Transportation Impact Assessment – Screening & Scoping

980 Earl Armstrong Road & 4700 Limebank Road, Riverside South Phase 7

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Prepared for Riverside South Development Corporation
by Arcadis IBI Group
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1 Introduction

Arcadis IBI Group (Arcadis) was retained by Riverside South Development Corporation to undertake a Transportation Impact Assessment (TIA) in support of a Draft Plan of Subdivision for a proposed mixed-use development to be located at 980 Earl Armstrong Road and 4700 Limebank Road in Ottawa.

In accordance with the City of Ottawa's Transportation Impact Assessment Guidelines (June 2017) and guideline revisions enacted in June 2023, the report is divided into three major components:

- **Screening** – Prior to the commencement of a TIA, an initial assessment of the proposed development is undertaken to establish the need for a comprehensive review of the site based on three triggers: Trip Generation, Location and Safety.
- **Scoping** – This component of the TIA report describes both the existing and planned conditions in the vicinity of the development and defines study parameters such as the study area, analysis periods and analysis years of the development. The anticipated trip generation of the proposed development is also established, taking into consideration the existing and future context of the site. Additionally, this section provides an opportunity to identify any scope exemptions that would eliminate elements of scope described in the TIA Guidelines but not relevant to the development proposal, based on consultation with City staff.
- **Analysis** – This component describes the background network travel demand and documents the results of any analyses undertaken to ensure that the transportation related features of the proposed development are in conformance with prescribed technical standards and that its impacts on the transportation network are both sustainable and effectively managed. It also identifies a development strategy to ensure that what is being proposed is aligned with the City of Ottawa's policies and city-building objectives.

Throughout the development of a TIA report, each of the three study components above are submitted in draft form to the City of Ottawa and undergo a review by a designated Transportation Project Manager. Any comments received are addressed to the satisfaction of the City's Transportation Project Manager before proceeding with subsequent components of the study.

Dependent on the findings of this report, the complete submission of this Transportation Impact Assessment may require Functional Design Drawings of recommended roadway improvements to support a Roadway Modification Application (RMA). The submission may also require a post-development Monitoring Plan to track performance of the planned TIA Strategy. The need for these two elements will be confirmed through the analysis undertaken for this report.

2 TIA Screening

An initial screening was completed to confirm the need for a Transportation Impact Assessment by reviewing the following three triggers:

- **Trip Generation**: Based on the proposed size of the development, the minimum development size threshold has been exceeded and therefore the Trip Generation trigger is satisfied.
- **Location**: The subject site is located within the Riverside South Community Core Design Priority Area (DPA), the Limebank Station Transit-Oriented Development (TOD) zone and the Riverside South Town Centre Protected Major Transit Station Area (PMTSA). Additionally, the proposed development will be accessed from Earl Armstrong Road which is identified as part of the crosstown bikeway network. As such, the Location trigger is satisfied.
- **Safety**: Boundary street conditions were reviewed to determine if there is an elevated potential for safety concerns adjacent the site. Given the high posted speeds on both Earl Armstrong Road and Limebank Road, and the proximity of one of the proposed accesses to the intersection of these two major roads, there may be a potential for safety concerns and therefore the Safety trigger is satisfied.

As the proposed development meets the Trip Generation, Location and Safety triggers, the need to undertake a Transportation Impact Assessment is confirmed.

A copy of the Screening Form is provided in **Appendix A**.

