.3	11.4	48.1	34.8	18.4	43.8
Internal Link Dist (m)	207.0			193.2	101.9	
Turn Bay Length (m)		135.0	115.0			
Base Capacity (vph)	1753	795	657	2324	552	613
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.12	0.45	0.19	0.07	0.30

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	465	90	270	410	35	170
Future Volume (vph)	465	90	270	410	35	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.3	3.3	3.5	3.5	3.5
Total Lost time (s)	7.6	7.6	5.0	7.6	8.4	8.4
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00	0.97	1.00	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3500	1491	1706	3500	1725	1525
Flt Permitted	1.00	1.00	0.42	1.00	0.95	1.00
Satd. Flow (perm)	3500	1491	746	3500	1725	1525
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	505	98	293	446	38	185
RTOR Reduction (vph)	0	49	0	0	0	152
Lane Group Flow (vph)	505	49	293	446	38	33
Confl. Peds. (#/hr)		15	15		15	15
Turn Type	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	2		1	6		
Permitted Phases		2	6		8	8
Actuated Green, G (s)	50.1	50.1	66.4	66.4	17.6	17.6
Effective Green, g (s)	50.1	50.1	66.4	66.4	17.6	17.6
Actuated g/C Ratio	0.50	0.50	0.66	0.66	0.18	0.18
Clearance Time (s)	7.6	7.6	5.0	7.6	8.4	8.4
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1753	746	603	2324	303	268
v/s Ratio Prot	0.14		c0.05	0.13		
v/s Ratio Perm		0.03	c0.27		c0.02	0.02
v/c Ratio	0.29	0.07	0.49	0.19	0.13	0.12
Uniform Delay, d1	14.6	12.9	7.1	6.5	34.7	34.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	3.12
Incremental Delay, d2	0.4	0.2	0.6	0.2	0.2	0.2
Delay (s)	15.0	13.0	7.7	6.7	34.9	108.5
Level of Service	B	B	A	A	C	F
Approach Delay (s)	14.7			7.1	96.0	
Approach LOS	B			A	F	

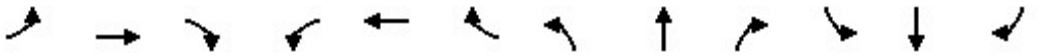
Intersection Summary			
HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	22	22	5	11	38	190	5	22	348	22
v/c Ratio	0.09	0.04	0.02	0.01	0.05	0.07	0.00	0.03	0.13	0.02
Control Delay	29.2	0.1	26.0	0.0	15.1	11.8	2.8	4.4	3.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.2	0.1	26.0	0.0	15.1	11.8	2.8	4.4	3.3	0.1
Queue Length 50th (m)	4.3	0.0	1.0	0.0	1.6	4.1	0.0	0.6	4.7	0.0
Queue Length 95th (m)	8.8	0.0	3.4	0.0	14.9	25.5	0.0	m1.5	7.7	m0.0
Internal Link Dist (m)		69.5		62.7		160.2			153.9	
Turn Bay Length (m)	50.0		50.0		130.0		110.0	110.0		100.0
Base Capacity (vph)	487	804	483	939	730	2660	1122	846	2660	1122
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.03	0.01	0.01	0.05	0.07	0.00	0.03	0.13	0.02

Intersection Summary

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	0	20	5	0	10	35	175	5	20	320	20
Future Volume (vph)	20	0	20	5	0	10	35	175	5	20	320	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.3	3.5	3.3	3.3	3.5	3.3	3.3	3.5	3.3
Total Lost time (s)	8.4	8.4		8.4	8.4		7.6	7.6	7.6	7.6	7.6	7.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.97		1.00	1.00	0.95	1.00	1.00	0.95
Flpb, ped/bikes	0.99	1.00		0.99	1.00		0.98	1.00	1.00	0.98	1.00	1.00
Frt	1.00	0.85		1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1687	1525		1687	1525		1681	3500	1458	1674	3500	1458
Flt Permitted	0.75	1.00		0.74	1.00		0.54	1.00	1.00	0.63	1.00	1.00
Satd. Flow (perm)	1333	1525		1320	1525		961	3500	1458	1114	3500	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	0	22	5	0	11	38	190	5	22	348	22
RTOR Reduction (vph)	0	19	0	0	9	0	0	0	2	0	0	7
Lane Group Flow (vph)	22	3	0	5	2	0	38	190	3	22	348	15
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8		8	4		4
Actuated Green, G (s)	14.4	14.4		14.4	14.4		69.6	69.6	69.6	69.6	69.6	69.6
Effective Green, g (s)	14.4	14.4		14.4	14.4		69.6	69.6	69.6	69.6	69.6	69.6
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.70	0.70	0.70	0.70	0.70	0.70
Clearance Time (s)	8.4	8.4		8.4	8.4		7.6	7.6	7.6	7.6	7.6	7.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	191	219		190	219		668	2436	1014	775	2436	1014
v/s Ratio Prot		0.00			0.00			0.05			c0.10	
v/s Ratio Perm	c0.02			0.00			0.04		0.00	0.02		0.01
v/c Ratio	0.12	0.01		0.03	0.01		0.06	0.08	0.00	0.03	0.14	0.02
Uniform Delay, d1	37.3	36.7		36.8	36.7		4.8	4.9	4.6	4.7	5.1	4.7
Progression Factor	1.00	1.00		1.00	1.00		1.57	1.55	1.00	0.45	0.42	1.00
Incremental Delay, d2	0.3	0.0		0.1	0.0		0.2	0.1	0.0	0.1	0.1	0.0
Delay (s)	37.5	36.7		36.8	36.7		7.7	7.7	4.6	2.2	2.3	4.7
Level of Service	D	D		D	D		A	A	A	A	A	A
Approach Delay (s)		37.1			36.7			7.6			2.4	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

