3777, 3787, 3791 & 3815 Portage Road Traffic Brief

Niagara Falls, Ontario

Project Number: PTRAN2023046

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Prepared for:
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Document Revision History

Rev	Description	Prepared/ Revised By	Reviewed By	Approved By	Date Issued (M/D/Y)
R0	Final Report for Submission	C. Zhang	M. Ismatyar	R. Sooklall	2/5/2024
R1	Final Report for Submission	R. Oh	R. Sooklall	R. Sooklall	5/16/2025

TraffMobility's Project Team

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1.0 Introduction

TraffMobility Engineering Inc. ("TraffMobility") was retained by Regent North Properties Inc. to prepare a Traffic Brief for the proposed development at 3777, 3787, 3791 & 3815 Portage Road in the City of Niagara Falls ("City"), Ontario. This report documents the analysis approach, results, and findings of the Traffic Brief.

1.1 Study Area

The subject site is bounded by Colborne Street to the north, St. John Street to the south, Portage Road to the east, and St. Peter Avenue to the west as shown in **Figure 1**.

Figure 1: Subject Site

1.2 Study Methodology

Intersection operations were assessed using the Synchro 11 software which utilizes the Highway Capacity Manual (HCM) methodology published by the Transportation Research Board National Research Council. Synchro 11 can analyze both signalized and unsignalized intersections in a road corridor or network considering the spacing, interaction, queues, and operations between intersections.

Intersection operations performance metrics are reported in terms of Level of Service (LOS), volume to capacity (v/c) ratios, and 95th percentile queues. Level of Service is based on the average control delay per vehicle for a given movement. Delay is an indicator of how long a vehicle must wait to complete a movement and is represented by a letter between 'A' and 'F', with 'F' being the longest delay. **Table 1** summarizes the LOS criteria for unsignalized intersections.

Table 1: Intersection Level of Service Criteria

Level of Service	Average Control Delay per Vehicle (second / vehicle)
	Unsignalized Intersection
A	≤ 10
B	>10 and ≤ 15
C	> 15 and ≤ 25
D	> 25 and ≤ 35
E	> 35 and ≤ 50
F	> 50

The analysis was conducted based on "*Transportation Impact Assessment Guidelines (2023)*" of Niagara Region ("Region"). For the purposes of the traffic analysis, the following criteria was used to identify critical movements as outlined in the Region's TIA guidelines:

- At signalized intersections, movements with v/c ratio greater than 0.85 and/or LOS "E" or worse.
- At unsignalized intersections, movements expected to operate at LOS "D" or worse and/or where the estimated 95th percentile queue length for an individual movement exceeds the available queueing space.
- An exclusive turning movement in which the 95th percentile queue will exceed the available storage space.
- Exclusive left- and right turn lanes that are inaccessible due to the length of queues in the adjacent through lanes.
- Any site accesses where entrances or egress is anticipated to be blocked by traffic queues from an upstream/downstream intersection.

Additionally, the following ideal saturation flow rates used in the analysis are based on "*Transportation Impact Assessment Guidelines (2023)*" of the Region:

- Shared left-through lane: 1,178 pc/h/ln
- Shared right-through lane: 1,338 pc/h/ln
- Shared left-through-right lane: 1,433 pc/h/ln

1.3 Data Collection

Existing traffic volumes at the site access with Portage Road were obtained from the traffic count survey conducted by Traffic-Survey-Analysis Inc. ("TSA") commissioned by TraffMobility. The turning movement count was conducted on January 17, 2024. A copy of the existing count is provided in **Appendix A**.

2.0 Existing Conditions

Traffic operations under existing conditions were analyzed for the weekday AM and weekday PM peak hours using the Synchro 11 software.

2.1 Existing Intersection Operations

Existing intersection operations were analyzed using the lane configurations illustrated in **Figure 2** and the existing (2024) traffic volumes shown in **Figure 3**. The peak hour factors ("PHFs") for the weekday AM and weekday PM peak hours were calculated based on the existing count. The analysis results are provided in **Table 2** and detailed calculations are provided in **Appendix B**.

The analysis results in **Table 2** indicate that all movements at the study intersection are operating with acceptable level of service and residual capacity during the weekday AM and weekday PM peak hours under existing conditions. Moreover, the analysis results indicate that the 95th percentile queues can be accommodated within the available storage under existing conditions.

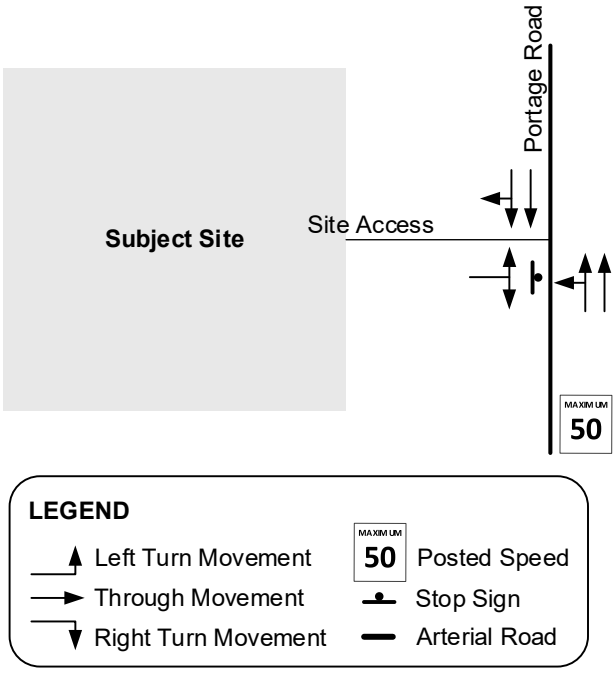


Figure 2: Existing Intersection Lane Configuration

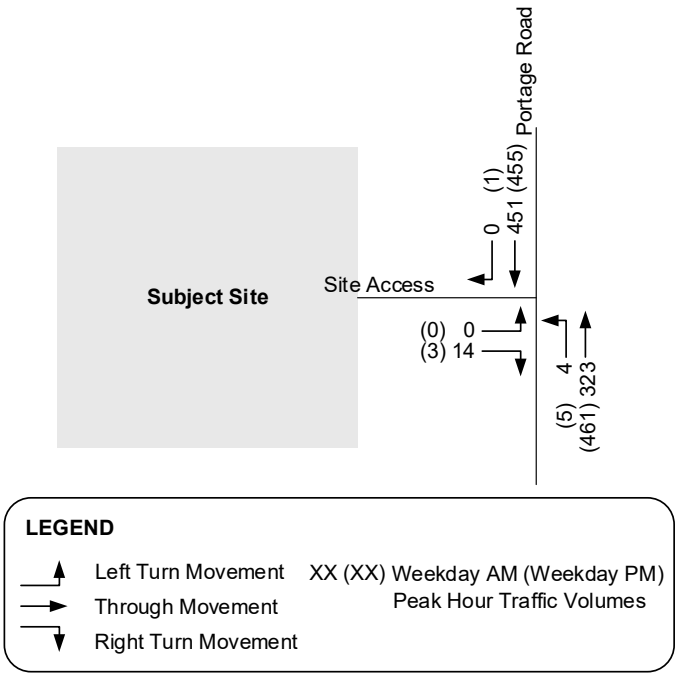


Figure 3: Existing Traffic Volumes

Table 2: Existing Conditions Intersection Operations

Intersection / Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c ratio	95th Percentile Queue (m)	LOS	Delay (s)	v/c ratio	95th Percentile Queue (m)	
Portage Road at Site Access (Unsignalized)									
EBLR	B	10	0.03	<7	A	10	0.00	<7	> 20
NBLT	A	0	0.16	<7	A	0	0.19	<7	> 80
SBTR	A	0	0.22	<7	A	0	0.19	<7	> 50

Note: LOS – level of service, v/c ratio – volume to capacity ratio

3.0 Proposed Development

The proposed development consists of a new 12-storey building with 94 dwelling units and the addition of 59 dwelling units to the existing two buildings for a total of 202 dwelling units (153 new and 49 existing units). Access to/from the subject site will be provided via the existing access fronting on Portage Road as shown on the site plan provided in **Appendix C**.

3.1 Trip Generation

The estimates of trips generated by the proposed development expansion are based on the following land uses from the Institute of Transportation Engineers (ITE) publication, Trip Generation Manual, 11th Edition:

- Multifamily Housing (Mid-Rise) (ITE LU Code 221)
- Multifamily Housing (High-Rise) (ITE LU Code 222)

The projected trip generation for the proposed development expansion during the weekday AM and weekday PM peak hours are summarized in **Table 3**. Relevant excerpts from the ITE Trip Generation Manual are provided in **Appendix D**.

Table 3: Trip Generation Summary

ITE Land Use	Units	Parameter	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Multifamily Housing (Mid-Rise) (ITE LU Code 221)	59	Equation	T = 0.44(X) - 11.61			T = 0.39(X) + 0.34		
		Gross Trips	3	11	14	14	9	23
		Net Auto Trips	**3**	**11**	**14**	**14**	**9**	**23**
Multifamily Housing (High-Rise) (ITE LU Code 222)	94	Equation	T = 0.22(X) + 18.85			T = 0.26(X) + 23.12		
		Gross Trips	14	26	40	26	22	48
		Net Auto Trips	**14**	**26**	**40**	**26**	**22**	**48**
Total Net Auto Trips			**17**	**37**	**54**	**40**	**31**	**71**

As detailed in **Table 3**, the proposed development expansion is expected to generate 54 additional auto trips during the weekday AM peak hour (17 trips in / 37 trips out) and 71 additional auto trips during the weekday PM peak hour (40 trips in / 31 trips out).

3.2 Trip Distribution

The trip distribution for the proposed development expansion is based on the existing travel patterns from the existing traffic counts. The resulting trip distribution is summarized in **Table 4**.

Table 4: Trip Distribution Summary

From/To	Via	Inbound	Outbound
North	Portage Road	40%	40%
South	Portage Road	60%	60%
Total		**100%**	**100%**

The resulting site generated trips from the proposed expansion were assigned to the study intersection as illustrated in **Figure 4**.

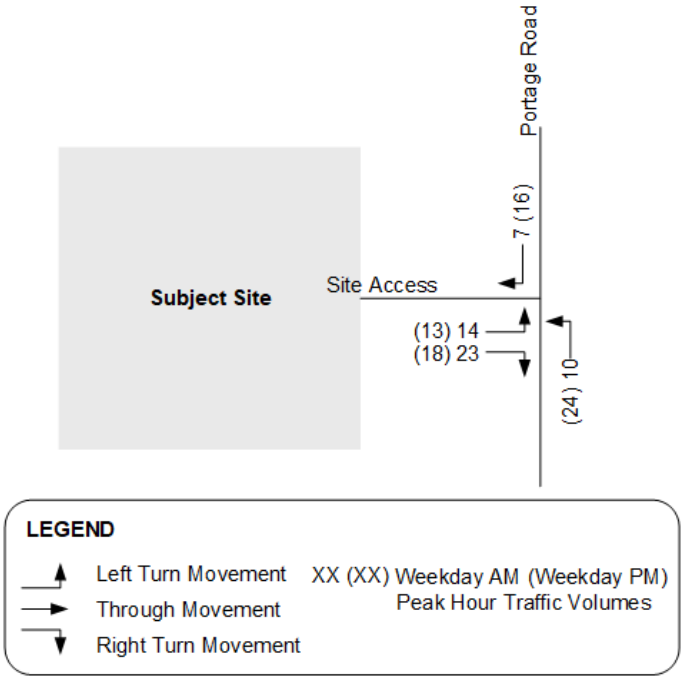


Figure 4: Site Traffic

4.0 Future Total Conditions

The anticipated completion year for the proposed expansion was assumed to be 2027. Traffic operations under future (2027) total conditions were analyzed for the weekday AM and weekday PM peak hours using the Synchro 11 software. The traffic analysis and results for the future total conditions are discussed in this section.

4.1 Future (2027) Total Intersection Operations

Future (2027) total intersection operations were assessed using the existing lane configurations illustrated in **Figure 2**. Future (2027) total traffic volumes were estimated by applying a growth rate 2% compounded per annum (as per the Region's *"Guidelines for Transportation Impact Studies"*) to the existing volumes (**Figure 3**) plus the site traffic (**Figure 4**). The resulting future (2027) total traffic volumes are shown in **Figure 5**. The analysis results are provided in **Table 5** and detailed calculations are provided in **Appendix E**.

The analysis results in **Table 5** indicate that all movements at the study intersection are expected to operate with acceptable level of service and residual capacity during the weekday AM and weekday PM peak hours under future (2027) total conditions. Moreover, the analysis results indicate that the 95th percentile queues can be accommodated within the available storage under future (2027) total conditions.

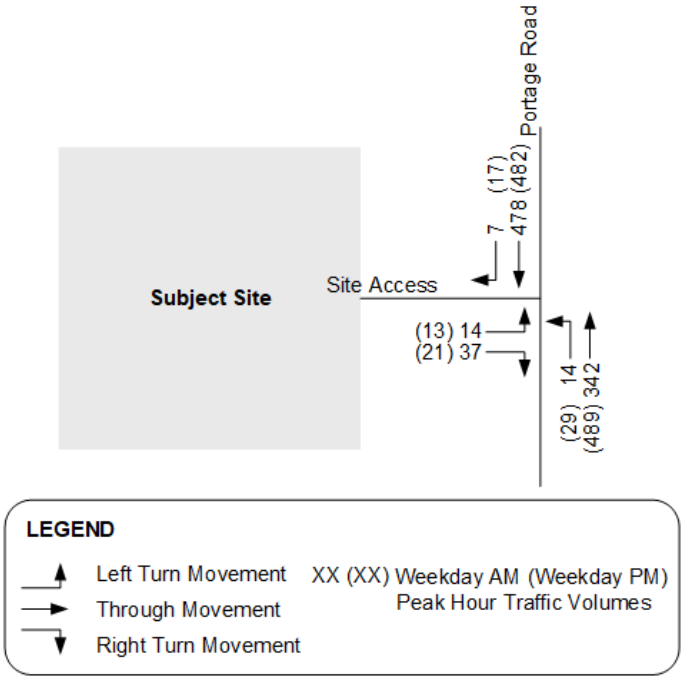


Figure 5: Future (2027) Total Traffic Volumes

Table 5: Future (2027) Total Conditions Intersection Operations

Intersection / Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c ratio	95th Percentile Queue (m)	LOS	Delay (s)	v/c ratio	95th Percentile Queue (m)	
Portage Road at Site Access (Unsignalized)									
EBLR	B	13	0.13	<7	B	13	0.08	<7	> 20
NBLT	A	1	0.17	<7	A	2	0.20	<7	> 80
SBTR	A	0	0.24	<7	A	0	0.20	<7	> 50

Note: LOS – level of service, v/c ratio – volume to capacity ratio

5.0 Left Turn Warrant

A left turn warrant analysis was conducted based on the requirements outlined in "*MTO Design Supplement for TAC Geometric Design Guide for Canadians Roads*" to determine if a left turn will be warranted on Portage Road at the site access under future (2027) total conditions and the detailed analysis results are provided in **Appendix F**. The results indicate that a left turn lane with a storage length of 15 metres is warranted on Portage Road at the site access, based on a design speed of 60 km/h as summarized in **Table 6**.

Table 6: Left Turn Lane Warrant

Analysis Factor	AM / PM Data	
Main Road	Portage Road	
Minor Road	Site Access	
Direction	Northbound	
Design Speed	60 km/h	
Condition	Future (2027) Total	
Peak Hour	AM	PM
Opposing Volume	485	499
Advancing Volume	356	518
Left Turning Volume	14	29
Warranted	No	Yes
Storage Length (m)	-	15

6.0 Parking Assessment

The proposed development adds 153 dwelling units to the existing 49 units on the project site, bringing the total dwelling units to 202. A total of 243 parking spaces is provided including 8 accessible parking spaces, which translates to 1.20 parking spaces per dwelling unit.

The new regular parking spaces proposed on site have a width of 2.75 m, a length of 6.00 m, and a perpendicular aisle width larger than 7.00 m, meeting the requirements outlined in Section 4.19.1 of the City's Zoning By-law No. 79-200, which specify a minimum width of 2.75 m, a minimum length of 6 m, and a minimum perpendicular manoeuvring aisle width of 6.9 m.

6.1 Zoning By-Law Requirements

According to the City's Zoning By-law No. 79-200, the proposed development can be categorized as "dwelling containing 4 or more dwelling units save and except an on-street townhouse dwelling". The following parking rate outlined in the City's Zoning By-law Section 4.19.1 is the applicable parking standards for the subject site:

- 1.4 parking space for each dwelling unit

Based on the preceding by-law requirement, the parking supply for the proposed development is summarized in **Table 7**. It is noted that the parking supply proposed for the development is deficient by 40 parking spaces.

Table 7: Zoning By-law Parking Space Requirement

Land Use	Units	By-law Requirement	Required Parking Supply	Proposed Parking Supply	Surplus (Deficiency)
Dwelling containing 4 or more dwelling units	202	1.4 space per dwelling unit	283	243	(40)
Parking Space per Dwelling Unit			**1.4**	**1.2**	**(0.2)**

The accessible parking supply for the proposed development was checked against Section 3 of the City's By-law No. 2019-44 and the findings are summarized in **Table 8**. It is noted that the accessible parking supply proposed for the development aligns with the By-law requirements.