3 Project Scoping

3.1 Proposed Development

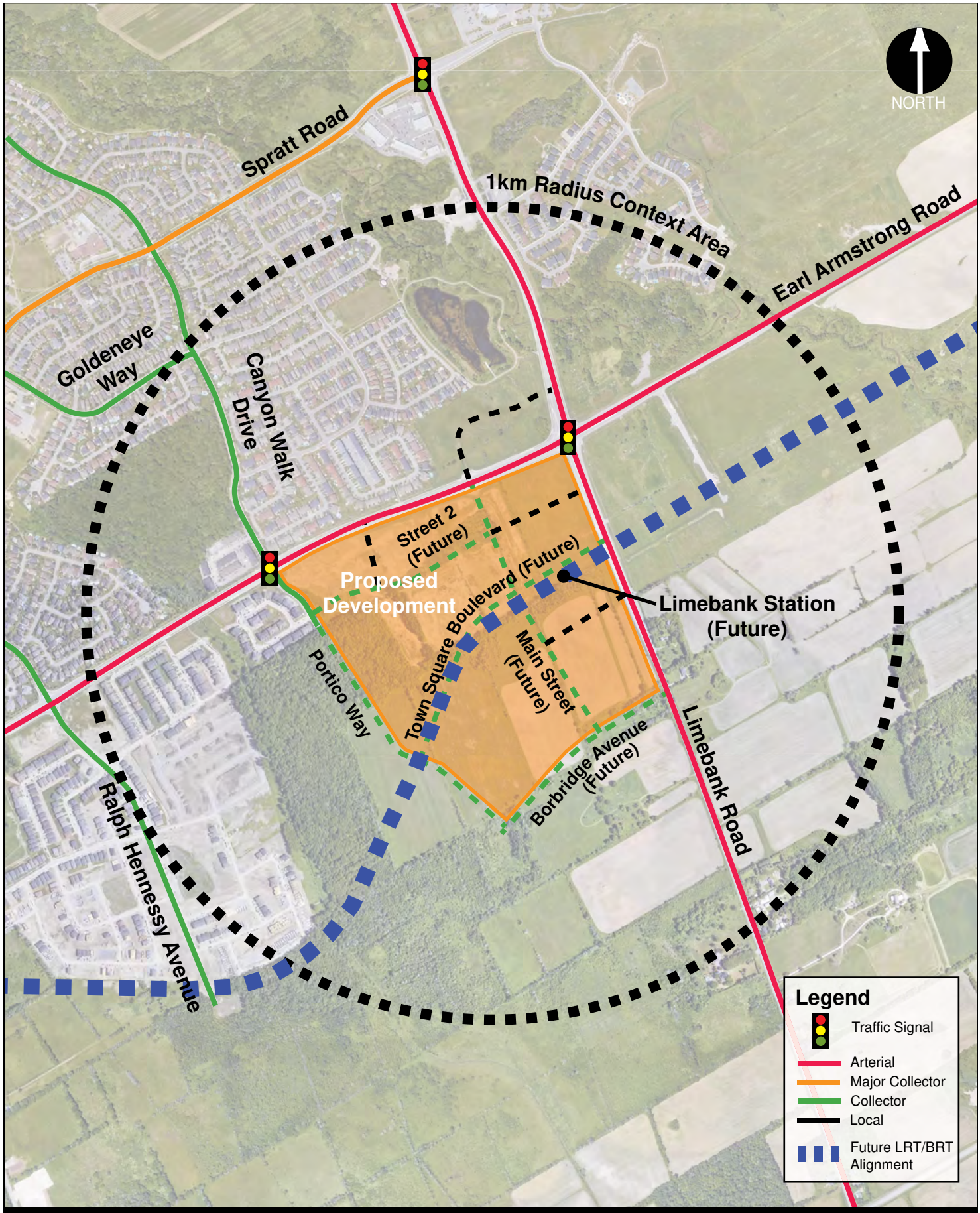
3.1.1 Site Location

The proposed development is located at 980 Earl Armstrong Road and 4700 Limebank Road in the Riverside South community. The site is located within the boundaries of the Riverside South Community Design Plan (CDP), the Riverside South Community Core Design Priority Area (DPA) and the draft Riverside South Secondary Plan. The site occupies the southwestern quadrant of the Earl Armstrong & Limebank intersection and is bound by Earl Armstrong Road to the north, Limebank Road to the east, Portico Way to the northwest, and undeveloped greenfield lands to the south and west.

The future O-Train Trillium Line Limebank Station is located within the proposed development and therefore the entirety of the subject site is within the Limebank Station Transit-Oriented Development (TOD) zone and PMTSA.

Based on the Official Plan approved by City Council on November 4, 2022, the proposed development is located within the Suburban Transect and is located in an area that is designated as a Town Centre and Hub. Both Earl Armstrong Road and Limebank Road are also designated as Minor Corridors and the site is within an Evolving Neighbourhood overlay.

The site location and its surrounding context is illustrated in **Exhibit 1**.



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Transportation Impact Assessment

Exhibit 1:
Site Location

PROJECT No. 144320

SCALE: 0m 125m 250m

3.1.2 Land Use Details

Table 1 below summarizes the proposed land uses included in this development.