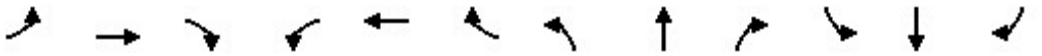
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	10	205	15	20	315
Future Volume (Veh/h)	5	10	205	15	20	315
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	11	223	16	22	342
Pedestrians	15		15			15
Lane Width (m)	3.4		3.4			3.4
Walking Speed (m/s)	1.2		1.2			1.2
Percent Blockage	1		1			1
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	468	142			254	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	468	142			254	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	99			98	
cM capacity (veh/h)	503	860			1293	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	5	11	112	112	16	22	171	171
Volume Left	5	0	0	0	0	22	0	0
Volume Right	0	11	0	0	16	0	0	0
cSH	503	860	1700	1700	1700	1293	1700	1700
Volume to Capacity	0.01	0.01	0.07	0.07	0.01	0.02	0.10	0.10
Queue Length 95th (m)	0.2	0.3	0.0	0.0	0.0	0.4	0.0	0.0
Control Delay (s)	12.2	9.2	0.0	0.0	0.0	7.8	0.0	0.0
Lane LOS	B	A				A		
Approach Delay (s)	10.2		0.0			0.5		
Approach LOS	B							

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	29.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	22	38	5	65	245	38	11	315	22
v/c Ratio	0.05	0.03	0.16	0.01	0.09	0.09	0.03	0.01	0.12	0.02
Control Delay	27.2	0.1	31.3	0.0	9.5	7.5	1.6	19.2	14.1	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.2	0.1	31.3	0.0	9.5	7.5	1.6	19.2	14.1	8.1
Queue Length 50th (m)	2.1	0.0	7.5	0.0	2.8	5.6	0.0	0.5	7.3	0.0
Queue Length 95th (m)	5.7	0.0	13.2	0.0	14.1	19.6	2.9	7.2	46.3	5.9
Internal Link Dist (m)		181.2		257.7		214.3			148.3	
Turn Bay Length (m)	50.0		50.0		120.0		110.0	110.0		110.0
Base Capacity (vph)	428	803	422	864	753	2658	1121	804	2658	1121
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.03	0.09	0.01	0.09	0.09	0.03	0.01	0.12	0.02

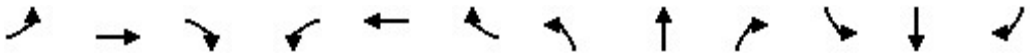
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	0	20	35	0	5	60	225	35	10	290	20
Future Volume (vph)	10	0	20	35	0	5	60	225	35	10	290	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.3	3.5	3.3	3.3	3.5	3.3	3.3	3.5	3.3
Total Lost time (s)	8.4	8.4		8.4	8.4		7.6	7.6	7.6	7.6	7.6	7.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.97		1.00	1.00	0.95	1.00	1.00	0.95
Flpb, ped/bikes	0.99	1.00		0.99	1.00		0.98	1.00	1.00	0.98	1.00	1.00
Frt	1.00	0.85		1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1687	1525		1687	1525		1680	3500	1458	1677	3500	1458
Flt Permitted	0.75	1.00		0.74	1.00		0.56	1.00	1.00	0.60	1.00	1.00
Satd. Flow (perm)	1340	1525		1320	1525		991	3500	1458	1058	3500	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	0	22	38	0	5	65	245	38	11	315	22
RTOR Reduction (vph)	0	19	0	0	4	0	0	0	12	0	0	7
Lane Group Flow (vph)	11	3	0	38	1	0	65	245	26	11	315	15
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8		8	4		4
Actuated Green, G (s)	14.5	14.5		14.5	14.5		69.5	69.5	69.5	69.5	69.5	69.5
Effective Green, g (s)	14.5	14.5		14.5	14.5		69.5	69.5	69.5	69.5	69.5	69.5
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.70	0.70	0.70	0.70	0.70	0.70
Clearance Time (s)	8.4	8.4		8.4	8.4		7.6	7.6	7.6	7.6	7.6	7.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	194	221		191	221		688	2432	1013	735	2432	1013
v/s Ratio Prot		0.00			0.00			0.07			c0.09	
v/s Ratio Perm	0.01			c0.03			0.07		0.02	0.01		0.01
v/c Ratio	0.06	0.01		0.20	0.00		0.09	0.10	0.03	0.01	0.13	0.02
Uniform Delay, d1	36.9	36.6		37.6	36.6		5.0	5.0	4.7	4.7	5.1	4.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.86	1.88	1.00
Incremental Delay, d2	0.1	0.0		0.5	0.0		0.3	0.1	0.0	0.0	0.1	0.0
Delay (s)	37.0	36.7		38.2	36.6		5.3	5.1	4.8	8.8	9.7	4.7
Level of Service	D	D		D	D		A	A	A	A	A	A
Approach Delay (s)		36.8			38.0			5.1			9.4	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		