The accessible parking spaces provided on site have a width of 3.9 m, a length of 6.0 m, and an accessible aisle width of 1.5 m, aligning with the requirements outlined in Sections 7 and 8 of By-law No. 2019-44, which specify a minimum width of 3.9 m, a minimum length of 6.0 m, and a minimum accessible aisle width of 1.5 m.

Table 8: Accessible Parking Requirement

Required Parking Spaces	By-law Requirement	Calculated Parking Supply per By-law	Proposed Parking Supply	Surplus (Deficiency)
283	2 plus 2% of total number of parking spaces	8	8	0

6.2 Parking Justification

It is noted that the proposed parking supply for the development has a deficiency of 40 parking spaces compared to the required number of parking spaces as per the City's Zoning by-law; therefore, a detailed parking justification study was conducted to assess whether the proposed number of parking spaces will meet the anticipated demand for the development.

6.2.1 Active and Public Transportation Infrastructure

Walk Score is an open data source that measures a location's walkability but evaluating the subject site's proximity to amenities and services essential to an average person's daily life. For each address, Walk Score analyzes hundreds of walking routes to amenities in the neighbourhood. Walk Score also evaluates a location's pedestrian friendliness by analyzing population density and road characteristics.

The subject site has a Walk Score of 90[1] out of 100, indicating that most errands can be completed on foot in this neighbourhood. The score is significantly higher than the average Walk Score of 64 for the City of Niagara Falls overall, highlighting the superior walkability of the site.

The area is well positioned for walking trips to all types of land uses including restaurants, groceries, shopping, errands, parks, schools, and entertainment as shown in **Figure 6**. In additional to distribution of pedestrian trips, **Figure 7** and **Figure 8** show various commercial establishments, educational institution, and medical clinic / pharmacies that are accessible within a 15-minute walk range.

[1] https://www.walkscore.com/score/3815-portage-rd-niagara-falls-on-canada (accessed May 2025)

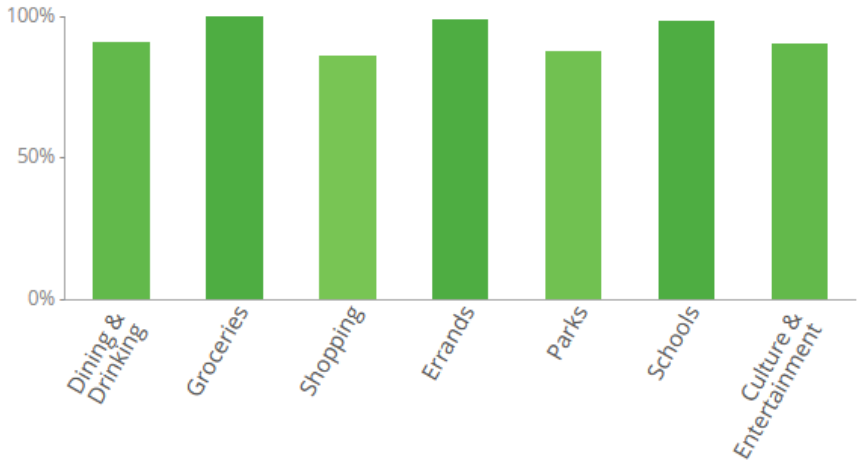


Figure 6: Walk Score Categories for Subject Site

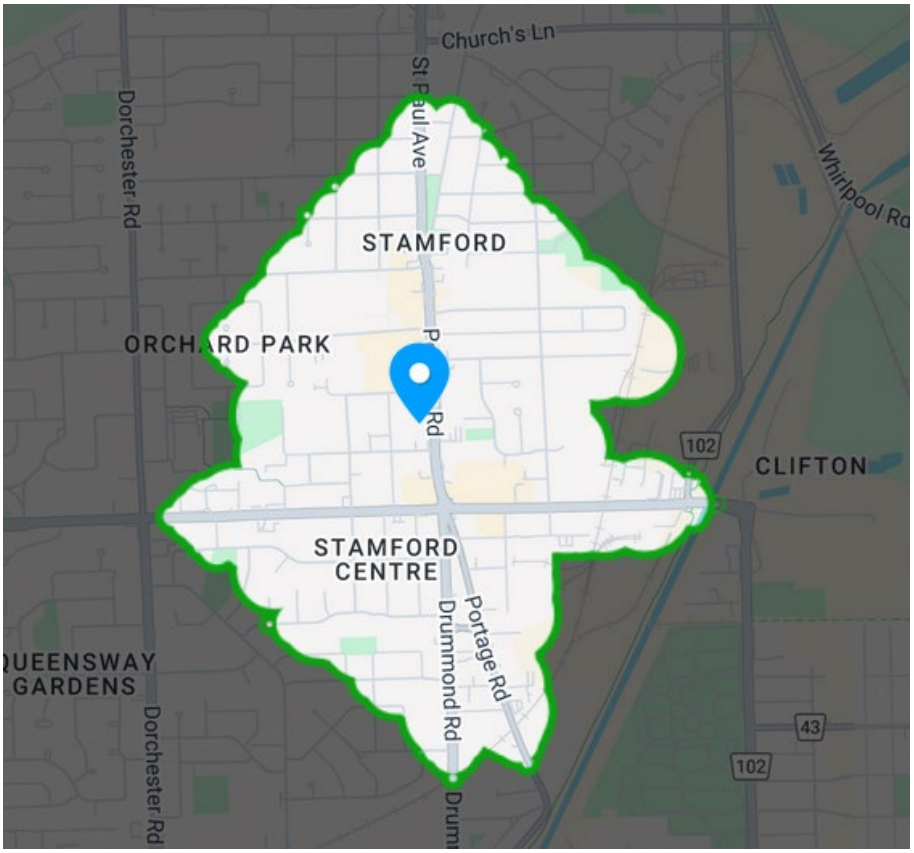


Figure 7: 15-Minute Travel Time Map by Walk

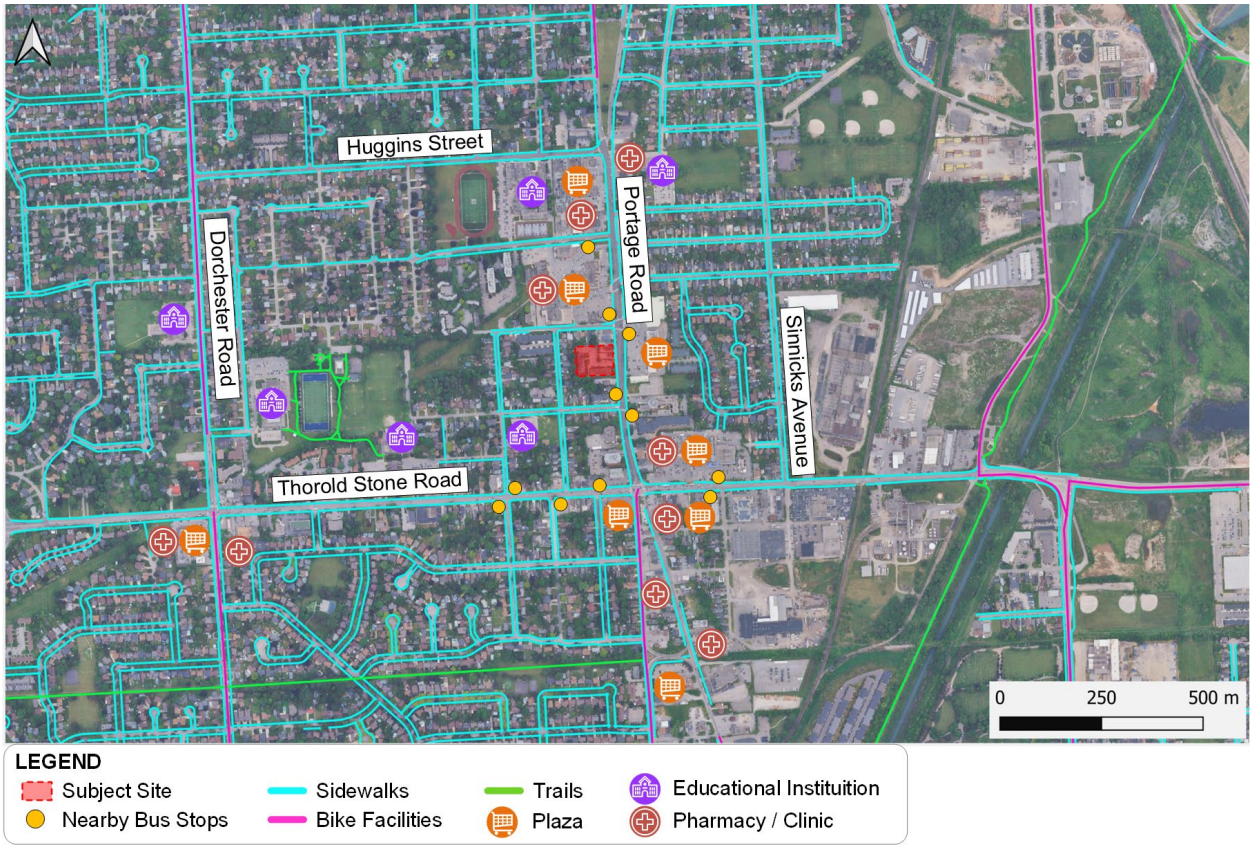


Figure 8: Existing Sidewalk Network including Connectivity to Transit Stops

Additionally, the subject site is well-served by public transit provided by Niagara Region Transit ("NRT"). The bus routes that directly serve the subject site include route 107, 108 and 114 during the daytime and route 214 during the evening period with service levels summarized in **Table 9** and route maps shown in **Figure 9**.

Route 107 operates along Portage Road and Drummond Road, connecting the Main Street/Ferry Hub with the Town/Country Plaza, which is located 300 meters north of the subject site. Route 108 provides service between the Morrison/Dorchester Hub and the Train/Bus Terminal, traveling through local neighborhoods. Routes 114 and 214 connect the Morrison/Dorchester Hub to the Town/Country Plaza via Dorchester Road and Portage Road.

Residents can access these routes from bus stops at the intersection of Portage Road and Colborne Street, located 125 m north of the subject site, serving both directions. Additionally, the bus stops at the intersection of Portage Road and St. John Street serve the same routes and are located 215 m south of the subject site.

Table 9: Niagara Region Transit Service Levels

Route		Monday - Saturday	Sundays / Holidays
107	Operation Period	NB: 6:30 am – 7:30 am SB: 6:15 am – 7:15 pm	-
	Interval	Off-Peak: 60 minutes Morning / Evening Peak: 30 minutes	-

Route		Monday - Saturday	Sundays / Holidays
108	Operation Period	EB: 7:00 am – 5:30 pm WB: 6:30 am – 5:00 pm	-
	Interval	Off-Peak: 60 minutes Morning / Evening Peak: 30 minutes	-
114/214	Operation Period	NB: 6:30 am – 10:30 pm SB: 6:48 am – 10:48 am	NB: 7:30 am – 7:30 pm SB: 7:48 am – 7:48 pm
	Interval	Every 60 minutes	Every 60 minutes

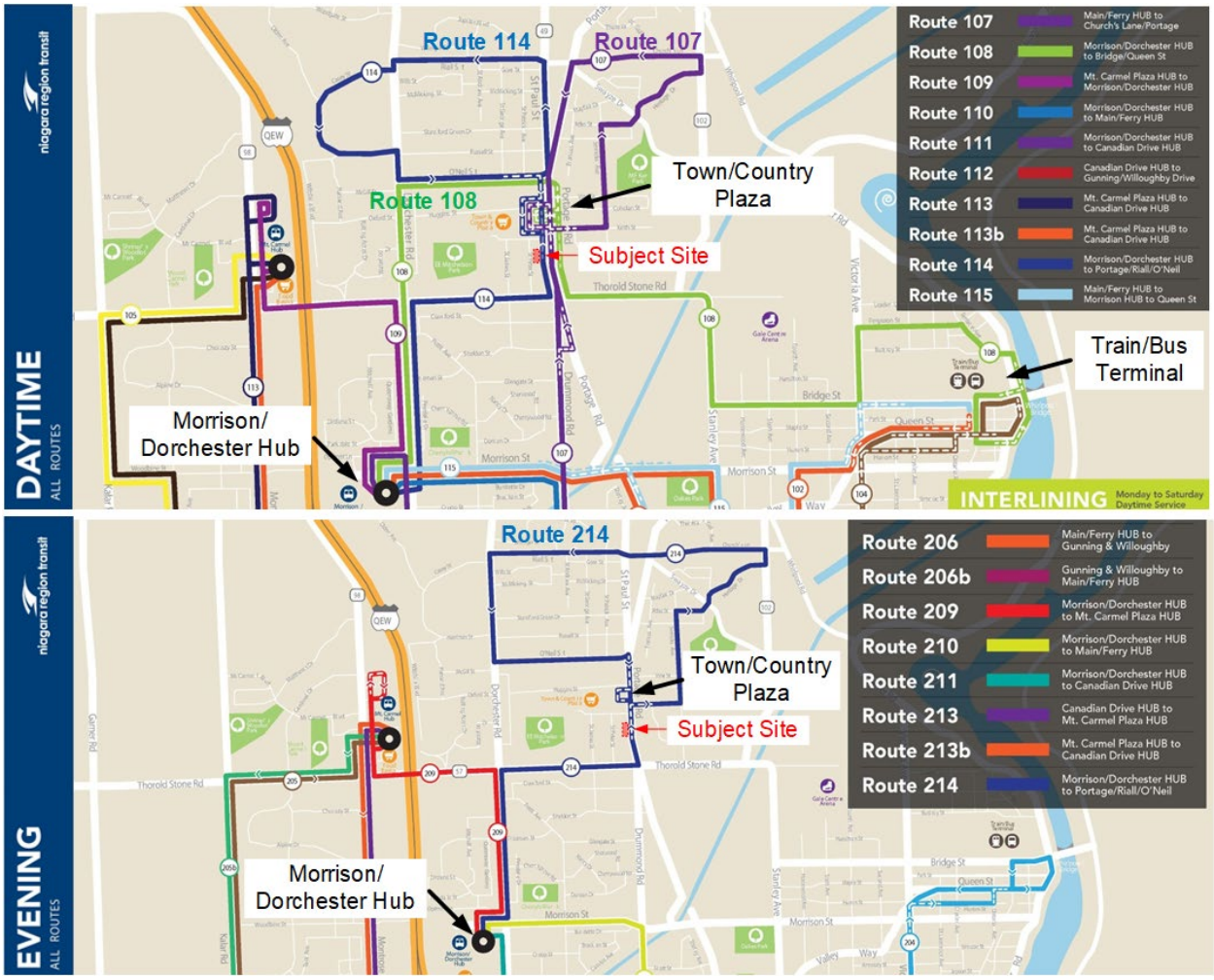


Figure 9: Existing Transit Service Route Maps

6.2.2 Parking Demand Generation

The Institute of Transportation Engineers ("ITE") Parking Generation Manual (6th edition) provides detailed data and methodologies for estimating parking demand for various types of land uses.

The proposed development will bring the total number of dwelling units at two mid-rise buildings to 108 and add a new high-rise building with 94 units. Based on the characteristics of the proposed

development, the parking demand for the subject site was estimated using the average rate of the following Land Use Codes from the ITE Parking Generation Manual:

- LU Code 221 – Multifamily Housing (Mid-Rise) with 2 or more bedrooms units
- LU Code 222 – Multifamily Housing (High-Rise) with 2 or more bedrooms units

The ITE Parking Generation Manual defines Mid-Rise Multifamily Housing as between four and ten floors (levels) and High-Rise Multifamily Housing as above ten floors.

Building 3791 (5 storeys) and Building 3815 (6 storeys) parking demand was analyzed as Mid-Rise multifamily housing and were assumed that all units have 2 or more bedrooms, a conservative approach. Building 3777 (12 storeys) parking demand was analyzed as High-Rise multifamily housing.

Given the subject site's location is in a low-medium density mixed-used space, the General Urban/Suburban setting was applied. The estimated parking demand using the ITE Parking Generation Manual rates are summarized in **Table 10**. The results show that the site will have a surplus of 14 parking spaces. Relevant excerpts from the ITE Parking Generation Manual are provided in **Appendix G**.

Table 10: ITE Parking Generation Manual Summary

Land Use	Height	Unit Type	Number of Units	Average Rate	Estimated Parking Demand	Total Estimated Demand	Proposed Supply
Multi-Family Housing	Mid	2 BR	53	1.23	65	229	243
		2 BR	55	1.23	68		
	High	2 BR	94	1.02	96		

6.2.3 Auto Ownership

The Transportation Tomorrow Survey ("TTS") collects data on urban travel in the southern Ontario region through collaborations between provincial and municipal governments. The most recent TTS data provides information on the number of vehicles owned by private households for the year 2022.