Table 1: Land Use Statistics

PHASE	BLOCK	LAND USE	SIZE
Phase 1	1	Low-Rise Residential	92 units
	2	Mid-Rise Residential	189 units
	3	Commercial	3,769 m^2
	4	Commercial	11,105 m^2
	7	District Park	10.60 ha
		Soccer Fields[1]	2 fields
		Baseball Fields[1]	1 field
		Tennis Courts[1]	4 courts
		Basketball Courts[1]	1 court
		Library[1]	1,394 m^2
		Community Centre[1]	1,997 m^2
Phase 2	5	Park	0.545 ha
	6	Commercial	9,958 m^2
Phase 3	8	Town Square Boulevard	1.78 ha
	9	Limebank LRT Station	0.80 ha
	11	Mid/High-Rise Residential	470 units
	12	High School	1,019 students
	13	Mid/High-Rise Residential	174 units
	14	Mid/High-Rise Residential	271 units

Notes: [1] Based on Preliminary Fit Plan for the Core District Park (April 2022).

In total, the proposed development is expected to include approximately 1,200 residential units and 25,000 m^2 of retail/commercial space, in addition to a significant cluster of public amenities.

The above land uses are based on the land use targets identified in the Riverside South CDP, although the road network layout and location of the high school and district park/community centre has since changed. **Figure 1** illustrates the CDP's concept plan for the town centre while **Figure 2** illustrates the Preliminary Fit Plan for the district park prepared by Parks and Facilities Planning (April 2022).

Figure 1: Town Centre Concept Plan

Source: Riverside South Community Design Plan

Figure 2: Preliminary Fit Plan for the District Park

Source: Preliminary Fit Plan for the Core District Park (April 2022)

The Draft Plan of Subdivision for the proposed development is illustrated in **Exhibit 2**. Access to the site will be provided via several new intersections on Earl Armstrong Road and Limebank Road, including an existing partially built all-movements intersection on Earl Armstrong Road. All access intersections will be configured as signalized full-movement intersections with the exception of the Earl Armstrong & Street #1, Limebank & Street #2 and Limebank & Street #5 intersections which will be configured as right-in/right-out accesses.

The subject site is currently an undeveloped greenfield site and, according to GeoOttawa, is zoned GM28 – General Mixed Use, R5Z – Residential Fifth Density Zone and L2 – Major Leisure Facility Zone.