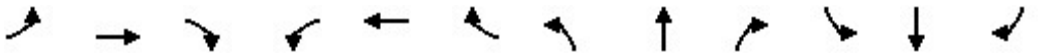
c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	120	543	16	130	592	125	5	717	65	54	321	87
v/c Ratio	0.28	0.27	0.02	0.29	0.30	0.14	0.02	0.77	0.15	0.50	0.34	0.19
Control Delay	14.5	11.9	0.1	14.4	12.2	4.7	35.2	41.6	17.1	47.2	29.8	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.5	11.9	0.1	14.4	12.2	4.7	35.2	41.6	17.1	47.2	29.8	6.5
Queue Length 50th (m)	11.8	27.7	0.0	12.8	30.8	3.1	0.6	59.4	0.2	9.3	27.6	0.0
Queue Length 95th (m)	26.8	43.3	0.0	28.7	47.6	12.7	m2.9	80.2	15.8	21.7	36.8	10.6
Internal Link Dist (m)		207.0			193.1			123.0			170.5	
Turn Bay Length (m)	145.0		135.0	115.0		75.0	120.0		110.0	120.0		100.0
Base Capacity (vph)	428	2003	878	456	2003	891	393	1386	629	158	1386	642
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.27	0.02	0.29	0.30	0.14	0.01	0.52	0.10	0.34	0.23	0.14

Intersection Summary

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	500	15	120	545	115	5	660	60	50	295	80
Future Volume (vph)	110	500	15	120	545	115	5	660	60	50	295	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.3	3.5	3.3	3.3	3.5	3.3	3.3	3.5	3.3
Total Lost time (s)	7.6	7.6	7.6	7.6	7.6	7.6	8.4	8.4	8.4	8.4	8.4	8.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1700	3500	1491	1699	3500	1491	1695	3500	1491	1703	3500	1491
Flt Permitted	0.42	1.00	1.00	0.45	1.00	1.00	0.56	1.00	1.00	0.22	1.00	1.00
Satd. Flow (perm)	749	3500	1491	797	3500	1491	995	3500	1491	400	3500	1491
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	543	16	130	592	125	5	717	65	54	321	87
RTOR Reduction (vph)	0	0	7	0	0	38	0	0	48	0	0	64
Lane Group Flow (vph)	120	543	9	130	592	87	5	717	17	54	321	23
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)	57.2	57.2	57.2	57.2	57.2	57.2	26.8	26.8	26.8	26.8	26.8	26.8
Effective Green, g (s)	57.2	57.2	57.2	57.2	57.2	57.2	26.8	26.8	26.8	26.8	26.8	26.8
Actuated g/C Ratio	0.57	0.57	0.57	0.57	0.57	0.57	0.27	0.27	0.27	0.27	0.27	0.27
Clearance Time (s)	7.6	7.6	7.6	7.6	7.6	7.6	8.4	8.4	8.4	8.4	8.4	8.4
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	428	2002	852	455	2002	852	266	938	399	107	938	399
v/s Ratio Prot		0.16			c0.17			c0.20			0.09	
v/s Ratio Perm	0.16		0.01	0.16		0.06	0.01		0.01	0.13		0.02
v/c Ratio	0.28	0.27	0.01	0.29	0.30	0.10	0.02	0.76	0.04	0.50	0.34	0.06
Uniform Delay, d1	10.9	10.8	9.2	10.9	11.0	9.7	26.9	33.7	27.1	31.0	29.5	27.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.45	1.08	2.55	1.00	1.00	1.00
Incremental Delay, d2	1.6	0.3	0.0	1.6	0.4	0.2	0.0	3.6	0.0	3.7	0.2	0.1
Delay (s)	12.5	11.2	9.2	12.5	11.4	10.0	39.0	39.9	69.1	34.7	29.7	27.3
Level of Service	B	B	A	B	B	A	D	D	E	C	C	C
Approach Delay (s)		11.4			11.4			42.3			29.8	
Approach LOS		B			B			D			C	

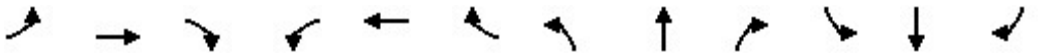
Intersection Summary			
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	98.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	33	228	5	38	141	728	5	380	82
v/c Ratio	0.14	0.50	0.03	0.12	0.23	0.31	0.01	0.16	0.08
Control Delay	30.8	8.0	26.4	16.0	7.2	6.3	6.8	5.3	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.8	8.0	26.4	16.0	7.2	6.3	6.8	5.3	1.4
Queue Length 50th (m)	6.5	1.0	1.0	3.1	6.4	17.5	0.2	7.2	0.4
Queue Length 95th (m)	11.9	17.3	3.4	9.6	12.1	24.4	m1.2	16.5	2.4
Internal Link Dist (m)		69.5		62.6		160.2		132.8	
Turn Bay Length (m)	50.0		50.0		130.0		110.0		100.0
Base Capacity (vph)	514	741	347	669	618	2324	434	2324	995
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.31	0.01	0.06	0.23	0.31	0.01	0.16	0.08