To estimate the vehicle ownership ratio in the study area, six traffic analysis zones were reviewed: Zone 11298, which includes the subject site, and the adjacent Zone 11301, 11303, 11309,11310 and 11311. These zones share similar characteristics such as the presence of schools and proximity to commercial areas. Given that the proposed development includes 5.5-story to 12-storey apartment buildings, vehicle ownership data for the dwelling type 2 (Apartment) were analyzed. The survey results are summarized in **Table 11** and the TTS data is provided in **Appendix H**.

The survey results indicate that the average vehicle ownership rate is 0.87 vehicles per unit. Applying this ratio to the proposed development with a total of 202 units, the estimated parking demand for residents is 176 spaces. Compared to 283 spaces required as per the City's current Zoning By-law, resulting in a deficiency of 40 spaces, the 2022 TTS data suggest a lower parking demand, with a surplus of 67 spaces.

Table 11: Vehicle Ownership Data Summary

Number of Vehicles in Household	Number of Households		Number of Vehicles
0	191	24%	0
1	535	66%	535
2	84	10%	168
Total	**810**	**100%**	**703**
Parking Space Ratio for Residents per Dwelling Unit		0.87	
Potential Parking Demand for 202 Dwelling Units		176 spaces	
Potential Parking Space Surplus (Deficiency)		67 spaces	

7.0 Transportation Demand Management (TDM) Plan

Transportation demand management ("TDM") is a set of strategies and initiatives used to improve transportation efficiency (i.e., reduce congestion), encourage use of alternative travel modes, and reduce reliance on single vehicle occupancy. The following TDM measures can be considered to further reduce the parking demand for the proposed development.

7.1.1 Unbundling Parking Spaces from Units

Auto parking spaces can be unbundled from the rental of the dwelling units, an excellent TDM measure which allows prospective residents to consider limiting the number of parking spaces they need which reduces the parking demand at the proposed development. If all the parking spaces are not utilized after rental of the units, the vacant spaces can be converted to other uses such as bicycle storage or carshare spaces.

7.1.2 Transit Services

Encourage residents to use transit as an alternative travel mode since the subject site is well served by frequent transit service. Residents can be provided with a package which includes pamphlets/maps outlining available transit routes and major destinations to/from the subject site.

7.1.3 Active Transportation

The subject site is in a highly walkable area where most errands can be completed on foot. Residents can be provided with pamphlets/maps that outline areas within 5, 10, 15, 20, 25, and 30-minute walking distances from the site, as well as the locations of key amenities within these distances. Including a list of those key amenities categorized by type, such as grocery stores, restaurants, pharmacies, and educational institutions, will offer a clearer understanding of the diverse amenities accessible by walking from the subject site.

8.0 Conclusions

Based on the analysis results, the following conclusions can be made:

Existing Conditions

- The analysis results indicate that all movements at the study intersection are operating with acceptable level of service and residual capacity during the weekday AM and weekday PM peak hours. Moreover, the analysis results indicate that the 95th percentile queues can be accommodated within the available storage.

Site Trip Generation

- The proposed development expansion is expected to generate 54 additional auto trips during the weekday AM peak hour (17 trips in / 37 trips out) and 71 additional auto trips during the weekday PM peak hour (40 trips in / 31 trips out).

Future Total Conditions

- The analysis results indicate that all movements at the study intersection are expected to operate with acceptable level of service and residual capacity during the weekday AM and weekday PM peak hours under future (2027) total conditions. Moreover, the analysis results indicate that the 95th percentile queues can be accommodated within the available storage.

Left Turn Warrant

- The analysis results indicate that a left turn lane with a storage length of 15 metres is warranted at the Portage Road site access.

Parking

- The proposed parking supply at 1.20 spaces per dwelling unit is sufficient to meet the expected parking demand. A site specific TDM Plan is proposed to further reduce auto dependency.

Appendix A

Existing Turning Movement Count Data

Portage Road & 3777 Portage Road Driveway

Morning Peak Diagram

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

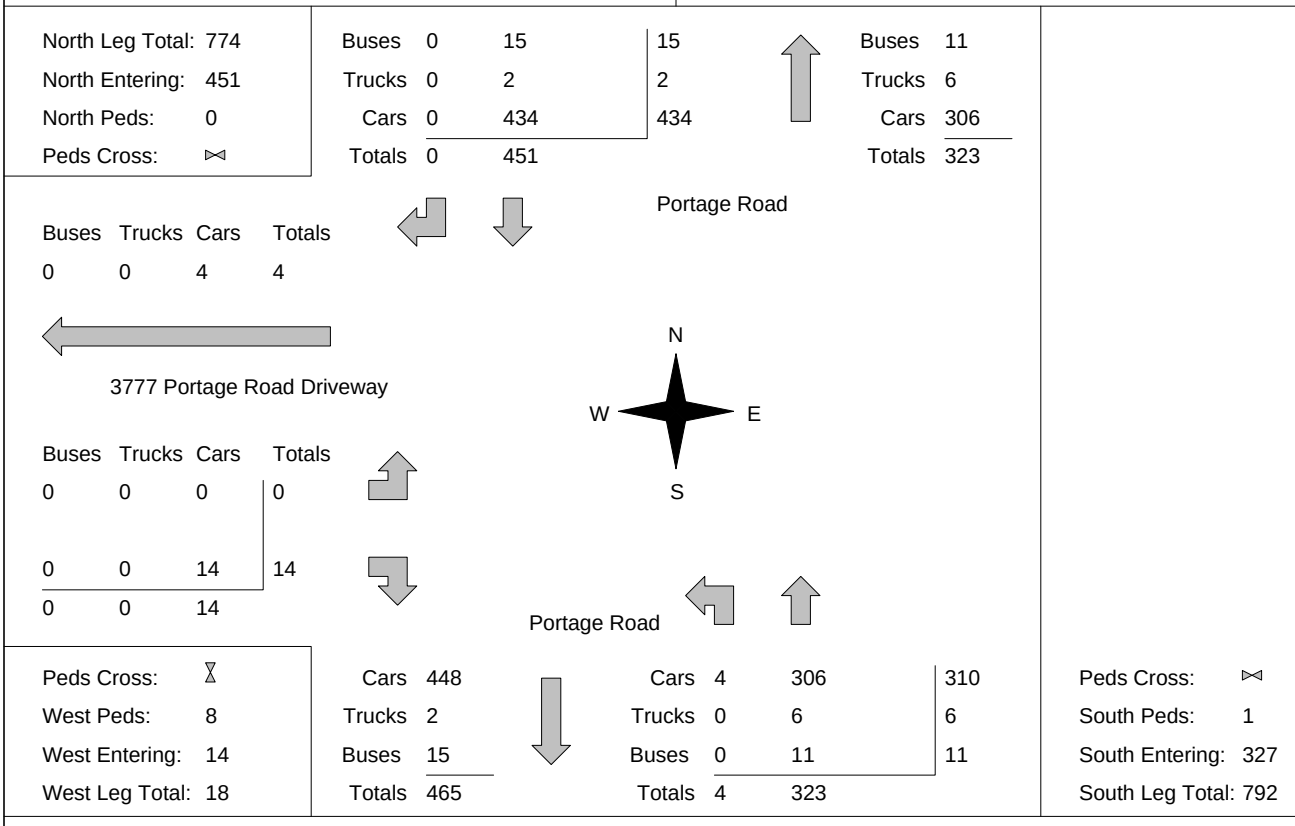
One Hour Peak
From: 8:00:00
To: 9:00:00

Municipality: Niagara Falls
Site #: 0000000400
Intersection: Portage Road & 3777 Portage Roa
TFR File #: 1
Count date: 17-Jan-2024

Weather conditions: Cloudy
Person(s) who counted:

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

Major Road: Portage Road runs N/S



Comments

Portage Road & 3777 Portage Road Driveway

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 18:00:00

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

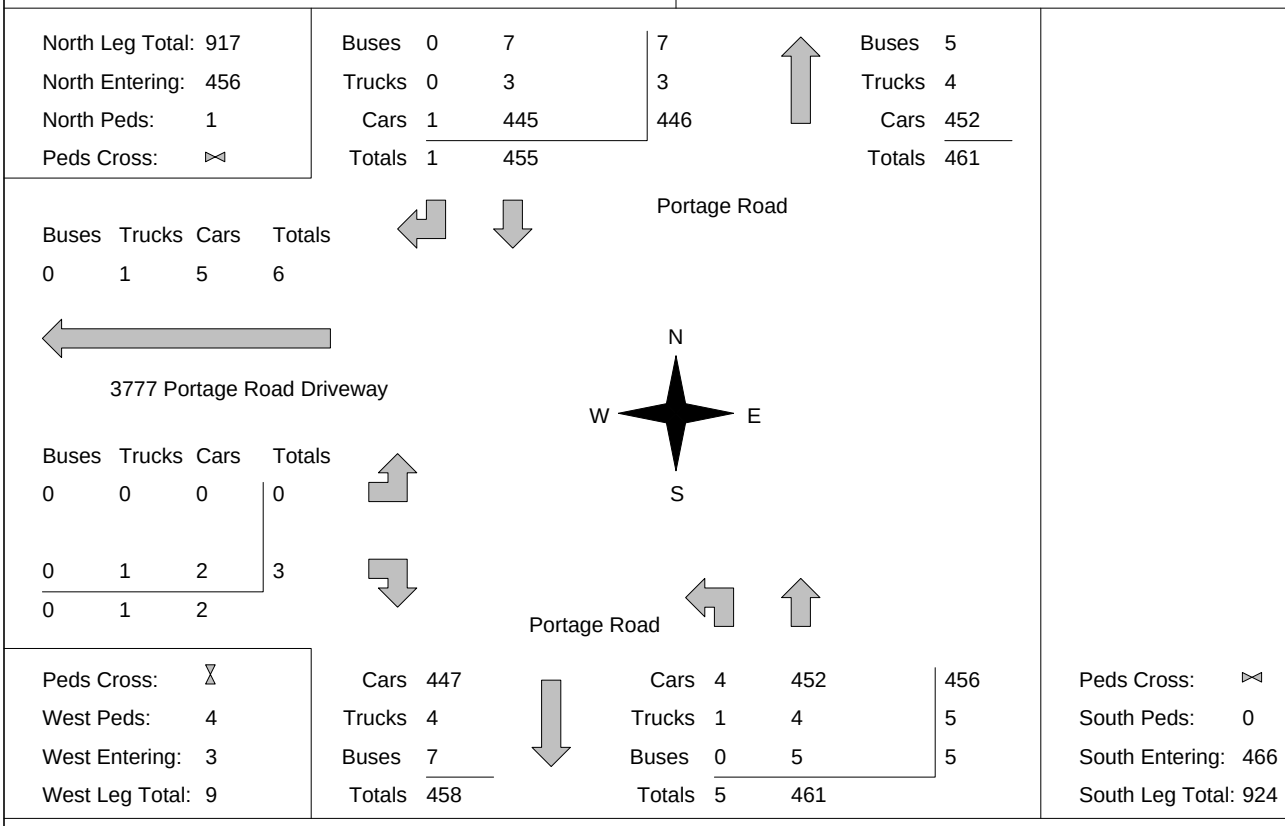
Municipality: Niagara Falls
Site #: 0000000400
Intersection: Portage Road & 3777 Portage Roa
TFR File #: 1
Count date: 17-Jan-2024

Weather conditions:
Cloudy

Person(s) who counted:

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

Major Road: Portage Road runs N/S



Comments

Portage Road & 3777 Portage Road Driveway

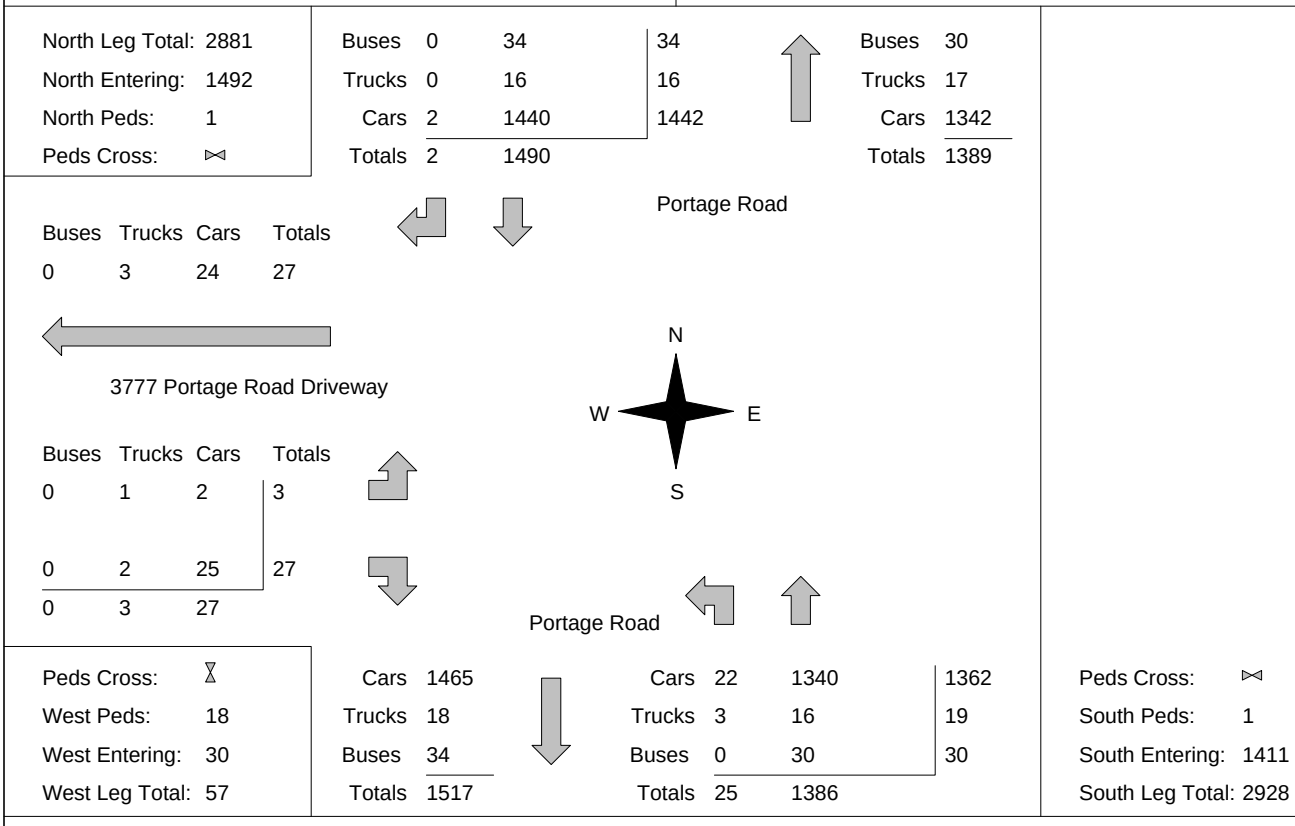
Total Count Diagram

Municipality: Niagara Falls
Site #: 0000000400
Intersection: Portage Road & 3777 Portage Roa
TFR File #: 1
Count date: 17-Jan-2024

Weather conditions: Cloudy
Person(s) who counted:

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

Major Road: Portage Road runs N/S



Comments

Portage Road & 3777 Portage Road Driveway
Traffic Count Summary

Intersection: Portage Road & 3777 Portage Roa | **Count Date:** 17-Jan-2024 | **Municipality:** Niagara Falls

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	0	189	0	189	0	366
9:00:00	0	451	0	451	0	778
16:00:00	0	0	0	0	0	0
17:00:00	0	455	1	456	1	922
18:00:00	0	395	1	396	0	837
Totals:	0	1490	2	1492	1	2903

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	3	174	0	177	0
9:00:00	4	323	0	327	1
16:00:00	0	0	0	0	0
17:00:00	5	461	0	466	0
18:00:00	13	428	0	441	0
Totals:	25	1386	0	1411	1

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	0	0	0	0	0	5
9:00:00	0	0	0	0	0	14
16:00:00	0	0	0	0	0	0
17:00:00	0	0	0	0	0	3
18:00:00	0	0	0	0	0	8
Totals:	0	0	0	0	0	30

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	0	0	5	5	3
9:00:00	0	0	14	14	8
16:00:00	0	0	0	0	0
17:00:00	0	0	3	3	4
18:00:00	3	0	5	8	3
Totals:	3	0	27	30	18

Calculated Values for Traffic Crossing Major Street

Hours Ending:	7:00	8:00	9:00	16:00	17:00	18:00	18:00	18:00
Crossing Values:	0	0	1	0	1	3	3	3