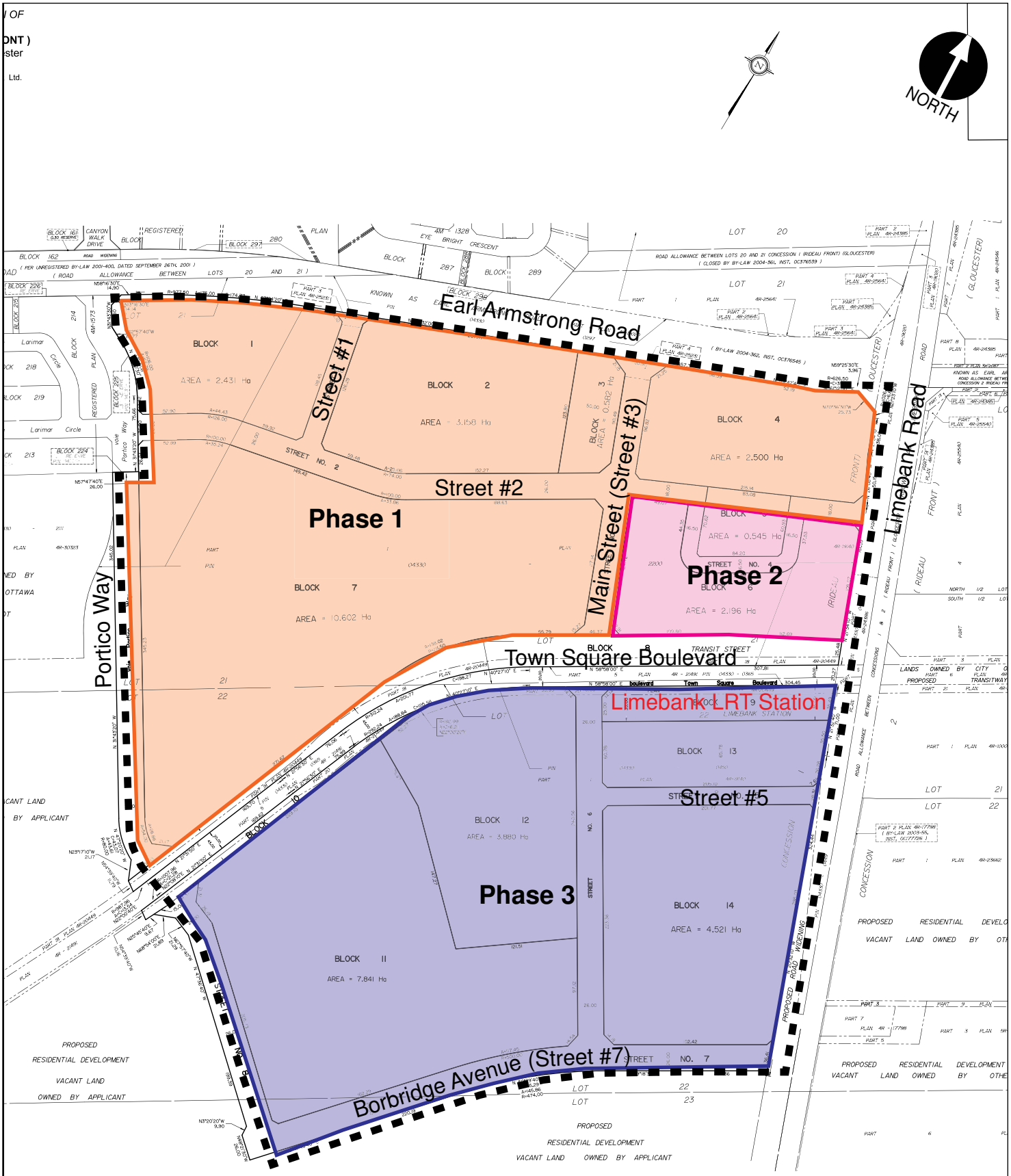

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Exhibit 2: Proposed Development

PROJECT No. 144320

SCALE: 0m 100m 200m

3.1.3 Development Phasing

For the purposes of this study, the proposed development is anticipated to be constructed in three phases with full buildout of all phases expected to be completed within 15 years. It is important to note that the individual blocks established by this subdivision will be developed in response to market conditions and the development timing and phasing may change. The specific transportation impacts of each block will be reviewed as part of subsequent Site Plan Control applications to the City of Ottawa. **Table 2** summarizes the anticipated buildout year for each phase of the development which will provide a base for the assessment of traffic conditions at 5-year intervals in this study. Phase 1 includes the majority of the lands north of the rapid transit corridor and is likely to be constructed first in conjunction with the district park by the City of Ottawa.

Table 2: Development Phasing

PHASE	BUILDOUT
1	2028
2	2033
3	2038

3.2 Existing Transportation Network

3.2.1 Existing Road Network

All major roads, and relevant local roads, within the context area of the site are outlined in **Exhibit 1** above.

There are currently no driveways within 200m of the proposed approaches nor are there any traffic management measures along any of the roads within the 1km context area.

Further details on the study area roads are provided in Section 3.7.

3.2.2 Existing Bicycle and Pedestrian Facilities

The following cycling and pedestrian facilities exist within the context area:

- Concrete sidewalks on both sides of Earl Armstrong Road (west of Limebank Road), Limebank Road (north of Earl Armstrong Road) and Canyon Walk Drive
- A concrete sidewalk on the west side of Portico Way
- On-street bike lanes on both sides of Earl Armstrong Road and Limebank Road

3.2.3 Existing Transit Facilities and Service

Table 3 summarizes the transit routes OC Transpo operates within close proximity to the proposed development.

Table 3: Existing Transit Routes

ROUTE	ROUTE TYPE	TERMINUSES	PEAK PERIOD FREQUENCY
#99	Regular, all-day	Citigate/Barrhaven Centre to Hurdman/Greenboro	30 minutes
#278	Weekday, peak period only	Riverside South to Tunney's Pasture	30 minutes
#299	Weekday, peak period only	Manotick to Hurdman	60 minutes
#699	Weekday, peak period only	Leitrim to Pierre-de-Blois High School	Two trips in the morning and two return trips in the afternoon

The nearest bus stops to the proposed development are presently located on Earl Armstrong Road approximately 450m west of Limebank as well as at Portico Way, providing access to Routes #278 and #699. The transit service maps for the above routes are provided in **Appendix B**.

It should be noted that the design of the partially constructed Earl Armstrong & Main Street intersection has provisioned for future eastbound/westbound bus stops.