Intersection Summary

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	5	205	5	15	20	130	670	0	5	350	75
Future Volume (vph)	30	5	205	5	15	20	130	670	0	5	350	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.3	3.5	3.3	3.3	3.5	3.3	3.3	3.5	3.3
Total Lost time (s)	8.4	8.4		8.4	8.4		7.6	7.6		7.6	7.6	7.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.99		1.00	1.00		1.00	1.00	0.95
Flpb, ped/bikes	0.99	1.00		0.99	1.00		0.98	1.00		0.99	1.00	1.00
Frt	1.00	0.85		1.00	0.91		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1688	1532		1694	1657		1683	3500		1694	3500	1458
Flt Permitted	0.73	1.00		0.49	1.00		0.53	1.00		0.37	1.00	1.00
Satd. Flow (perm)	1301	1532		877	1657		932	3500		654	3500	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	5	223	5	16	22	141	728	0	5	380	82
RTOR Reduction (vph)	0	184	0	0	18	0	0	0	0	0	0	28
Lane Group Flow (vph)	33	44	0	5	20	0	141	728	0	5	380	54
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8		8	4		4
Actuated Green, G (s)	17.6	17.6		17.6	17.6		66.4	66.4		66.4	66.4	66.4
Effective Green, g (s)	17.6	17.6		17.6	17.6		66.4	66.4		66.4	66.4	66.4
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.66	0.66		0.66	0.66	0.66
Clearance Time (s)	8.4	8.4		8.4	8.4		7.6	7.6		7.6	7.6	7.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	228	269		154	291		618	2324		434	2324	968
v/s Ratio Prot		c0.03			0.01			c0.21			0.11	
v/s Ratio Perm	0.03			0.01			0.15			0.01		0.04
v/c Ratio	0.14	0.16		0.03	0.07		0.23	0.31		0.01	0.16	0.06
Uniform Delay, d1	34.8	35.0		34.1	34.4		6.7	7.1		5.7	6.3	5.9
Progression Factor	1.00	1.00		1.00	1.00		0.64	0.64		0.63	0.61	0.44
Incremental Delay, d2	0.3	0.3		0.1	0.1		0.8	0.3		0.0	0.1	0.1
Delay (s)	35.1	35.3		34.2	34.5		5.1	4.9		3.6	4.0	2.7
Level of Service	D	D		C	C		A	A		A	A	A
Approach Delay (s)		35.2			34.4			4.9			3.8	
Approach LOS		D			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	30	770	0	15	560
Future Volume (Veh/h)	5	30	770	0	15	560
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)	5	33	837	0	16	609
Pedestrians	15		15			15
Lane Width (m)	3.4		3.4			3.4
Walking Speed (m/s)	1.2		1.2			1.2
Percent Blockage	1		1			1
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1204	448			852	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1204	448			852	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	94			98	
cM capacity (veh/h)	169	545			773	

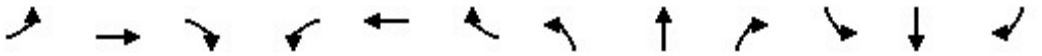
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	5	33	418	418	0	16	304	304
Volume Left	5	0	0	0	0	16	0	0
Volume Right	0	33	0	0	0	0	0	0
cSH	169	545	1700	1700	1700	773	1700	1700
Volume to Capacity	0.03	0.06	0.25	0.25	0.00	0.02	0.18	0.18
Queue Length 95th (m)	0.7	1.5	0.0	0.0	0.0	0.5	0.0	0.0
Control Delay (s)	26.9	12.0	0.0	0.0	0.0	9.8	0.0	0.0
Lane LOS	D	B				A		
Approach Delay (s)	14.0		0.0			0.2		
Approach LOS	B							

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	16	27	65	5	22	821	11	5	603	5
v/c Ratio	0.07	0.06	0.27	0.01	0.04	0.33	0.01	0.01	0.24	0.00
Control Delay	27.7	0.3	33.9	0.0	10.4	9.5	0.0	7.4	5.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.7	0.3	33.9	0.0	10.4	9.5	0.0	7.4	5.0	0.0
Queue Length 50th (m)	3.0	0.0	12.7	0.0	1.0	25.4	0.0	0.1	8.3	0.0
Queue Length 95th (m)	7.2	0.0	20.0	0.0	6.2	68.2	0.0	m1.2	25.6	m0.0
Internal Link Dist (m)		115.3		196.7		193.5			152.4	
Turn Bay Length (m)	50.0		50.0		120.0		110.0	110.0		110.0
Base Capacity (vph)	476	669	467	611	533	2473	1047	415	2473	1047
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.04	0.14	0.01	0.04	0.33	0.01	0.01	0.24	0.00