Portage Road & 3777 Portage Road Driveway

Morning Peak Diagram

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

One Hour Peak
From: 7:15:00
To: 8:15:00

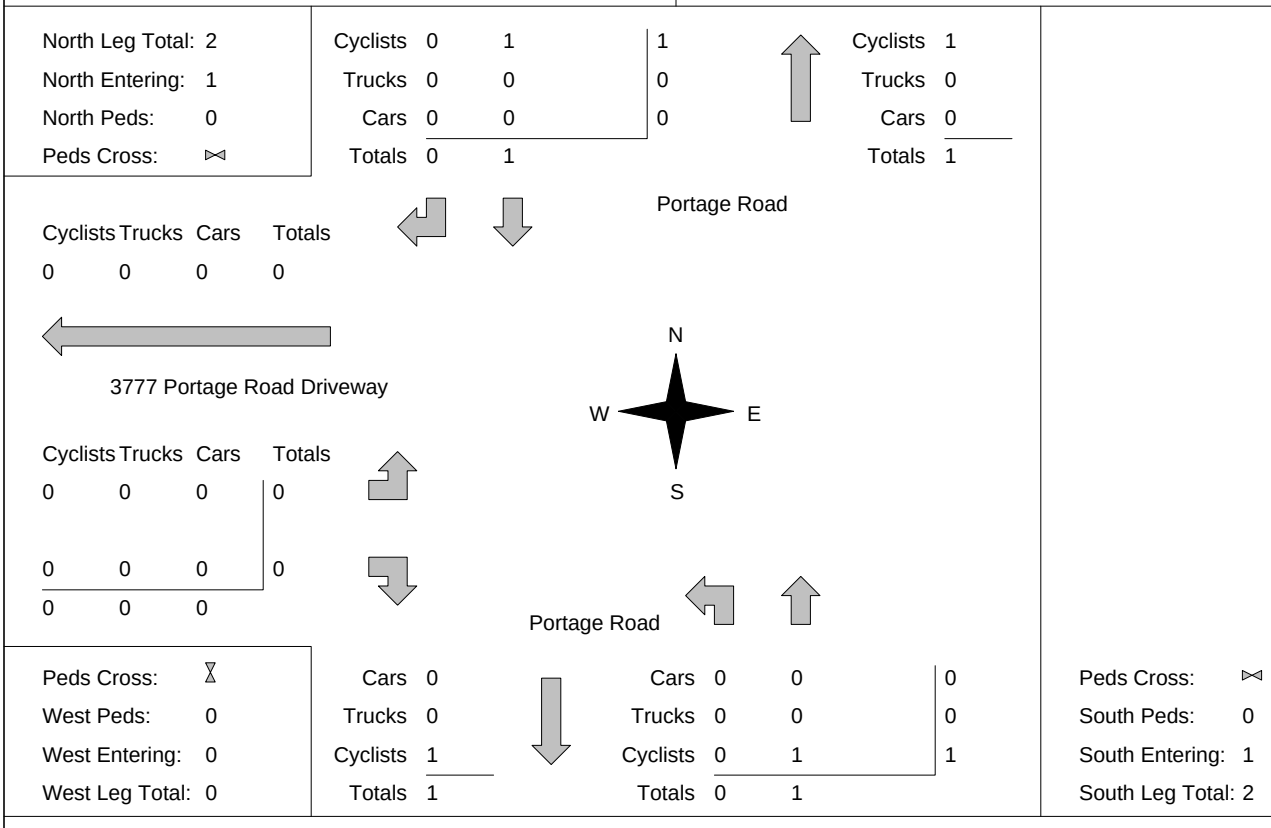
Municipality: Niagara Falls
Site #: 5000000400
Intersection: Portage Road & 3777 Portage Roa
TFR File #: 1
Count date: 17-Jan-2024

Weather conditions:
Cloudy

Person(s) who counted:

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

Major Road: Portage Road runs N/S



Comments

Portage Road & 3777 Portage Road Driveway

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 18:00:00

One Hour Peak
From:
To:

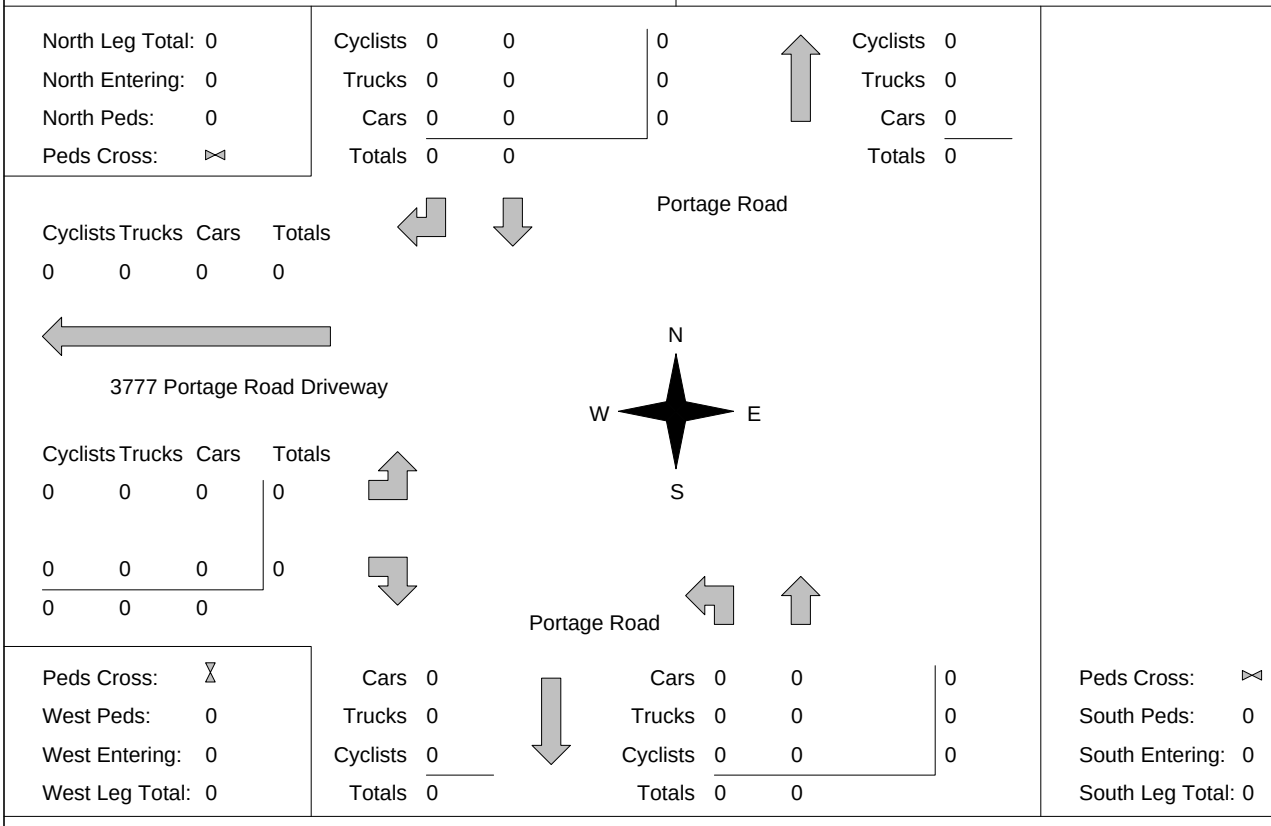
Municipality: Niagara Falls
Site #: 5000000400
Intersection: Portage Road & 3777 Portage Roa
TFR File #: 1
Count date: 17-Jan-2024

Weather conditions:
Cloudy

Person(s) who counted:

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

Major Road: Portage Road runs N/S



Comments

Portage Road & 3777 Portage Road Driveway

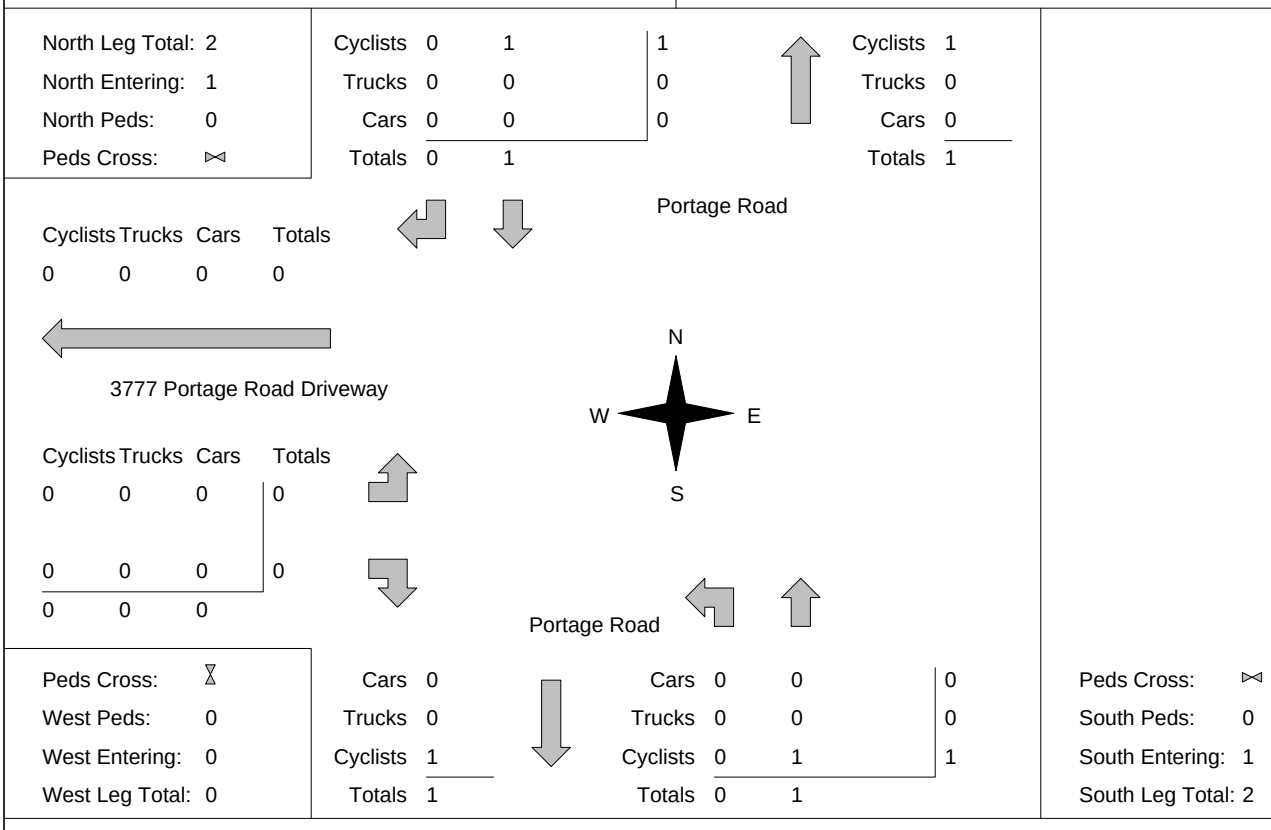
Total Count Diagram

Municipality: Niagara Falls
Site #: 5000000400
Intersection: Portage Road & 3777 Portage Roa
TFR File #: 1
Count date: 17-Jan-2024

Weather conditions: Cloudy
Person(s) who counted:

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

Major Road: Portage Road runs N/S



Comments

Portage Road & 3777 Portage Road Driveway
Traffic Count Summary

Intersection: Portage Road & 3777 Portage Roa | **Count Date:** 17-Jan-2024 | **Municipality:** Niagara Falls

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Cyclists: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	0	0	0	0	0	1
9:00:00	0	1	0	1	0	1
16:00:00	0	0	0	0	0	0
17:00:00	0	0	0	0	0	0
18:00:00	0	0	0	0	0	0
Totals:	0	1	0	1	0	2

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Cyclists: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	0	1	0	1	0
9:00:00	0	0	0	0	0
16:00:00	0	0	0	0	0
17:00:00	0	0	0	0	0
18:00:00	0	0	0	0	0
	0	1	0	1	0

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Cyclists: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	0	0	0	0	0	0
9:00:00	0	0	0	0	0	0
16:00:00	0	0	0	0	0	0
17:00:00	0	0	0	0	0	0
18:00:00	0	0	0	0	0	0
Totals:	0	0	0	0	0	0

West Approach Totals

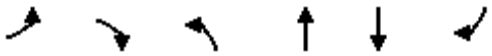
Hour Ending	Includes Cars, Trucks, & Cyclists: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	0	0	0	0	0
9:00:00	0	0	0	0	0
16:00:00	0	0	0	0	0
17:00:00	0	0	0	0	0
18:00:00	0	0	0	0	0
	0	0	0	0	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	7:00	8:00	9:00	16:00	17:00	17:00	18:00	18:00
Crossing Values:	0	0	0	0	0	0	0	0

Appendix B

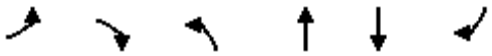
Existing Intersection Operation Calculations (Synchro)



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	14	4	323	451	0
Future Volume (Veh/h)	0	14	4	323	451	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	0	18	5	409	571	0
Pedestrians	8			1		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	794	294	579			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	794	294	579			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	97	99			
cM capacity (veh/h)	325	702	997			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	18	141	273	381	190
Volume Left	0	5	0	0	0
Volume Right	18	0	0	0	0
cSH	702	997	1700	1700	1700
Volume to Capacity	0.03	0.01	0.16	0.22	0.11
Queue Length 95th (m)	0.6	0.1	0.0	0.0	0.0
Control Delay (s)	10.3	0.4	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	10.3	0.1		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	29.3%	ICU Level of Service	A
Analysis Period (min)	15		



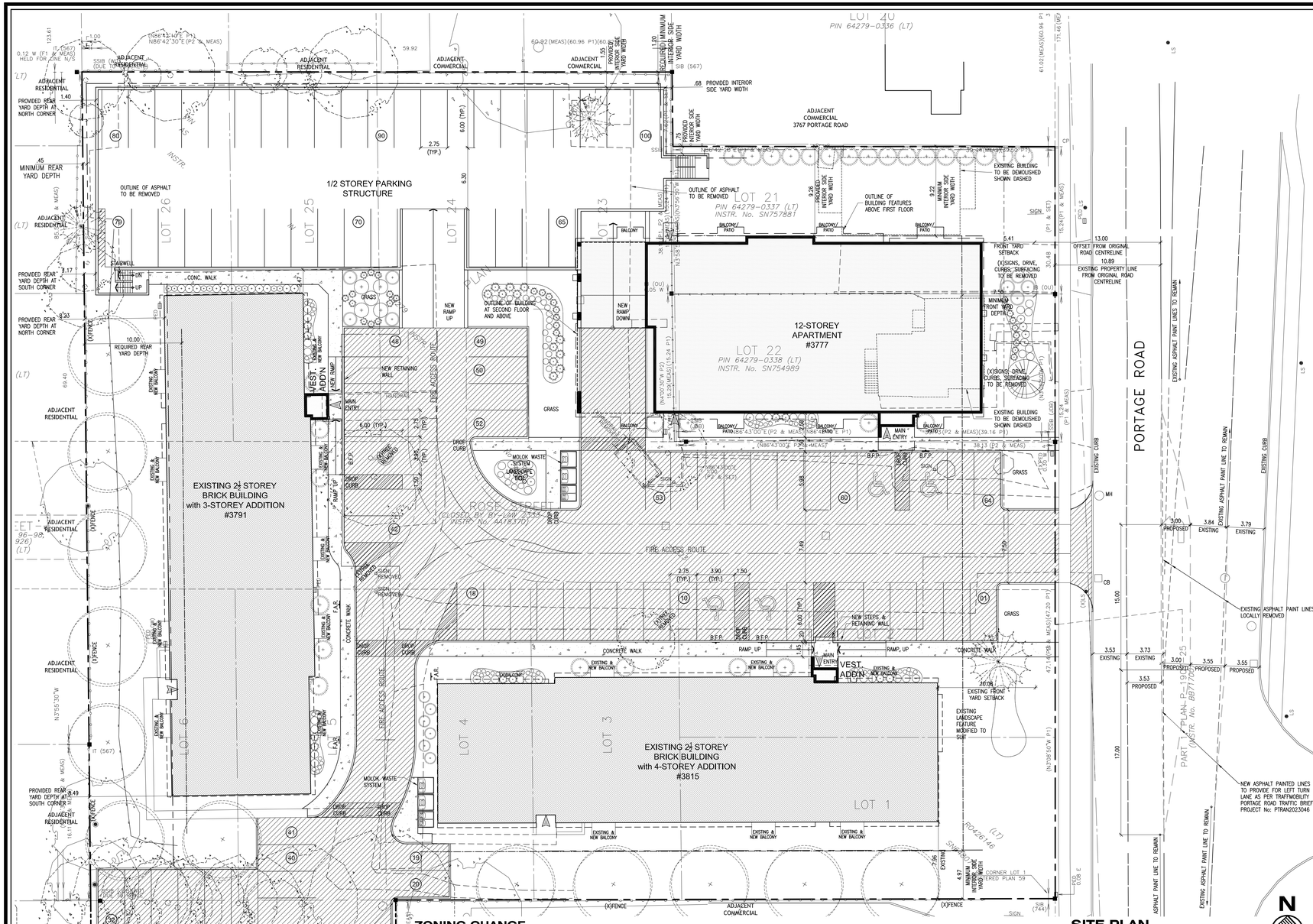
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	3	5	461	455	1
Future Volume (Veh/h)	0	3	5	461	455	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	0	3	5	480	474	1
Pedestrians	4				1	
Lane Width (m)	3.7				3.7	
Walking Speed (m/s)	1.1				1.1	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	730	242	479			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	730	242	479			
tC, single (s)	6.8	6.9	4.5			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.4			
p0 queue free %	100	100	99			
cM capacity (veh/h)	358	763	959			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	3	165	320	316	159
Volume Left	0	5	0	0	0
Volume Right	3	0	0	0	1
cSH	763	959	1700	1700	1700
Volume to Capacity	0.00	0.01	0.19	0.19	0.09
Queue Length 95th (m)	0.1	0.1	0.0	0.0	0.0
Control Delay (s)	9.7	0.3	0.0	0.0	0.0
Lane LOS	A	A			
Approach Delay (s)	9.7	0.1		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	36.2%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix C