3.3 Planned Transportation Network

3.3.1 Future Road Network

The 2013 Transportation Master Plan (TMP) outlines future road network modifications required in the 2031 'Affordable Network'. The TMP projections have been supplemented by the more recent Development Charges (DC) Amendment Background Study (March 2019), which allocates funds and assigns anticipated completion dates to specific capital projects. The Riverside South Community Design Plan (CDP) (June 2016) and draft Secondary Plan have also been referenced as they provide specific details regarding the planned transportation network within the immediate community.

The following projects were noted that may have an impact on area traffic within the vicinity of the site:

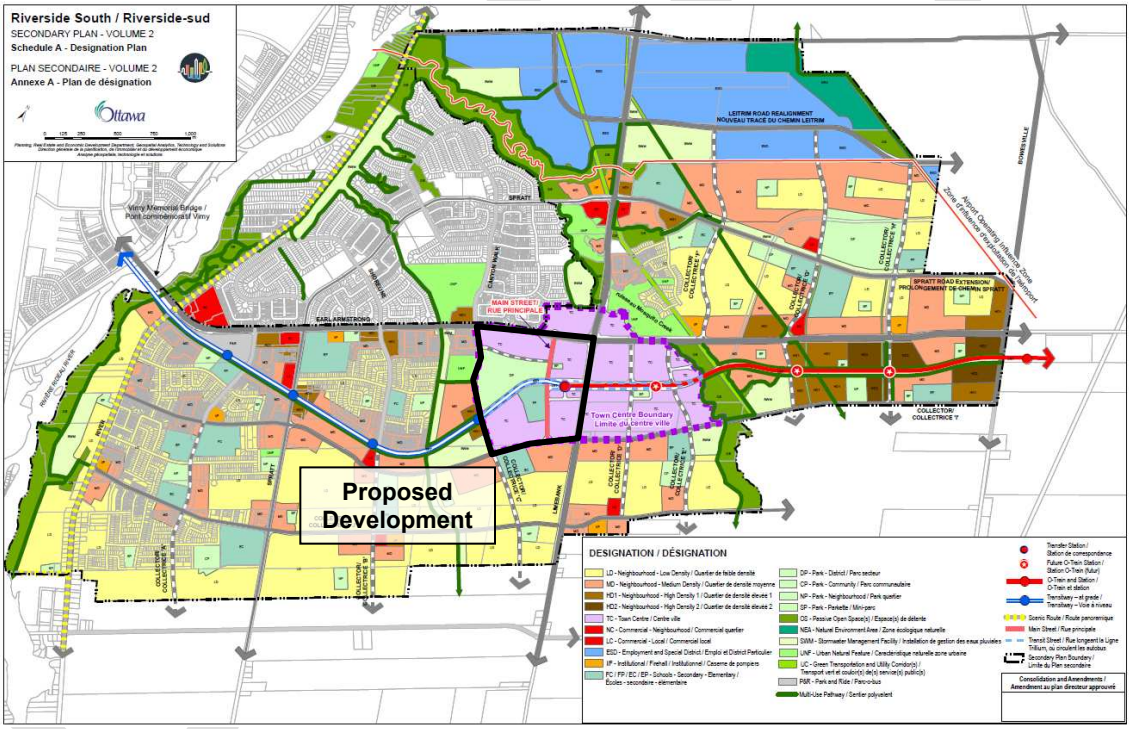
- **Earl Armstrong Road:** Planned widening from two to four lanes between Limebank Road and Bowesville Road. Based on the 2019 DC study, this widening is expected to be completed between 2030 to 2031.
- **Limebank Road**: The DC study indicates that this road will be widened between Earl Armstrong Road and Rideau Road in 2032.
- **Portico Way:** The draft Secondary Plan indicates that this road will be extended south to the urban boundary.
- **Main Street (Street #3):** A new collector road will extend south from Earl Armstrong Road through the proposed development, intersect with the new Town Square Boulevard and terminate at the future extension of Borbridge Avenue (Street #7). Based on discussions with City of Ottawa staff, it is understood that the segment between Earl Armstrong Road and Town Square Boulevard will be constructed as part of the Trillium Line Extension (see Section 3.3.3). Traffic signal infrastructure will also be provided at the intersections with Earl Armstrong Road and Town Square Boulevard when this roadway segment is constructed.

- **Town Square Boulevard:** A new collector road will extend west from Limebank Road through the proposed development and will be located immediately north of the future Limebank Station (see Section 3.3.3). Bus Rapid Transit (BRT) lanes are expected to be provided within the median of this road west of Main Street. Town Square Boulevard will terminate at Portico Way, but it is anticipated that the BRT lanes will continue further west, as discussed in Section 3.3.3.
- **Borbridge Avenue (Street #7):** Borbridge Avenue is an existing street which currently extends from River Road to Spratt Road. It is expected that as development progresses within Riverside South that this street will be extended east and eventually intersect with Limebank Road.