Intersection Summary

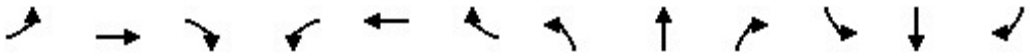
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	0	25	60	0	5	20	755	10	5	555	5
Future Volume (vph)	15	0	25	60	0	5	20	755	10	5	555	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.3	3.5	3.3	3.3	3.5	3.3	3.3	3.5	3.3
Total Lost time (s)	8.4	8.4		8.4	8.4		7.6	7.6	7.6	7.6	7.6	7.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.97		1.00	1.00	0.95	1.00	1.00	0.95
Flpb, ped/bikes	0.99	1.00		0.99	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.85		1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1687	1525		1687	1525		1690	3500	1458	1696	3500	1458
Flt Permitted	0.75	1.00		0.74	1.00		0.42	1.00	1.00	0.33	1.00	1.00
Satd. Flow (perm)	1340	1525		1314	1525		754	3500	1458	587	3500	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	0	27	65	0	5	22	821	11	5	603	5
RTOR Reduction (vph)	0	23	0	0	4	0	0	0	4	0	0	2
Lane Group Flow (vph)	16	4	0	65	1	0	22	821	7	5	603	3
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8		8	4		4
Actuated Green, G (s)	16.5	16.5		16.5	16.5		67.5	67.5	67.5	67.5	67.5	67.5
Effective Green, g (s)	16.5	16.5		16.5	16.5		67.5	67.5	67.5	67.5	67.5	67.5
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.68	0.68	0.68	0.68	0.68	0.68
Clearance Time (s)	8.4	8.4		8.4	8.4		7.6	7.6	7.6	7.6	7.6	7.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	221	251		216	251		508	2362	984	396	2362	984
v/s Ratio Prot		0.00			0.00			c0.23			0.17	
v/s Ratio Perm	0.01			c0.05			0.03		0.01	0.01		0.00
v/c Ratio	0.07	0.02		0.30	0.00		0.04	0.35	0.01	0.01	0.26	0.00
Uniform Delay, d1	35.3	35.0		36.7	34.9		5.4	6.9	5.3	5.3	6.4	5.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	0.67	0.55	1.00
Incremental Delay, d2	0.1	0.0		0.8	0.0		0.2	0.4	0.0	0.1	0.3	0.0
Delay (s)	35.4	35.0		37.5	34.9		5.6	7.3	5.3	3.6	3.8	5.3
Level of Service	D	C		D	C		A	A	A	A	A	A
Approach Delay (s)		35.2			37.3			7.2			3.8	
Approach LOS		D			D			A			A	

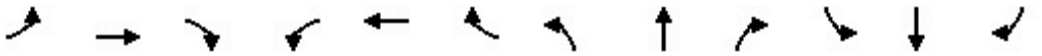
Intersection Summary			
HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	125	723	38	168	609	82	16	446	120	174	864	114
v/c Ratio	0.43	0.54	0.06	0.46	0.33	0.10	0.16	0.41	0.22	0.67	0.79	0.21
Control Delay	30.9	26.9	0.2	16.4	14.9	3.6	25.0	25.3	10.5	42.6	36.6	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.9	26.9	0.2	16.4	14.9	3.6	25.0	25.3	10.5	42.6	36.6	5.3
Queue Length 50th (m)	19.2	61.4	0.0	16.4	36.3	0.0	2.2	34.2	0.0	30.3	83.0	0.0
Queue Length 95th (m)	39.8	84.4	0.0	30.8	53.6	7.8	10.9	68.1	35.2	52.2	99.2	11.2
Internal Link Dist (m)		207.0			193.1			123.0			170.5	
Turn Bay Length (m)	145.0		135.0	115.0		75.0	120.0		110.0	120.0		100.0
Base Capacity (vph)	288	1343	641	375	1842	823	114	1281	621	303	1281	617
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.54	0.06	0.45	0.33	0.10	0.14	0.35	0.19	0.57	0.67	0.18

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	665	35	155	560	75	15	410	110	160	795	105
Future Volume (vph)	115	665	35	155	560	75	15	410	110	160	795	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.3	3.5	3.3	3.3	3.5	3.3	3.3	3.5	3.3
Total Lost time (s)	7.6	7.6	7.6	5.0	7.6	7.6	8.4	8.4	8.4	8.4	8.4	8.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1700	3500	1491	1709	3500	1491	1705	3500	1491	1698	3500	1491
Flt Permitted	0.42	1.00	1.00	0.26	1.00	1.00	0.17	1.00	1.00	0.46	1.00	1.00
Satd. Flow (perm)	754	3500	1491	460	3500	1491	311	3500	1491	830	3500	1491
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	723	38	168	609	82	16	446	120	174	864	114
RTOR Reduction (vph)	0	0	23	0	0	39	0	0	82	0	0	78
Lane Group Flow (vph)	125	723	15	168	609	43	16	446	38	174	864	36
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)	38.3	38.3	38.3	52.6	52.6	52.6	31.4	31.4	31.4	31.4	31.4	31.4
Effective Green, g (s)	38.3	38.3	38.3	52.6	52.6	52.6	31.4	31.4	31.4	31.4	31.4	31.4
Actuated g/C Ratio	0.38	0.38	0.38	0.53	0.53	0.53	0.31	0.31	0.31	0.31	0.31	0.31
Clearance Time (s)	7.6	7.6	7.6	5.0	7.6	7.6	8.4	8.4	8.4	8.4	8.4	8.4
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	288	1340	571	358	1841	784	97	1099	468	260	1099	468
v/s Ratio Prot		c0.21		c0.04	0.17			0.13			c0.25	
v/s Ratio Perm	0.17		0.01	0.20		0.03	0.05		0.03	0.21		0.02
v/c Ratio	0.43	0.54	0.03	0.47	0.33	0.06	0.16	0.41	0.08	0.67	0.79	0.08
Uniform Delay, d1	22.8	24.0	19.2	13.8	13.6	11.6	24.8	27.0	24.1	29.8	31.2	24.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.92	2.24	1.00	1.00	1.00
Incremental Delay, d2	4.7	1.6	0.1	1.0	0.5	0.1	0.8	0.2	0.1	6.4	3.8	0.1
Delay (s)	27.5	25.6	19.3	14.7	14.1	11.7	23.2	25.0	54.1	36.2	35.0	24.2
Level of Service	C	C	B	B	B	B	C	C	D	D	D	C
Approach Delay (s)		25.6			14.0			30.9			34.1	
Approach LOS		C			B			C			C	