Site Plan



SURVEY NOTE:

PT LOT 72, PLAN 59 LOTS 01-06, 23-36, IN THE GEOGRAPHIC TOWNSHIP OF STAMFORD, CITY OF NIAGARA FALLS, REGIONAL MUNICIPALITY OF NIAGARA

BOUNDARIES, EXISTING SITE FEATURES AND SURVEY: J.D. BARNES LIMITED, NIAGARA FALLS, ON

LEGEND

- EXISTING 2-STOREY APARMENT w/ PROPOSED ADDED STOREYS
- SINGLE STOREY CONSTRUCTION
- TWELVE STOREY CONSTRUCTION
- ASPHALT SURFACE
- CONCRETE SURFACE
- CONCRETE CURB

NOTE:
ALL AREAS NOT HATCHED TO BE NEW OR EXISTING GRASS

- POSTED SIGNS (SEE DETAIL BELOW)
- B.F.P. – BARRIER FREE PARKING
- F.A.R. – FIRE ACCESS ROUTE
- (01) PARKING STALL NUMBER
- XLS EXISTING LAMP STANDARD

DECIDUOUS / CONIFEROUS

- EXISTING TREE TO REMAIN
- EXISTING TREE TO BE REMOVED
- TREE TO BE PLANTED
- SHRUBS

DWELLING UNIT SUMMARY

BUILDING #3791	
EXISTING	26
PROPOSED	27
SUB-TOTAL	53
EXISTING BUILDING #3815	
EXISTING	23
PROPOSED	32
SUB-TOTAL	55
NEW TWELVE STOREY APARTMENT	94
TOTAL DWELLING UNITS	202

PARKING REQUIREMENTS

DWELLING containing more than 3 Dwelling units require 1.4 Parking Spaces per Unit x 202 Dwelling Units = 283 Spaces

Parking Required to be Designated as Accessible 8 Spaces

PARKING PROVIDED

STANDARD PARKING SPACE (2.75m x 6.00m TYPICAL)	235 Spaces
DESIGNATED ACCESSIBLE PARKING	8 Spaces
TOTAL PARKING PROVIDED	243 Spaces

1.20 Parking Spaces per Dwelling Unit provide, Variance Requested, see R5F Zoning Relief Table to Left

KEY PLAN

SCALE : NOT TO SCALE

SITE STATISTICS

LOT COVERAGE

LOT AREA	8,776.15 m²
EXISTING BUILDING GROUND COVER	
Existing #3791 (754.99m²) + New Entry (6.40m²)	761.50 m²
Existing #3815 (756.33m²) + New Entry (4.48m²)	760.81 m²
New Twelve Storey Apartment	615.13 m²
New Parking Structure (Formally Asphalt)	1,208.83 m²
TOTAL	3,350.25 m²
38.13% of Total Lot Area	
ASPHALT AREA	2,404.86 m²
27.40% of Total Lot Area	
LANDSCAPED AREA	3,025.02 m²
34.47% of Total Lot Area	

BUILDING ANALYSIS #3777 Portage

PROJECT DESCRIPTION	Addition & Alterations
MAJOR OCCUPANCY	Group C
BUILDING AREA	615.1 m²
GROSS FLOOR AREA	8,768.5 m²
NO. OF STOREYS	12 Above Grade, 1 Basement
HEIGHT OF BUILDING	36.9 m
FIRE ALARM REQ'D	Yes
STANDPIPE REQ'D	Yes
TYPE OF CONSTRUCTION	Non-Combustible
TOTAL OCCUPANCY	350
BARRIER FREE DESIGN	Yes
HAZARDOUS SUBSTANCE	No
BUILDING CLASSIFICATION	3.2.2.42. Group C, Any Height, Any Area, Sprinklered
FACES NO. OF STREETS	2 Streets

BUILDING ANALYSIS #3791 Portage

PROJECT DESCRIPTION	Addition & Alterations
MAJOR OCCUPANCY	Group C
BUILDING AREA	761.5 m²
GROSS FLOOR AREA	4,533.9 m²
NO. OF STOREYS	5 Above Grade, 1 Basement
HEIGHT OF BUILDING	16.9 m
FIRE ALARM REQ'D	Yes
STANDPIPE REQ'D	Yes
TYPE OF CONSTRUCTION	Non-Combustible
TOTAL OCCUPANCY	152
BARRIER FREE DESIGN	Yes
HAZARDOUS SUBSTANCE	No
BUILDING CLASSIFICATION	3.2.2.43. Group C, up to 6 Storeys, Sprinklered, Non-combustible Construction
FACES NO. OF STREETS	1 Street

BUILDING ANALYSIS #3815 Portage

PROJECT DESCRIPTION	Addition & Alterations
MAJOR OCCUPANCY	Group C
BUILDING AREA	760.8 m²
GROSS FLOOR AREA	5,306.3 m²
NO. OF STOREYS	6 Above Grade, 1 Basement
HEIGHT OF BUILDING	19.9 m
FIRE ALARM REQ'D	Yes
STANDPIPE REQ'D	Yes
TYPE OF CONSTRUCTION	Non-Combustible
TOTAL OCCUPANCY	192
BARRIER FREE DESIGN	Yes
HAZARDOUS SUBSTANCE	No
BUILDING CLASSIFICATION	3.2.2.43. Group C, up to 6 Storeys, Sprinklered, Non-combustible Construction
FACES NO. OF STREETS	1 Street

ZONING CHANGE

Change Zoning from an Residential Apartment 5C (R5C Zone) to an Residential Apartment 5F (R5F Zone) Density

R5F ZONING RELIEF TABLE

BY-LAW 7.12.2	BY-LAW REGULATIONS	PROVIDED	BY-LAW REQUESTED
a) Minimum Lot Area	202 Units x 57m² per Unit = 11,514 m²	8,776.15 m² or 43.4 per unit	43 m² per Unit
b) Minimum Lot Frontage	45m	77.60 m	None
c) Minimum Front Yard Depth	7.5m plus any applicable distance specified in section 4.27.1 (13.0m from centreline of original road allowance) = 20.5 m	18.41 m	18.2
d) Minimum Rear Yard Depth	one-half building height or 10m whichever is greater plus any applicable distance specified in section 4.27.1 = 10 m	Existing 8.23 m	8.2 m
e) Minimum Interior Side Yard Width	one-quarter the height of the building = 9.23 m North Apartment	9.26 m	None
	one-quarter the height of the building = 4.97 m South Apartment	7.96 m	None
f) Minimum Exterior Side Yard Width	7.5m plus any applicable distance specified in section 4.27.1	N/A	None
g) Maximum Lot Coverage	30%	38.1 %	39%
h) Maximum Building Height	28m subject to section 4.7	36.9 m	38 m
i) Number of Apartment Dwellings on One Lot	one only	Three	Three
j) Parking and Access Requirements	in accordance with section 4.19,1 = 1,4 spaces per unit	1.20 Per Unit	1.15 per Unit
k) Accessory Buildings and Accessory Structures	in accordance with sections 4.13 and 4.14	N/A	None
l) Minimum Landscaped Open Space	55% of the lot area	34.5 %	34%
m) Minimum Amenity Space for an Apartment Dwelling Unit	in accordance with section 4.42 = 20m² per unit	18.2 m² per unit	18.0 m² per unit

ACCESSORY PARKING STRUCTURE RELIEF TABLE

BY-LAW 4.13	PROVIDED	BY-LAW REQUESTED
a) Except as otherwise specifically permitted in this By-law, no accessory building or accessory structure shall be erected in a front yard, a rear yard or a side yard,	Not Applicable	Not Applicable
b) Subject to Section 4.27,1 but notwithstanding any other provisions of this By-law, no accessory building or accessory structure shall be erected on a corner lot closer than 4,5 metres (14.76 ft) to the side lot line abutting a street line or a reserve,	Not Applicable	Not Applicable
c) An accessory building or accessory structure may be erected in an interior side yard provided that it is distant not less than 1,2 metres (3.94 ft) from the side lot line. Notwithstanding the foregoing, common semi-detached private garages may be centred on the mutual lot line if erected simultaneously on two abutting lots and as one building. (2016-03)	0.68 m at 3767 Portage Road	0.64 m at 3767
d) subject to section 4.27,1, an accessory building or accessory structure may be erected in a rear yard of a lot provided that it shall not be less than 0.45 metre from any lot line and no overhanging roof, eaves or gutter shall project more than 0.3 metre into any required yard or be less than 0.15 metre from any lot line. (2016- 03)	0.68 m at 3767 Portage Road	None
e) An attached private garage or carport which is erected as part of the main building shall not be deemed an accessory building or accessory structure and shall comply with all yard requirements for the main building,	Not Applicable	Not Applicable
f) except as otherwise specifically permitted in this by-law, no person shall, in any residential zone, DH zone, A zone, R zone, DC zone or DTC zone, erect any accessory building or accessory structure having a greater height than 3 metres, provided that an accessory building with a pitched roof may be erected to a height not exceeding 4,6 metres but in no event shall any part of the walls or supporting posts excluding any gable or dormer exceed 3 metres in height. (82-283, 2016-03)	2.54 m	None
g) In a R1A, R1B, R1C, R1D, R1E, R1F, R2 or R3 zone, the total lot coverage of all accessory buildings and accessory structures on a lot shall not exceed 15% of the lot area or 93 square metres, whichever is lesser, and in no case shall the total lot coverage of all buildings and structures exceed the maximum lot coverage regulation of the specific zone. (2008-148)	Not Applicable	Not Applicable

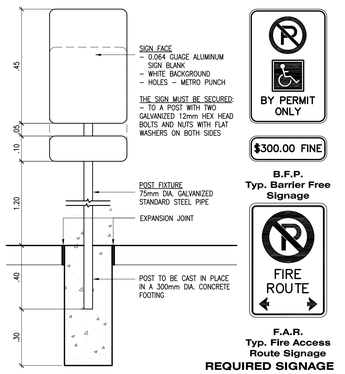
SIGNAGE NOTES:

ALL PARKING SPACES FOR BARRIER-FREE SHALL BE INDICATED WITH TYPICAL BARRIER FREE SIGNAGE CENTERED AT EACH PARKING SPACE – THESE SIGNS SHALL BE SUPPLIED & INSTALLED BY THE GENERAL CONTRACTOR.

THE SIGN SHALL BE MOUNTED AT A HEIGHT OF 1–1.5 METERS FROM TOP OF CURB TO BOTTOM OF SIGN & CENTERED WITHIN THE PARKING SPACE.

THE GENERAL CONTRACTOR SHALL SUPPLY ALL REQUIRED FIRE ROUTE SIGNS. THESE SIGNS SHALL BE POSTED IN COMPLIANCE WITH THE HIGHWAY TRAFFIC ACT AND OR THE ONTARIO TRAFFIC MANUAL, WITH A MAX. SPACING OF 30M

ALL STOP, BARRIER FREE, STAFF PARKING, NO OVERNIGHT PARKING AND ONE WAY SIGNS SHALL BE SUPPLIED & INSTALLED BY THE GENERAL CONTRACTOR, – ALL SIGNS SHALL CONFORM TO THE ONTARIO TRAFFIC MANUAL AND HIGHWAY TRAFFIC ACT.



B.F.P.
Typ. Barrier Free Signage

F.A.R.
Typ. Fire Access Route Signage

REQUIRED SIGNAGE

Peter J. Lesdow
architect
4460 Dorchester Road, Niagara Falls, Ontario, L0S 1K0
telephone: 905.371.1112 e-mail: plesdow@cogeco.net

REVISIONS

DATE	
Nov. 26/21	FOR PRE-CONSULTATION
Apr. 19/23	FOR PRE-CONSULTATION
Apr. 24/24	FOR CONSULTANTS

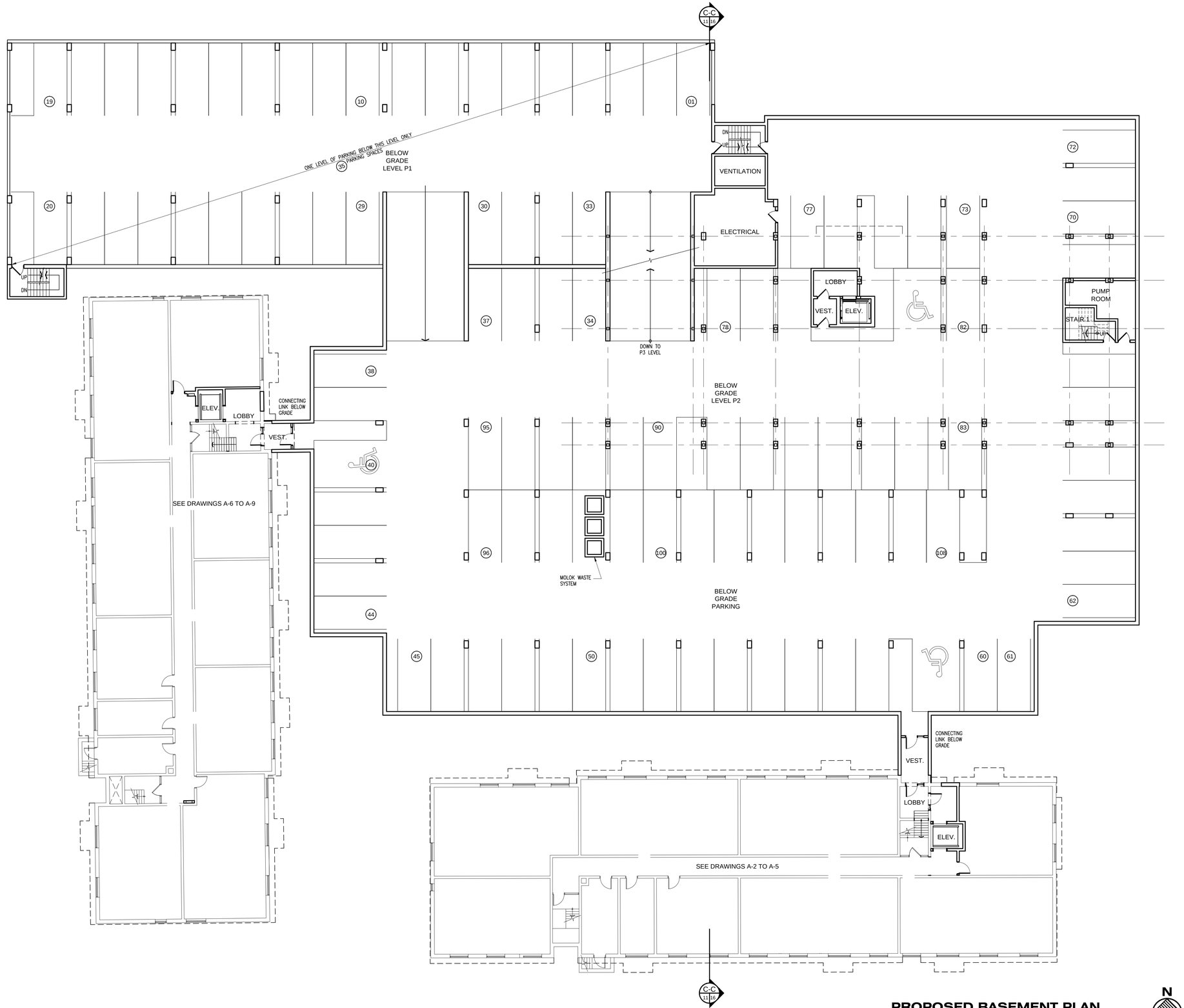
COLBORNE COURT APARTMENTS
ADDITIONS & ALTERATIONS
3777, 3791 & 3815 Portage Road
Niagara Falls, ON

DATE:
SCALE: AS NOTED
DRAWN BY: MRW
CHECK BY: PJL

21 – 03

SITE PLAN & STATISTICS

A-1



PROPOSED BASEMENT PLAN

SCALE : 1:150

N

Peter J. Lesdow
architect
4465 Drummond Road, Niagara Falls, Ontario L2E 6C5
telephone 905-357-1112
e-mail plesdow@cogeco.net