Additionally, the 1515 Earl Armstrong Road TIA (Arcadis IBI Group, March 2023) has identified the need for a dual southbound right-turn lane at the Earl Armstrong & Limebank intersection. It is expected that this dual right-turn lane will be constructed prior to full buildout of Phase 1 (2024) of the 1515 Earl Armstrong Road development.

Figure 3 illustrates the latest draft plan from the draft Secondary Plan.

Figure 3: Riverside South Draft Secondary Plan



Source: Draft Riverside South Secondary Plan (https://devapps.ottawa.ca/en/applications/D01-01-21-0027/details)

3.3.2 Future Bicycle and Pedestrian Facilities

The Transportation Master Plan (TMP) designates Earl Armstrong Road and Limebank Road as 'Spine' or City-wide Cycling Routes and the 2023 TMP Update Part 1 designates Earl Armstrong Road west of Limebank Road as part of the Crosstown Bikeway Network, which forms part of a system linking the commercial, employment, institutional, residential and educational nodes throughout the City of Ottawa. Canyon Walk Drive and Town Square Boulevard are identified as 'Local Routes' in the Ultimate Cycling Network.

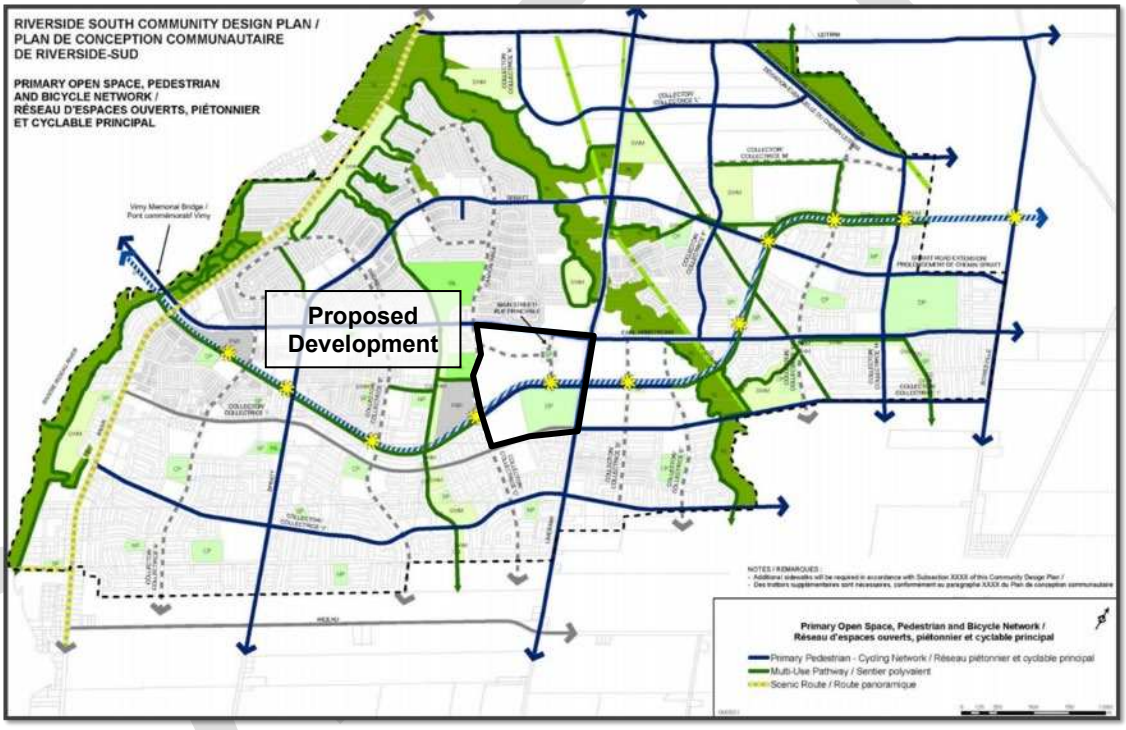
The following pedestrian and cycling projects were identified in the Draft 2023 TMP Update which may have an impact on active travel in the area:

- **Spratt Road Cycling:** Study to determine the feasibility of removing vehicles lanes on Spratt Road between Earl Armstrong Road and Limebank Road in order to add buffered cycling facilities.
- **Limebank Station Pathway:** Multi-use path (MUP) connecting the Riverside South Park & Ride to Limebank Station. This MUP would follow the alignment of the planned BRT corridor.