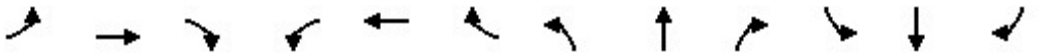
Intersection Summary			
HCM 2000 Control Delay	26.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	100.5%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	43	250	21	293	522	5	22	772	277
v/c Ratio	0.17	0.62	0.07	0.73	0.23	0.01	0.04	0.34	0.27
Control Delay	30.6	21.0	13.7	39.7	15.9	1.0	17.2	19.3	11.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.6	21.0	13.7	39.7	15.9	1.0	17.2	19.3	11.7
Queue Length 50th (m)	8.0	21.4	0.9	36.6	16.4	0.0	2.2	73.3	34.4
Queue Length 95th (m)	14.4	38.3	6.1	#113.8	74.6	m0.0	m6.5	103.1	51.2
Internal Link Dist (m)		69.5	62.6		160.2			132.8	
Turn Bay Length (m)	50.0			130.0		110.0	110.0		100.0
Base Capacity (vph)	430	596	532	400	2276	968	530	2276	1045
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.42	0.04	0.73	0.23	0.01	0.04	0.34	0.27

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	10	220	0	5	15	270	480	5	20	710	255
Future Volume (vph)	40	10	220	0	5	15	270	480	5	20	710	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.3	3.5	3.3	3.3	3.5	3.3	3.3	3.5	3.3
Total Lost time (s)	8.4	8.4			8.4		7.6	7.6	7.6	7.6	7.6	7.6
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.98			0.98		1.00	1.00	0.95	1.00	1.00	0.95
Flpb, ped/bikes	0.99	1.00			1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.86			0.89		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1687	1539			1599		1695	3500	1458	1688	3500	1458
Flt Permitted	0.74	1.00			1.00		0.34	1.00	1.00	0.46	1.00	1.00
Satd. Flow (perm)	1321	1539			1599		615	3500	1458	815	3500	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	11	239	0	5	16	293	522	5	22	772	277
RTOR Reduction (vph)	0	113	0	0	13	0	0	0	2	0	0	97
Lane Group Flow (vph)	43	137	0	0	8	0	293	522	3	22	772	180
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			6			2	
Permitted Phases	4			8			6		6	2		2
Actuated Green, G (s)	19.0	19.0			19.0		65.0	65.0	65.0	65.0	65.0	65.0
Effective Green, g (s)	19.0	19.0			19.0		65.0	65.0	65.0	65.0	65.0	65.0
Actuated g/C Ratio	0.19	0.19			0.19		0.65	0.65	0.65	0.65	0.65	0.65
Clearance Time (s)	8.4	8.4			8.4		7.6	7.6	7.6	7.6	7.6	7.6
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	250	292			303		399	2275	947	529	2275	947
v/s Ratio Prot		c0.09			0.01			0.15			0.22	
v/s Ratio Perm	0.03						c0.48		0.00	0.03		0.12
v/c Ratio	0.17	0.47			0.03		0.73	0.23	0.00	0.04	0.34	0.19
Uniform Delay, d1	33.9	36.0			33.0		11.7	7.2	6.1	6.3	7.9	7.0
Progression Factor	1.00	1.00			1.00		1.75	1.73	1.00	1.65	1.94	6.81
Incremental Delay, d2	0.3	1.2			0.0		11.1	0.2	0.0	0.1	0.3	0.4
Delay (s)	34.2	37.2			33.0		31.6	12.7	6.1	10.5	15.6	48.0
Level of Service	C	D			C		C	B	A	B	B	D
Approach Delay (s)		36.8			33.0			19.4			23.8	
Approach LOS		D			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	24.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	20	735	5	40	885
Future Volume (Veh/h)	5	20	735	5	40	885
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)	5	22	799	5	43	962
Pedestrians	15		15			15
Lane Width (m)	3.4		3.4			3.4
Walking Speed (m/s)	1.2		1.2			1.2
Percent Blockage	1		1			1
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1396	430			819	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1396	430			819	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	96			95	
cM capacity (veh/h)	122	560			796	