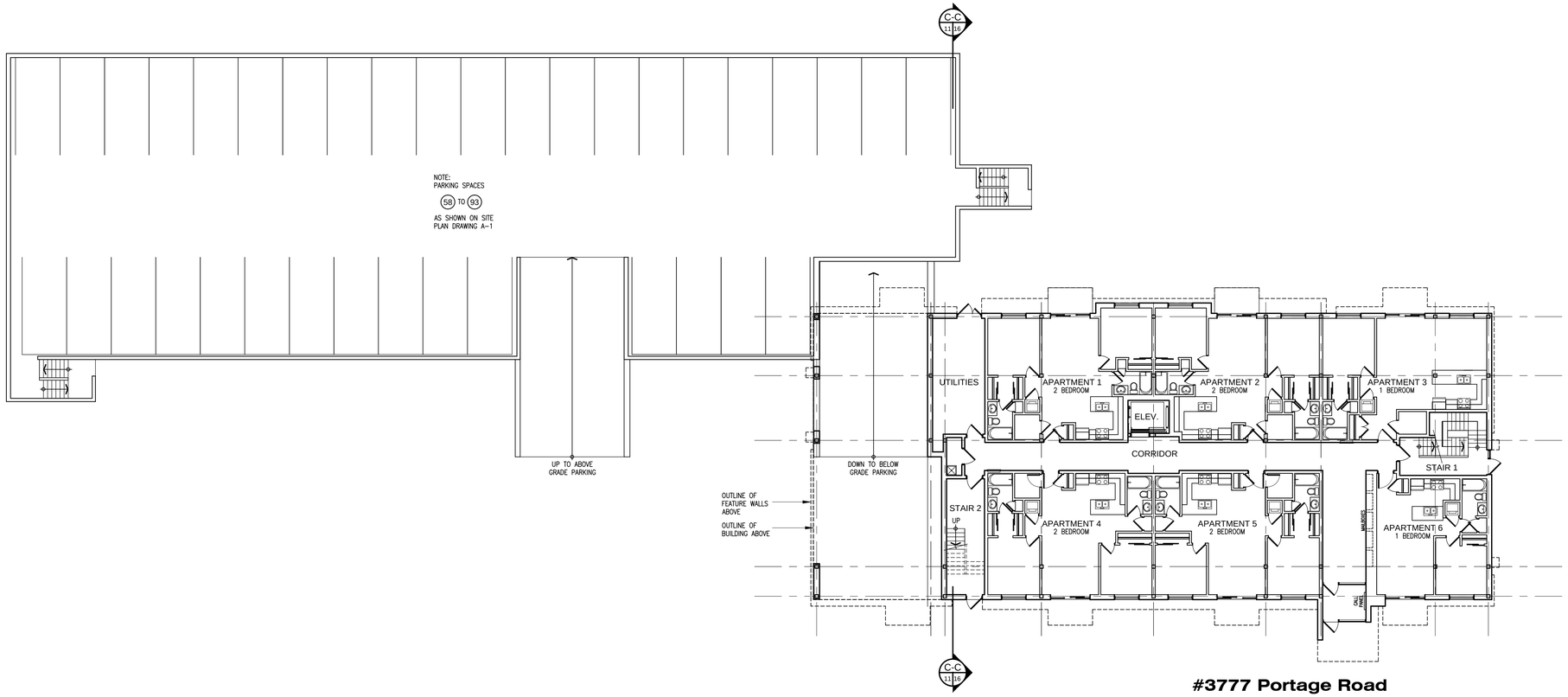
REVISIONS	DATE
FOR PRE-CONSULTATION	Nov. 28/21
FOR PRE-CONSULTATION	Apr. 19/23
FOR CONSULTANTS	Apr. 24/24
FOR ZBA/OPA APPLICATION	Sep. 12/24

COLBORNE COURT APARTMENTS
ADDITIONS & ALTERATIONS
3777, 3791 & 3815 Portage Road
Niagara Falls, ON

DATE:	Mar. 31/ 21
SCALE:	AS NOTED
DRAWN BY:	MRW
CHECK BY:	PJL

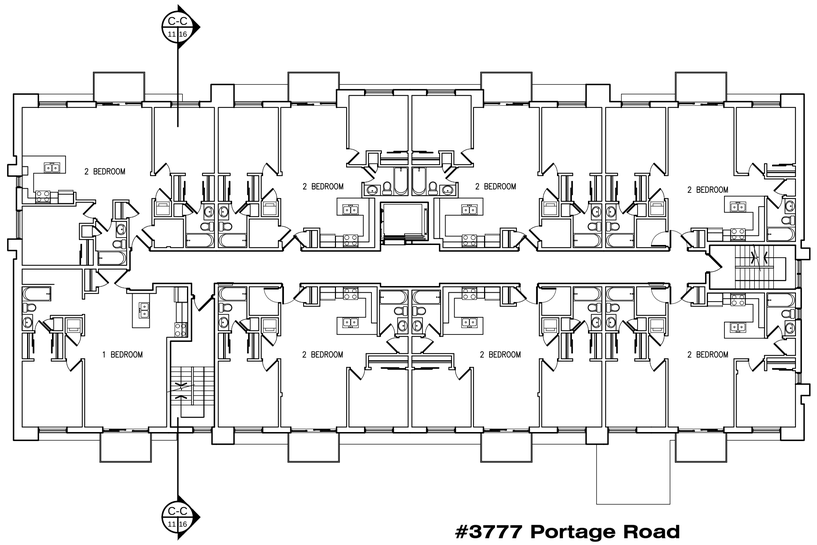
21 – 03

A-10



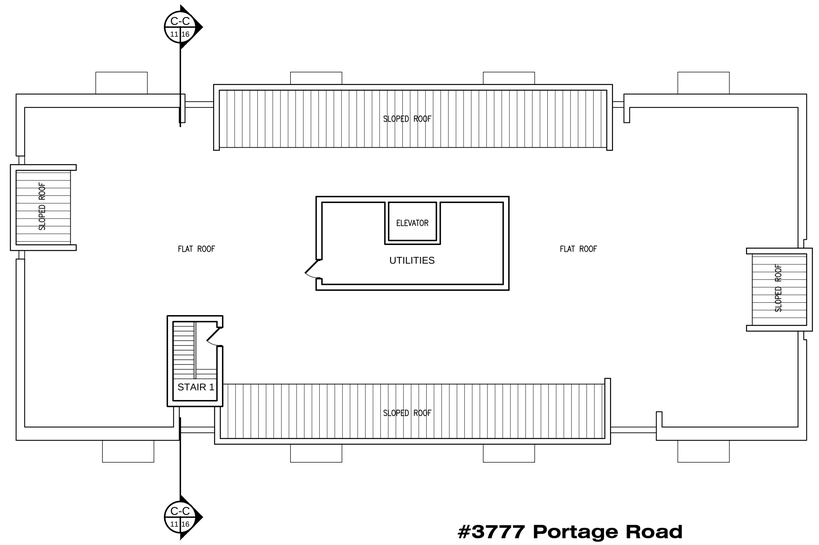
#3777 Portage Road
PROPOSED GROUND FLOOR PLAN

SCALE: 1:150



#3777 Portage Road
PROPOSED TYPICAL FLOOR PLAN

SCALE: 1:150



#3777 Portage Road
PROPOSED ROOF PLAN

SCALE: 1:150

Peter J. Lesdow
architect
4465 Drummond Road, Niagara Falls, Ontario L2E 6C5
telephone: 905-357-1112
e-mail: plesdow@cogeco.net

PROPOSED FLOOR PLANS
3777 Portage Rd

REVISIONS

DATE	
Nov. 25/21	FOR PRE-CONSULTATION
Apr. 19/23	FOR PRE-CONSULTATION
Apr. 24/24	FOR CONSULTANTS
Sep. 12/24	FOR ZBA/OPA APPLICATION

COLBORNE COURT APARTMENTS
ADDITIONS & ALTERATIONS
3777, 3791 & 3815 Portage Road
Niagara Falls, ON

DATE:	Mar. 31/ 21
SCALE:	AS NOTED
DRAWN BY:	MRW
CHECK BY:	PJL

21 – 03

A-11

Appendix D

ITE Trip Generation Manual Excerpts

Land Use: 221
Multifamily Housing (Mid-Rise)

Description

Mid-rise multifamily housing includes apartments and condominiums located in a building that has between four and 10 floors of living space. Access to individual dwelling units is through an outside building entrance, a lobby, elevator, and a set of hallways.

Multifamily housing (low-rise) (Land Use 220), multifamily housing (high-rise) (Land Use 222), off-campus student apartment (mid-rise) (Land Use 226), and mid-rise residential with ground-floor commercial (Land Use 231) are related land uses.

Land Use Subcategory

Data are presented for two subcategories for this land use: (1) not close to rail transit and (2) close to rail transit. A site is considered close to rail transit if the walking distance between the residential site entrance and the closest rail transit station entrance is ½ mile or less.

Additional Data

For the six sites for which both the number of residents and the number of occupied dwelling units were available, there were an average of 2.5 residents per occupied dwelling unit.

For the five sites for which the numbers of both total dwelling units and occupied dwelling units were available, an average of 96 percent of the total dwelling units were occupied.

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

It is expected that the number of bedrooms and number of residents are likely correlated to the trips generated by a residential site. To assist in future analysis, trip generation studies of all multifamily housing should attempt to obtain information on occupancy rate and on the mix of residential unit sizes (i.e., number of units by number of bedrooms at the site complex).

The sites were surveyed in the 1990s, the 2000s, the 2010s, and the 2020s in Alberta (CAN), California, District of Columbia, Florida, Georgia, Illinois, Maryland, Massachusetts, Minnesota, Montana, New Jersey, New York, Ontario (CAN), Oregon, Utah, and Virginia.

Source Numbers

168, 188, 204, 305, 306, 321, 818, 857, 862, 866, 901, 904, 910, 949, 951, 959, 963, 964, 966, 967, 969, 970, 1004, 1014, 1022, 1023, 1025, 1031, 1032, 1035, 1047, 1056, 1057, 1058, 1071, 1076

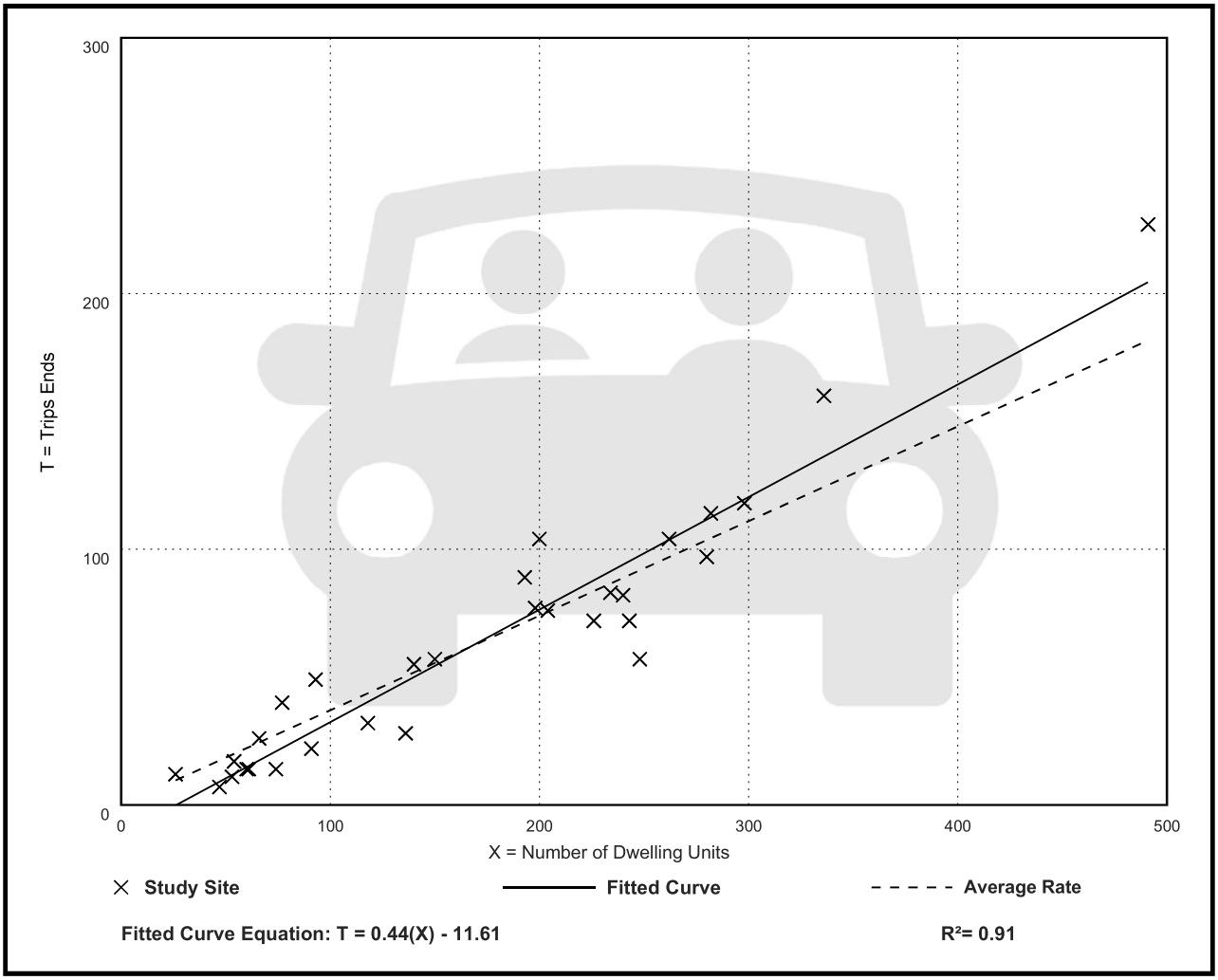
Multifamily Housing (Mid-Rise)
Not Close to Rail Transit (221)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 30
Avg. Num. of Dwelling Units: 173
Directional Distribution: 23% entering, 77% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.37	0.15 - 0.53	0.09

Data Plot and Equation



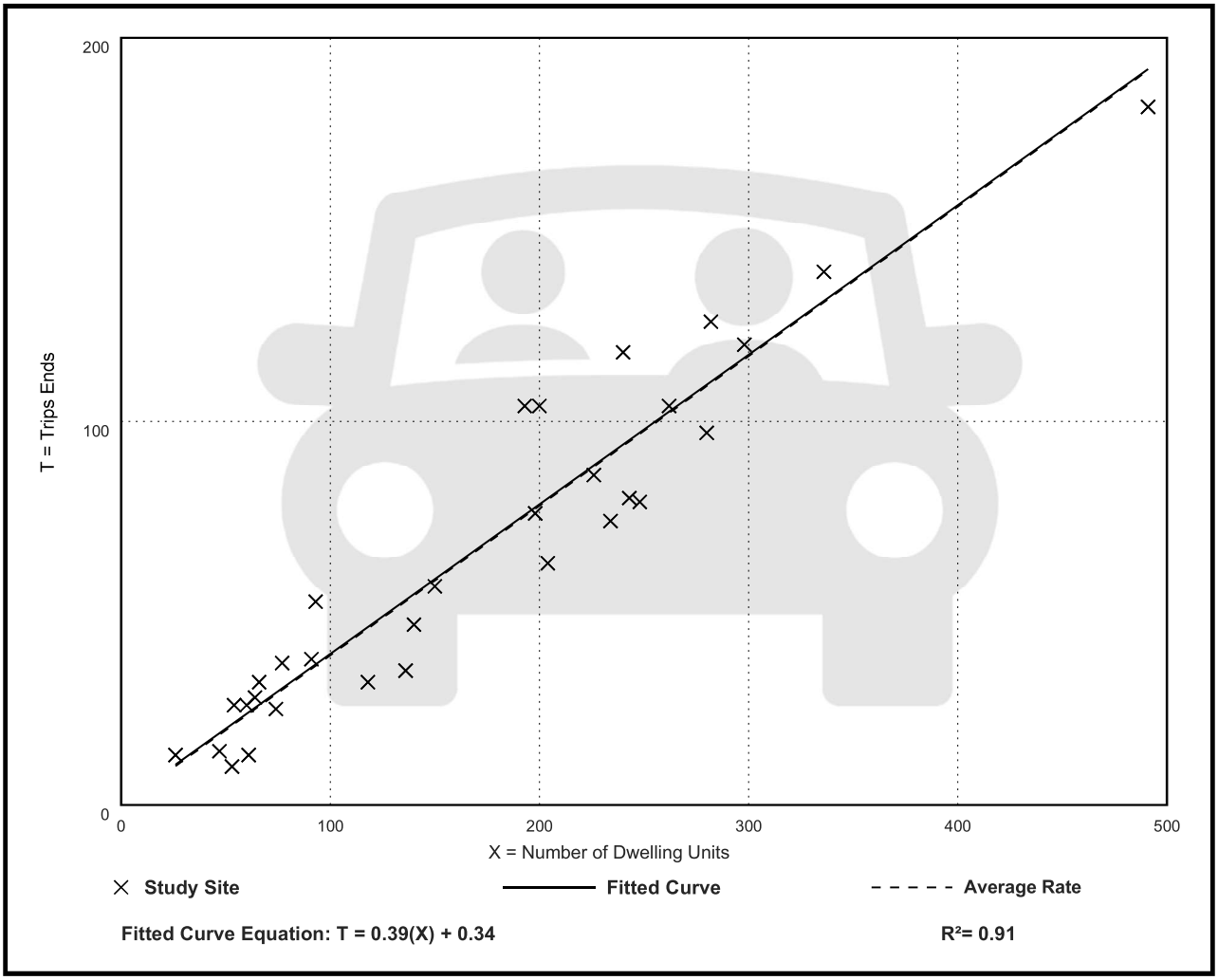
Multifamily Housing (Mid-Rise)
Not Close to Rail Transit (221)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 31
Avg. Num. of Dwelling Units: 169
Directional Distribution: 61% entering, 39% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.39	0.19 - 0.57	0.08

Data Plot and Equation



Land Use: 222
Multifamily Housing (High-Rise)

Description

High-rise multifamily housing includes apartments, townhouses, and condominiums. Each building has more than 10 floors of living space. Access to individual dwelling units is through an outside building entrance, a lobby, elevators, and a set of hallways.