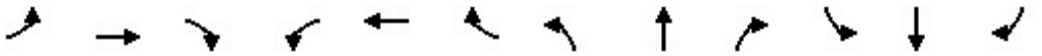
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	5	22	400	400	5	43	481	481
Volume Left	5	0	0	0	0	43	0	0
Volume Right	0	22	0	0	5	0	0	0
cSH	122	560	1700	1700	1700	796	1700	1700
Volume to Capacity	0.04	0.04	0.23	0.23	0.00	0.05	0.28	0.28
Queue Length 95th (m)	1.0	1.0	0.0	0.0	0.0	1.4	0.0	0.0
Control Delay (s)	35.8	11.7	0.0	0.0	0.0	9.8	0.0	0.0
Lane LOS	E	B				A		
Approach Delay (s)	16.1		0.0			0.4		
Approach LOS	C							

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	40.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	22	38	5	65	810	38	11	935	22
v/c Ratio	0.05	0.06	0.16	0.01	0.17	0.30	0.03	0.02	0.35	0.02
Control Delay	27.2	0.3	31.3	0.0	11.4	8.7	1.6	18.1	16.2	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.2	0.3	31.3	0.0	11.4	8.7	1.6	18.1	16.2	7.5
Queue Length 50th (m)	2.1	0.0	7.5	0.0	3.0	22.5	0.0	1.1	60.0	0.3
Queue Length 95th (m)	5.7	0.0	13.2	0.0	16.4	67.1	2.9	m5.5	107.8	m5.2
Internal Link Dist (m)		115.3		196.7		193.5			152.4	
Turn Bay Length (m)	50.0		50.0		120.0		110.0	110.0		110.0
Base Capacity (vph)	449	569	443	592	392	2658	1121	457	2658	1121
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.04	0.09	0.01	0.17	0.30	0.03	0.02	0.35	0.02

Intersection Summary

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	0	20	35	0	5	60	745	35	10	860	20
Future Volume (vph)	10	0	20	35	0	5	60	745	35	10	860	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.3	3.5	3.3	3.3	3.5	3.3	3.3	3.5	3.3
Total Lost time (s)	8.4	8.4		8.4	8.4		7.6	7.6	7.6	7.6	7.6	7.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.97		1.00	1.00	0.95	1.00	1.00	0.95
Flpb, ped/bikes	0.99	1.00		0.99	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.85		1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1687	1525		1687	1525		1699	3500	1458	1696	3500	1458
Flt Permitted	0.75	1.00		0.74	1.00		0.29	1.00	1.00	0.34	1.00	1.00
Satd. Flow (perm)	1340	1525		1320	1525		516	3500	1458	601	3500	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	0	22	38	0	5	65	810	38	11	935	22
RTOR Reduction (vph)	0	19	0	0	4	0	0	0	12	0	0	7
Lane Group Flow (vph)	11	3	0	38	1	0	65	810	26	11	935	15
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			6			2	
Permitted Phases	4			8			6		6	2		2
Actuated Green, G (s)	14.5	14.5		14.5	14.5		69.5	69.5	69.5	69.5	69.5	69.5
Effective Green, g (s)	14.5	14.5		14.5	14.5		69.5	69.5	69.5	69.5	69.5	69.5
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.70	0.70	0.70	0.70	0.70	0.70
Clearance Time (s)	8.4	8.4		8.4	8.4		7.6	7.6	7.6	7.6	7.6	7.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	194	221		191	221		358	2432	1013	417	2432	1013
v/s Ratio Prot		0.00			0.00			0.23			c0.27	
v/s Ratio Perm	0.01			c0.03			0.13		0.02	0.02		0.01
v/c Ratio	0.06	0.01		0.20	0.00		0.18	0.33	0.03	0.03	0.38	0.02
Uniform Delay, d1	36.9	36.6		37.6	36.6		5.3	6.1	4.7	4.7	6.3	4.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.71	1.81	1.00
Incremental Delay, d2	0.1	0.0		0.5	0.0		1.1	0.4	0.0	0.1	0.4	0.0
Delay (s)	37.0	36.7		38.2	36.6		6.4	6.4	4.8	8.2	11.9	4.7
Level of Service	D	D		D	D		A	A	A	A	B	A
Approach Delay (s)		36.8			38.0			6.4			11.7	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Appendix G:
Traffic Warrant Analysis

Input Data Sheet

Analysis Sheet | Results Sheet | Proposed Collision

GO TO Justification:

What are the intersecting roadways? Peter Matthews Dr / Doverwood Ave & Northern Site Access

What is the direction of the Main Road street? North-South

When was the data collected?

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road? 2 or more

b.- Number of lanes on the Minor Road? 1

c.- How many approaches? 4

d.- What is the operating environment? Urban Population >= 10,000 AND Speed < 70 km/hr

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

Hour Ending	Main Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
8:00	7	167	0	30	0	22	2	133	2	9	0	17	
9:00	15	195	0	35	0	25	5	155	5	10	0	20	
10:00	7	114	0	6	0	4	2	90	2	2	0	3	
12:00	12	100	0	12	0	8	4	80	4	3	0	7	
13:00	10	97	1	5	0	5	6	177	6	1	0	3	
17:00	32	172	5	15	0	15	18	315	18	4	0	7	
18:00	35	175	5	20	0	20	20	320	20	5	0	10	
19:00	29	158	4	21	0	21	16	288	16	5	0	10	
Total	**147**	**1,178**	**15**	**144**	**0**	**120**	**73**	**1,558**	**73**	**39**	**0**	**77**	**0**