Multifamily housing (low-rise) (Land Use 220), multifamily housing (mid-rise) (Land Use 221), off-campus student apartment (high-rise) (Land Use 227), and high-rise residential with ground-floor commercial (Land Use 232) are related land uses.

Land Use Subcategory

Data are presented for two subcategories for this land use: (1) not close to rail transit and (2) close to rail transit. A site is considered close to rail transit if the walking distance between the residential site entrance and the closest rail transit station entrance is ½ mile or less.

Additional Data

For the 12 sites for which both the number of residents and the number of occupied dwelling units were available, there were an average of 1.6 residents per occupied dwelling unit.

For the 26 sites for which the numbers of both total dwelling units and occupied dwelling units were available, an average of 98 percent of the total dwelling units were occupied.

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

For the 12 sites for which data were provided for both occupied dwelling units and residents, there was an average of 1.6 residents per occupied dwelling unit.

For the 26 sites for which data were provided for both occupied dwelling units and total dwelling units, an average of 98 percent of the units were occupied.

It is expected that the number of bedrooms and number of residents are likely correlated to the trips generated by a residential site. To assist in future analysis, trip generation studies of all multifamily housing should attempt to obtain information on occupancy rate and on the mix of residential unit sizes (i.e., number of units by number of bedrooms at the site complex).

The sites were surveyed in the 1980s, the 2000s, and the 2010s in California, District of Columbia, Maryland, New Jersey, New York, Ontario (CAN), Oregon, Pennsylvania, and Virginia.

Source Numbers

105, 168, 169, 237, 321, 356, 818, 862, 901, 910, 949, 963, 964, 966, 967, 1056, 1057, 1076, 1077

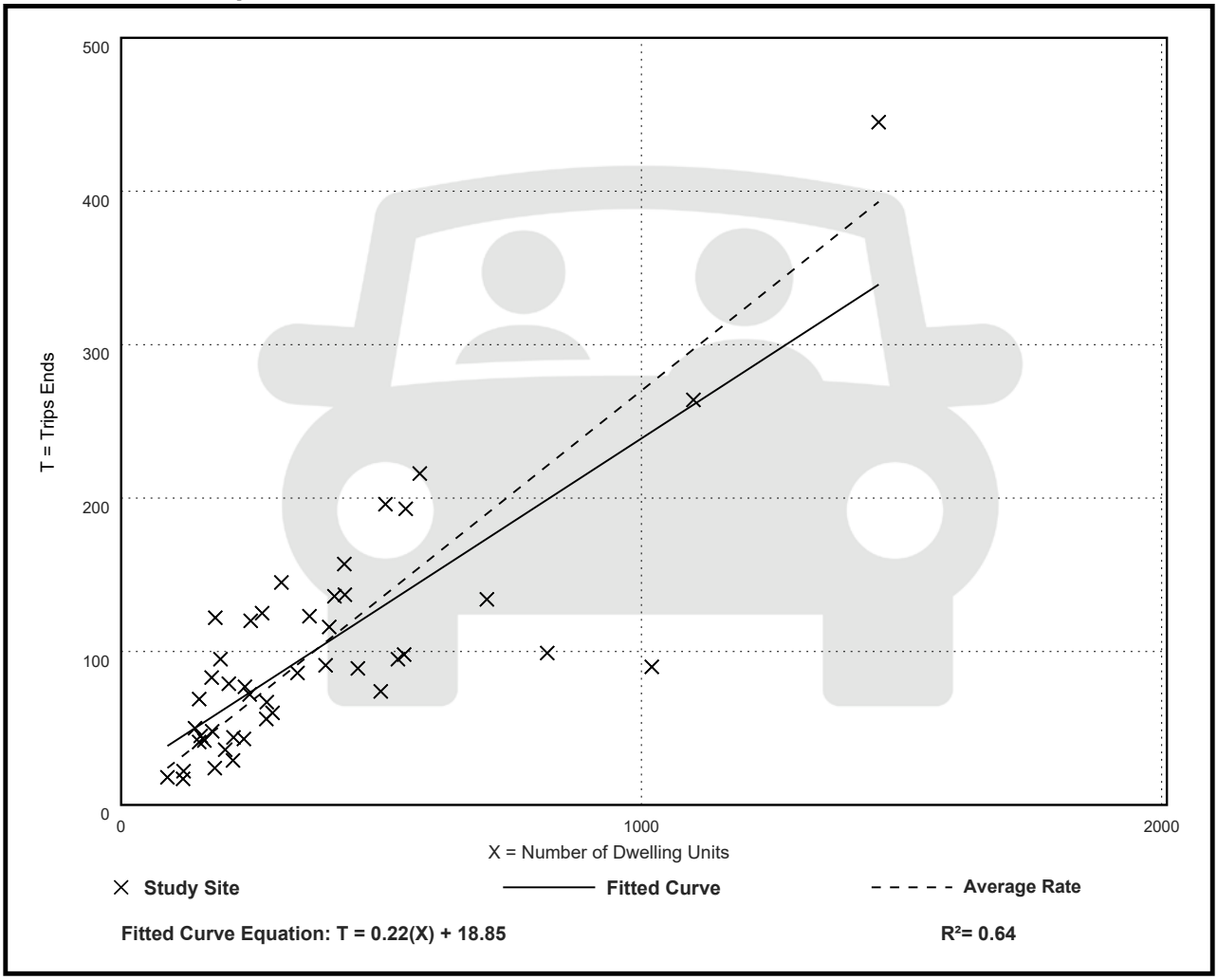
Multifamily Housing (High-Rise)
Not Close to Rail Transit (222)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 45
Avg. Num. of Dwelling Units: 372
Directional Distribution: 34% entering, 66% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.27	0.09 - 0.67	0.11

Data Plot and Equation



Fitted Curve Equation: T = 0.22(X) + 18.85

R^2= 0.64

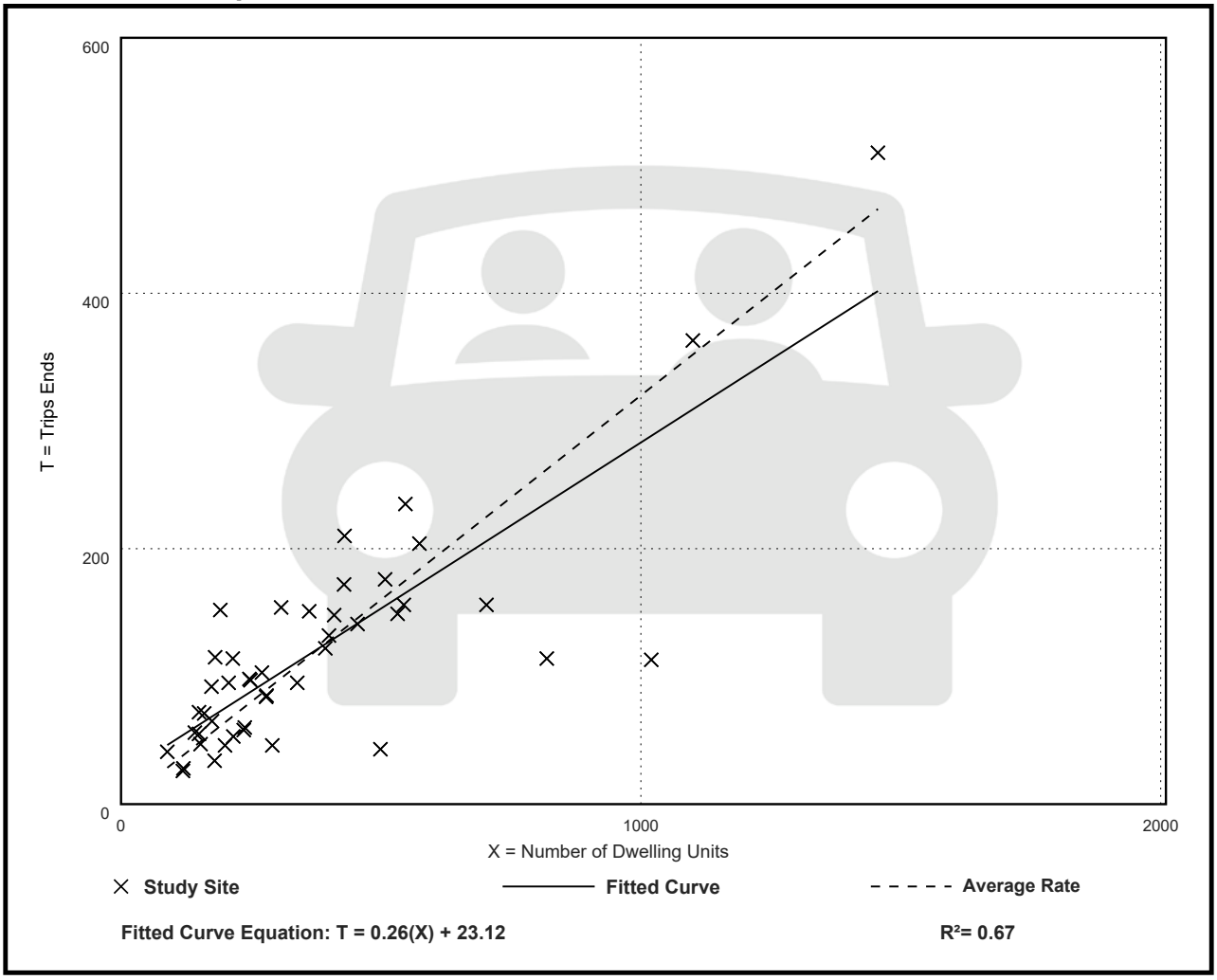
Multifamily Housing (High-Rise)
Not Close to Rail Transit (222)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 45
Avg. Num. of Dwelling Units: 372
Directional Distribution: 56% entering, 44% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.32	0.09 - 0.80	0.13

Data Plot and Equation

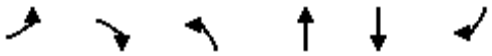


Fitted Curve Equation: T = 0.26(X) + 23.12

R^2= 0.67

Appendix E

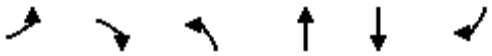
Future (2027) Total Intersection Operation Calculations (Synchro)



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	14	37	14	342	478	7
Future Volume (Veh/h)	14	37	14	342	478	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	18	47	18	433	605	9
Pedestrians	8			1		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	870	316	622			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	870	316	622			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	93	98			
cM capacity (veh/h)	287	680	961			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	65	162	289	403	211
Volume Left	18	18	0	0	0
Volume Right	47	0	0	0	9
cSH	493	961	1700	1700	1700
Volume to Capacity	0.13	0.02	0.17	0.24	0.12
Queue Length 95th (m)	3.4	0.4	0.0	0.0	0.0
Control Delay (s)	13.4	1.1	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	13.4	0.4		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	43.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	13	21	29	489	482	17
Future Volume (Veh/h)	13	21	29	489	482	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	14	22	30	509	502	18
Pedestrians	4				1	
Lane Width (m)	3.7				3.7	
Walking Speed (m/s)	1.1				1.1	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	830	264	524			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	830	264	524			
tC, single (s)	6.8	6.9	4.5			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.4			
p0 queue free %	95	97	97			
cM capacity (veh/h)	301	738	920			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	36	200	339	335	185
Volume Left	14	30	0	0	0
Volume Right	22	0	0	0	18
cSH	471	920	1700	1700	1700
Volume to Capacity	0.08	0.03	0.20	0.20	0.11
Queue Length 95th (m)	1.9	0.8	0.0	0.0	0.0
Control Delay (s)	13.3	1.6	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	13.3	0.6		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		

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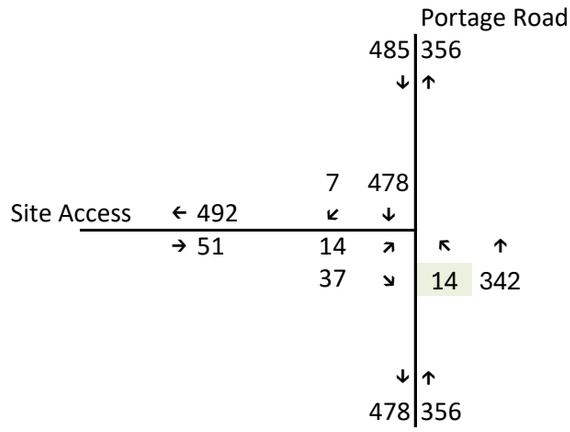
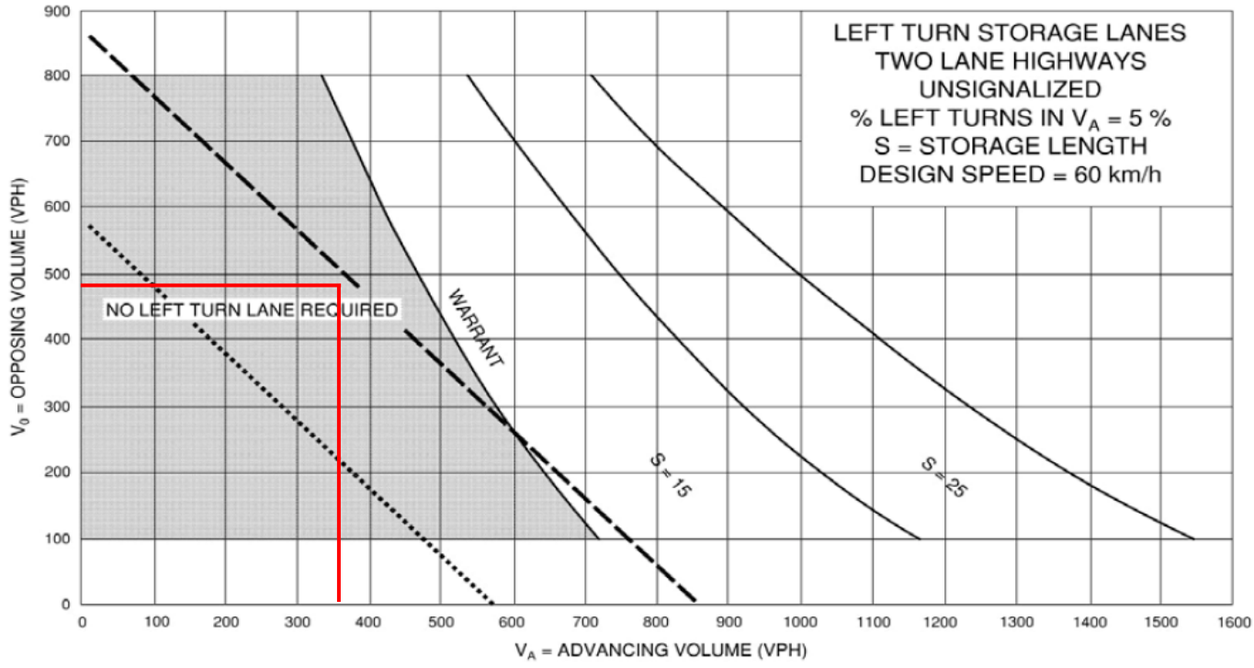
Appendix F

Left Turn Lane Warrant Analysis

Weekday AM Future (2027) Total Conditions - Left Turn Warrant Analysis at Portage Road and Site Access

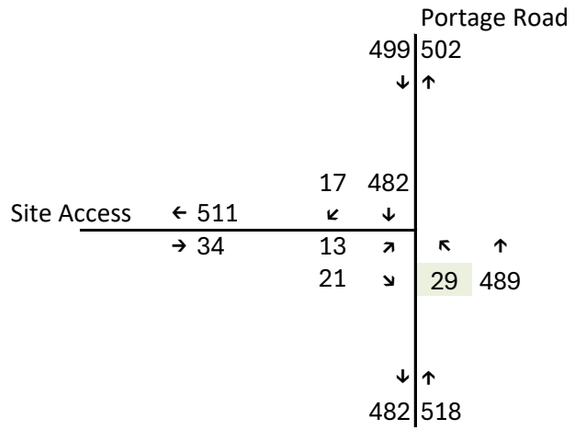
Design Speed =	60
Advancing Traffic Vol (VA) =	356
Opposing Traffic Vol (VO) =	485
Left Turn Traffic Vol (VL) =	14
Formula =	(LT x 100) / VA
% of Left Turning Veh's =	**3.9**

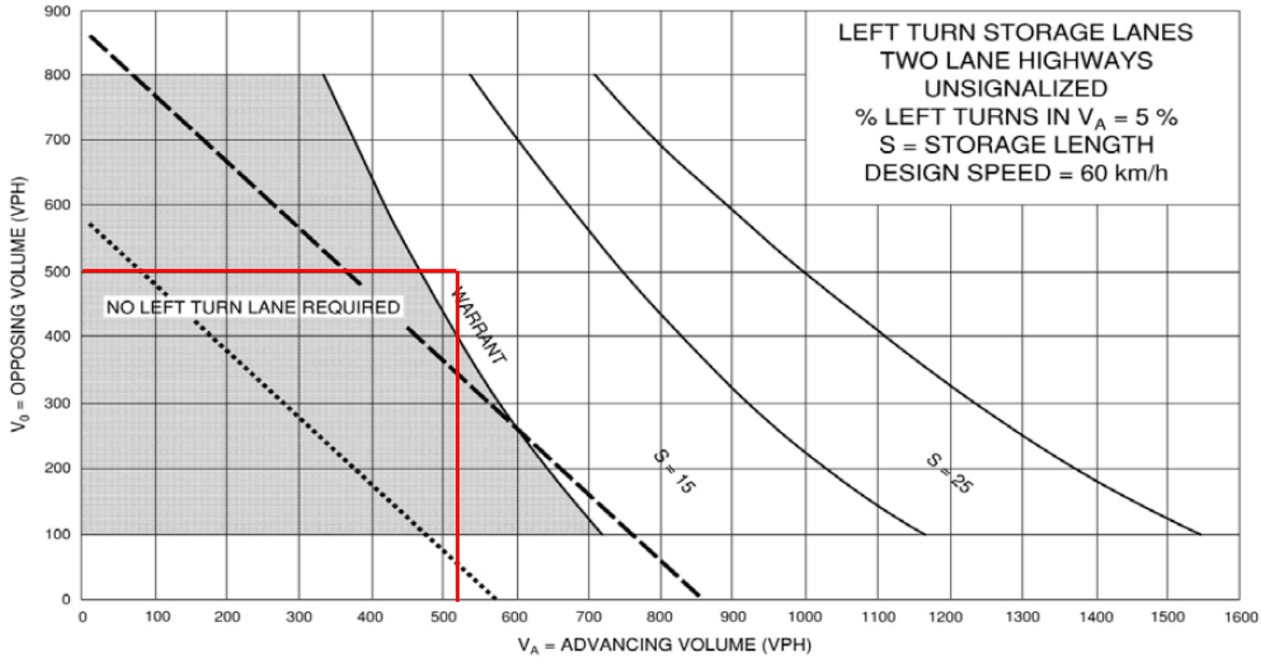




Weekday PM Future (2027) Total Conditions - Left Turn Warrant Analysis at Portage Road and Site Access

Design Speed =	60
Advancing Traffic Vol (VA) =	518
Opposing Traffic Vol (VO) =	499
Left Turn Traffic Vol (VL) =	29
Formula =	(LT x 100) / VA
% of Left Turning Veh's =	**5.6**





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Appendix G

ITE Parking Generation Manual Excerpts

Land Use: 221 Multifamily Housing—2+ BR (Mid-Rise)

Description

Mid-rise multifamily housing with two or more bedrooms is a residential building with between four and 10 floors (levels) of residence that contain at least one dwelling unit with two or more bedrooms. Access to individual dwelling units is through an outside building entrance, a lobby, elevator, and a set of hallways.

Land Use Subcategory

Data are separated into two subcategories for this land use: (1) not close to rail transit and (2) close to rail transit. A site is considered close to rail transit if the walking distance between the residential site entrance and the closest rail transit station entrance is ½ mile or less.

Time-of-Day Distribution for Parking Demand

The following table presents a composite (weekday and Saturday) Time-of-Day distribution of parking demand for three general urban/suburban study sites.

Hour Beginning	Percent of Peak Parking Demand
	Weekday/Saturday Composite
12:00-4:00 a.m.	100
5:00 a.m.	96
6:00 a.m.	86
7:00 a.m.	77
8:00 a.m.	66
9:00 a.m.	60
10:00 a.m.	57
11:00 a.m.	55
12:00 p.m.	52
1:00 p.m.	50
2:00 p.m.	52
3:00 p.m.	51
4:00 p.m.	57
5:00 p.m.	62
6:00 p.m.	65
7:00 p.m.	68
8:00 p.m.	75
9:00 p.m.	82
10:00 p.m.	87
11:00 p.m.	91

Additional Data

The average parking supply ratios and average peak parking occupancy for the study sites with parking supply information are shown in the table below.

Setting	Proximity to Rail Transit	Parking Supply Per Dwelling Unit	Average Peak Parking Occupancy
Center City Core	Within ½ mile of rail transit	0.73 (8 sites)	69%
Dense Multi-Use Urban	Within ½ mile of rail transit	0.88 (31 sites)	81%
	Not within ½ mile of rail transit	1.1 (35 sites)	76%
General Urban/ Suburban	Within ½ mile of rail transit	1.5 (6 sites)	74%
	Not within ½ mile of rail transit	1.7 (38 sites)	72%

The sites were surveyed in the 1990s, the 2000s, the 2010s, and the 2020s in California, Connecticut, District of Columbia, Maine, Maryland, Massachusetts, North Carolina, Ontario (CAN), Oregon, Tennessee, Virginia, Washington, and Wisconsin.

Source Numbers

209, 255, 277, 402, 419, 505, 512, 533, 535, 536, 537, 545, 546, 547, 575, 576, 577, 579, 581, 583, 584, 585, 587. 602, 603, 604, 620, 631

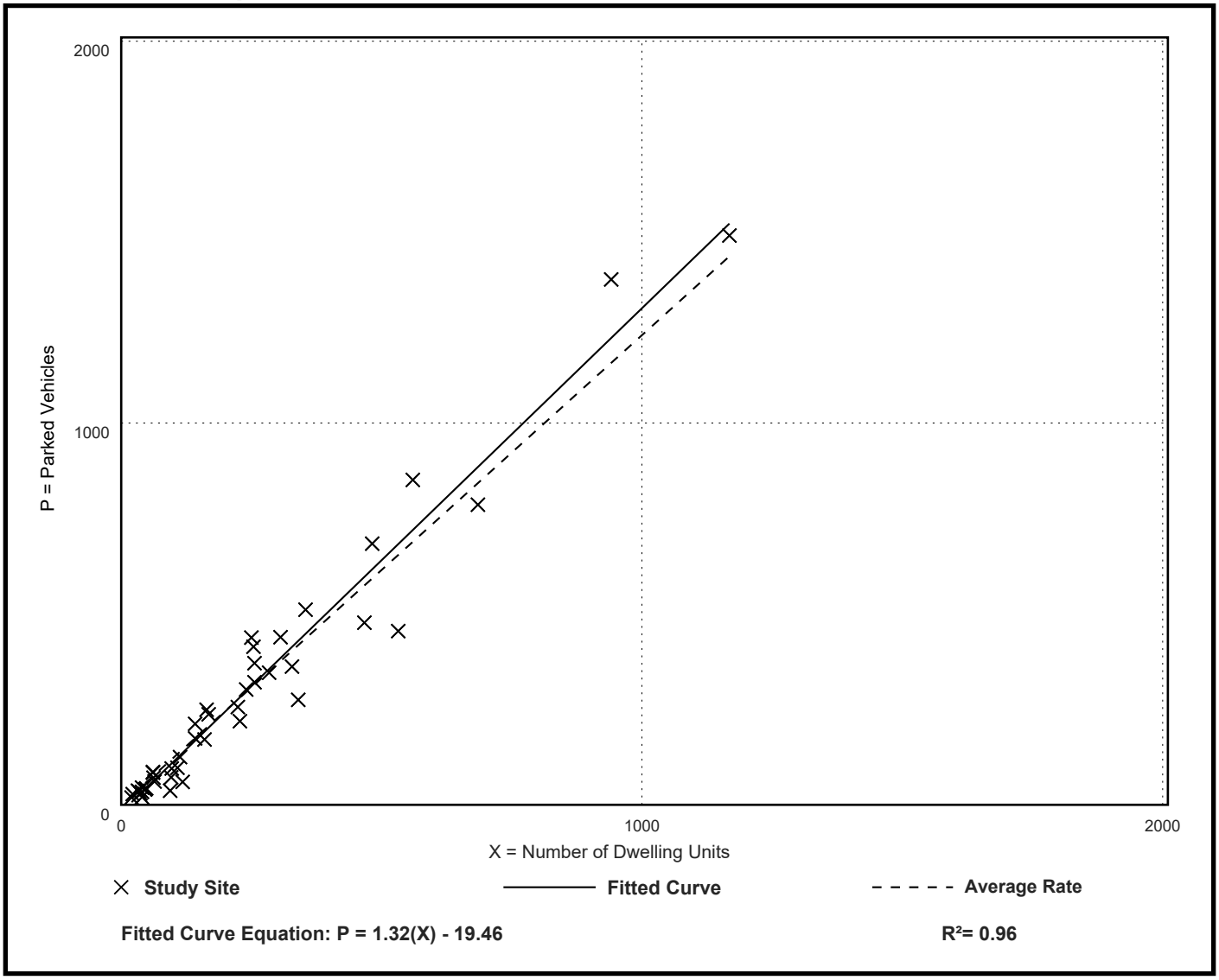
Multifamily Housing - 2+ BR (Mid-Rise) Not Close to Rail Transit (221)

Peak Period Parking Demand vs: Dwelling Units
On a: Weekday (Monday - Friday)
Setting/Location: General Urban/Suburban
Number of Studies: 44
Avg. Num. of Dwelling Units: 231

Peak Period Parking Demand per Dwelling Unit

Average Rate	Range of Rates	33rd / 85th Percentile	95% Confidence Interval	Standard Deviation (Coeff. of Variation)
1.23	0.39 - 1.75	0.98 / 1.45	1.15 - 1.31	0.27 (22%)

Data Plot and Equation



Fitted Curve Equation: P = 1.32(X) - 19.46

R^2= 0.96

Land Use: 222 Multifamily Housing-2+ BR (High-Rise)

Description

High-rise multifamily housing with two or more bedrooms is a residential building with more than 10 floors (levels) of residence that contain at least one dwelling unit with two or more bedrooms. Access to individual dwelling units is through an outside building entrance, a lobby, elevator, and a set of hallways.

Land Use Subcategory

Data are separated into two subcategories for this land use: (1) not close to rail transit and (2) close to rail transit. A site is considered close to rail transit if the walking distance between the residential site entrance and the closest rail transit station entrance is ½ mile or less.

Time-of-Day Distribution for Parking Demand

The following table presents a Time-of-Day distribution of parking demand on a weekday for one study site in a general urban/suburban setting.

Hour Beginning	Percent of Weekday Peak Parking Demand
12:00–4:00 a.m.	100
5:00 a.m.	99
6:00 a.m.	94
7:00 a.m.	81
8:00 a.m.	74
9:00 a.m.	68
10:00 a.m.	66
11:00 a.m.	63
12:00 p.m.	64
1:00 p.m.	60
2:00 p.m.	53
3:00 p.m.	56
4:00 p.m.	62
5:00 p.m.	68
6:00 p.m.	72
7:00 p.m.	78
8:00 p.m.	83
9:00 p.m.	88
10:00 p.m.	93
11:00 p.m.	97

Additional Data

The average parking supply ratios for the study sites with parking supply information are shown in the table below.

Setting	Proximity to Rail Transit	Parking Supply Per Dwelling Unit	Average Peak Parking Occupancy
Center City Core	Within ½ mile of rail transit	0.66 (16 sites)	68%
Dense Multi-Use Urban	Within ½ mile of rail transit	0.94 (5 sites)	79%
	Not within ½ mile of rail transit	1.3 (1 site)	62%
General Urban/ Suburban	Within ½ mile of rail transit	Not Available	Not Available
	Not within ½ mile of rail transit	1.2 (3 sites)	80%

The sites were surveyed in the 2000s and the 2010s in California, Connecticut, District of Columbia, Ontario (CAN), and Virginia.

Source Numbers

402, 583, 602, 603, 604, 609

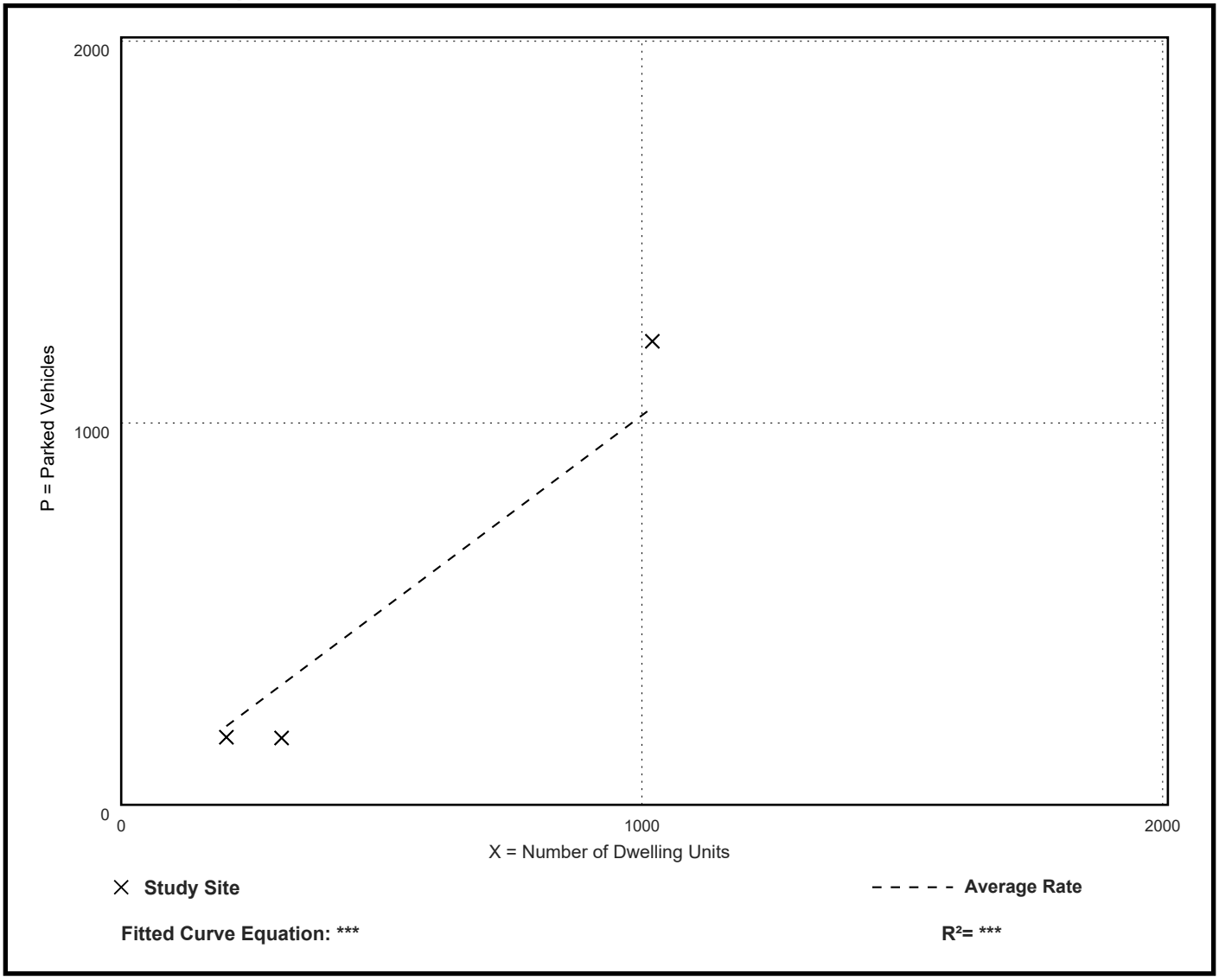
Multifamily Housing - 2+ BR (High-Rise) Not Close to Rail Transit (222)

Peak Period Parking Demand vs: **Dwelling Units**
On a: **Weekday (Monday - Friday)**
Setting/Location: **General Urban/Suburban**
Number of Studies: 3
Avg. Num. of Dwelling Units: 510

Peak Period Parking Demand per Dwelling Unit

Average Rate	Range of Rates	33rd / 85th Percentile	95% Confidence Interval	Standard Deviation (Coeff. of Variation)
1.02	0.57 - 1.19	0.67 / 1.19	***	0.31 (30%)

Data Plot and Equation



Appendix H

2022 TTS Data

Fri May 16 2025 13:11:04 GMT-0400 (Eastern Daylight Time) - Run Time: 708ms

Cross Tabulation Query Form - Household - 2022

Row: Type of dwelling unit - dwell_type
Column: No. of vehicles in household - n_vehicle

Filters:
Type of dwelling unit - dwell_type In 2
and
2022 TTS zone of household - tts22_hhld In 11298, 11310, 11309,11301,11311,11303

Household 2022
ROW : dwell_type
COLUMN : n_vehicle

dwell_type	n_vehicle	total
2	0	191
2	1	535
2	2	84

Number of Vehicles in Household	Number of households		Number of Vehicles
0	191	24%	0
1	535	66%	535
2	84	10%	168
Total	810	100%	703

Vehicle Ownership: 0.87 vehicles per household