Justification 5: Collision Experience

Preceding Months	Number of Collisions*
1-12	
13-24	
25-36	

* Include only collisions that are susceptable to correction through the installation of traffic signal control

Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume									
Factored 8 hour pedestrian volume	0		0		0		0		
% Assigned to crossing rate									
Net 8 Hour Pedestrian Volume at Crossing									0
Net 8 Hour Vehicular Volume on Street Being Crossed									

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	0	0	0	0	0	0	0	0	
Total 8 hour pedestrians delayed greater than 10 seconds									
Factored volume of total pedestrians	0		0		0		0		
Factored volume of delayed pedestrians	0		0		0		0		
% Assigned to Crossing Rate	0%		0%		0%		0%		
Net 8 Hour Volume of Total Pedestrians									0
Net 8 Hour Volume of Delayed Pedestrians									0

Analysis Sheet

Input Sheet | Results Sheet | Proposed Collision

GO TO Justification:

Intersection: Peter Matthews Dr / Doverwood Ave & Northern Site Access Count Date:

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 Lanes		2 or More Lanes		Hour Ending									
Flow Condition	FREE FLOW ☐	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☑	8:00	9:00	10:00	12:00	13:00	17:00	18:00	19:00		
1A	480	720	600	900	389	465	230	230	311	601	630	568		
	COMPLIANCE %				43	52	26	26	35	67	70	63	380	48
1B	120	170	120	170	78	90	15	30	14	41	55	57		
	COMPLIANCE %				46	53	9	18	8	24	32	34	224	28

Restricted Flow Signal Justification 1:

Both 1A and 1B 100% Fulfilled each of 8 hours — Yes ☐ No ☑

Lesser of 1A or 1B at least 80% fulfilled each of 8 hours — Yes ☐ No ☑

Justification 2: Delay to Cross Traffic

Restricted Flow Urban Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 lanes		2 or More lanes		Hour Ending									
Flow Condition	FREE FLOW ☐	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☑	8:00	9:00	10:00	12:00	13:00	17:00	18:00	19:00		
2A	480	720	600	900	311	375	215	200	297	560	575	511		
	COMPLIANCE %				35	42	24	22	33	62	64	57	338	42
2B	50	75	50	75	39	45	8	15	6	19	25	26		
	COMPLIANCE %				52	60	11	20	8	25	33	35	244	31

Restricted Flow Signal Justification 2:

Both 2A and 2B 100% fulfilled each of 8 hours — Yes ☐ No ☑

Lesser of 2A or 2B at least 80% fulfilled each of 8 hours — Yes ☐ No ☑

Justification 3: Combination

Combination Justification 1 and 2

	Justification Satisfied 80% or More			Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicle Volume	YES ☐	NO ☑	YES ☐	NO ☑
Justification 2	Delay Cross Traffic	YES ☐	NO ☑		NOT JUSTIFIED

Justification 4: Four Hour Volume

Justification	Time Period	Total Volume of Both Approaches (Main) X	Heaviest Minor Approach Y (actual)	Required Value Y (warrant threshold)	Average % Compliance	Overall % Compliance
Justification 4	9:00	375	60	538	11 %	9 %
	17:00	560	30	410	7 %	
	18:00	575	40	401	10 %	
	19:00	511	42	442	10 %	

Analysis Sheet

Input Sheet | Results Sheet | Proposed Collision

GO TO Justification:

Intersection: Peter Matthews Dr / Doverwood Ave & Northern Site Access Count Date:

Justification 5: Collision Experience

Justification	Preceding Months	% Fulfillment	Overall % Compliance
Justification 5	1-12	0 %	0 %
	13-24	0 %	
	25-36	0 %	

Justification 6: Pedestrian Volume

Pedestrian Volume Analysis

8 Hour Vehicular Volume V_8		Net 8 Hour Pedestrian Volume				
		< 200	200 - 275	276 - 475	476 - 1000	>1000
Justification 6A	< 1440	Not Justified				
	1440 - 2600					
	2601 - 7000					
	> 7000					

Pedestrian Delay Analysis

Net Total 8 Hour Volume of Total Pedestrians		Net Total 8 Hour Volume of Delayed Pedestrians		
		< 75	75 - 130	> 130
Justification 6B	< 200	Not Justified		
	200 - 300			
	> 300			

Results Sheet

Input Sheet | Analysis Sheet | Proposed Collision

GO TO Justification:

Intersection: Peter Matthews Dr / Doverwood Ave & Northern Site Count Date:

Summary Results

Justification			Compliance	Signal Justified? YES	Signal Justified? NO
1. Minimum Vehicular Volume	A	Total Volume	48 %	☐	☑
	B	Crossing Volume	28 %		
2. Delay to Cross Traffic	A	Main Road	42 %	☐	☑
	B	Crossing Road	31 %		
3. Combination	A	Justificaton 1	28 %	☐	☑
	B	Justification 2	31 %		
4. 4-Hr Volume			9 %	☐	☑
5. Collision Experience			0 %	☐	☑
6. Pedestrians	A	Volume	Justification not met	☐	☑
	B	Delay	Justification not met		