The Riverside South CDP provides guidance on future active transportation facilities within the area and describes Earl Armstrong Road, Limebank Road and Town Square Boulevard as being part of the 'Primary Pedestrian – Cycling Network'.

The planned cycling and pedestrian network indicated in the CDP is shown in **Figure 4** below.

Figure 4: Riverside South Community Design Plan - Cycling and Pedestrian Network



Source: Riverside South Community Design Plan

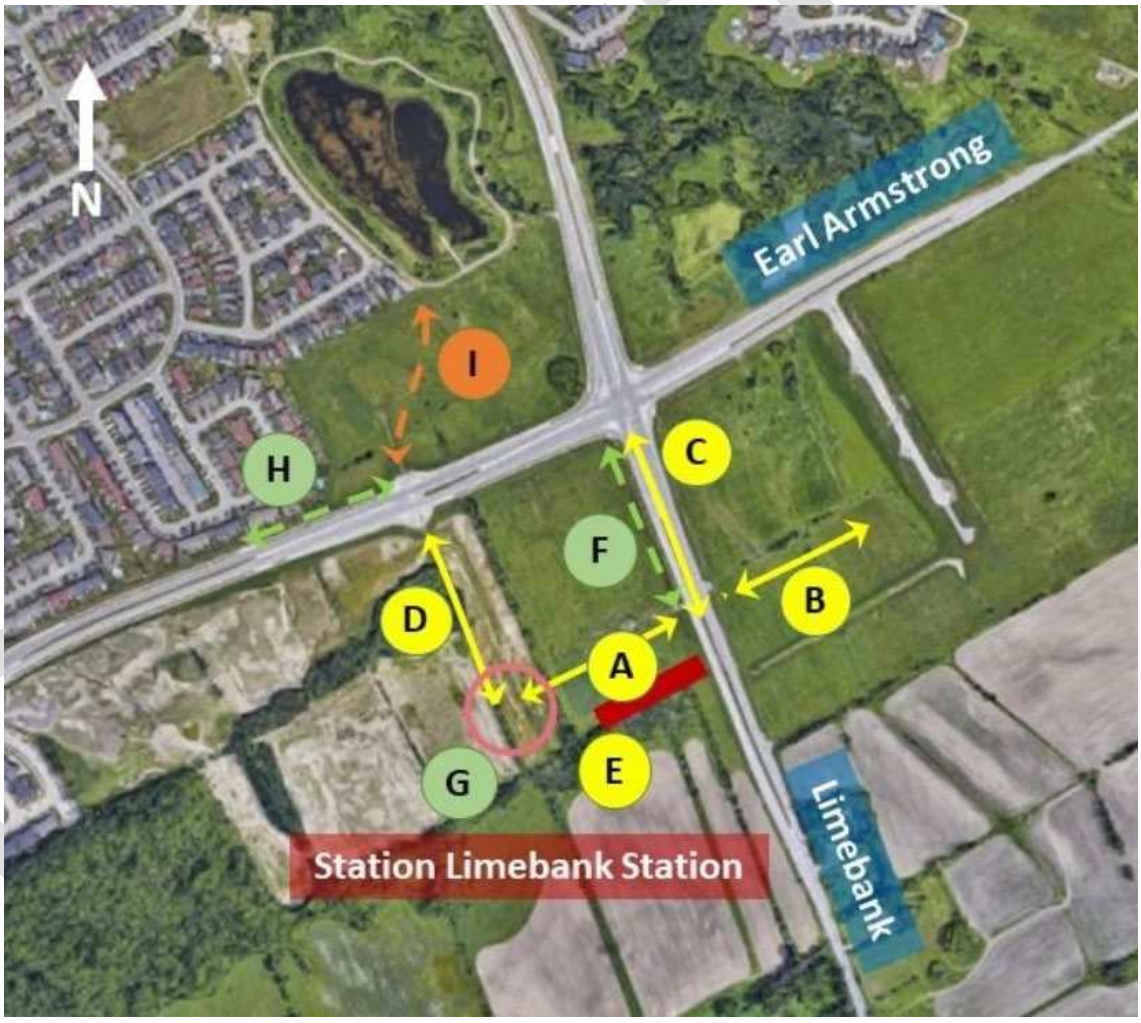
As part of the Trillium Line Extension project, a connectivity enhancement study has been completed to identify future pedestrian and cycling facilities that will link Limebank Station to the adjacent pedestrian and cycling network. As part of this review, the following infrastructure improvements are planned which will have an influence on the proposed development:

- Pedestrian crossing between eastbound and westbound bus stops and plaza (Item A).
- Raised cycle tracks, sidewalks and three passenger pick-up and drop-off (PPUDO) spots east of Limebank Road (Item B).
- New multi-use path (MUP) along Limebank Road between Limebank Station and Earl Armstrong Road (Item C). Alternatively, instead of a MUP, concrete sidewalks and cycle tracks may be provided on both sides of Limebank Road (Item F).

- 80 bicycle parking spaces (Item E).
- New MUP along the east side of Main Street between Limebank Station and Earl Armstrong Road (Item D).
- Protected intersection design for the future Main & Town Square intersection (Item G).
- Potential new MUP along the north side of Earl Armstrong Road west of Main Street (Item H).
- New MUP connection through the 1515 Earl Armstrong Road development (Item I).

Figure 5 illustrates the planned/proposed improvements identified in the connectivity enhancement study.

Figure 5: Limebank Station Connectivity Enhancement Study



Source: Stage 2 Trillium Line South Extension Connectivity Enhancement Study (https://ottawa.ca/en/city-hall/public-engagement/projects/stage-2-lrt-station-connectivity-enhancement-study)

3.3.3 Future Transit Facilities and Services

The 2013 TMP outlines the future rapid transit and transit priority (RTTP) network in the 'Affordable RTTP Network'. The TMP projections have since been supplemented by the Trillium Line

Extension Planning and Environmental Assessment (EA) Study (January 2016) and the Trillium Line Light Rail Transit Extension Addendum (September 2018).

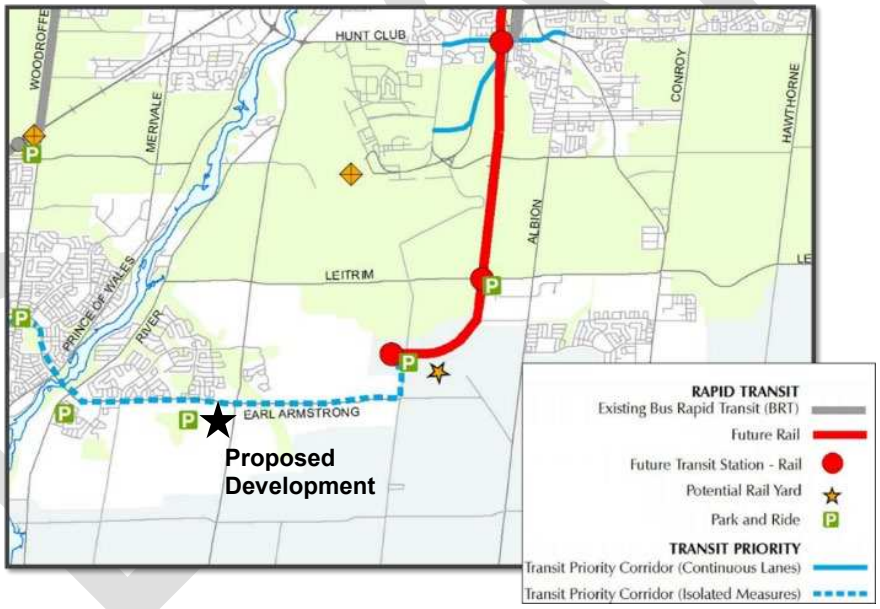
The following transit projects were identified that may have an impact on traffic:

- **Trillium Line Extension:** Extension of the Trillium Line from its current terminus at Greenboro Station to Limebank Station (immediately west of Limebank Road and within the proposed development) with a spur line to the Ottawa International Airport. Based on recent news articles, it is understood that the Trillium Line South Extension is not expected to begin revenue service until at least the end of 2023.
- **Chapman Mills/Strandherd Drive/Earl Armstrong Road Transit Priority Corridor:** The corridor is expected to be upgraded with transit signal priority and queue jump lanes between the Barrhaven Town Centre Station and Bowesville Station. There is presently no specific timing available for the implementation of this project.

Figure 6 below shows the transit infrastructure projects in the vicinity of the proposed development that are part of the 2031 Affordable Network. The proposed Trillium Line South Extension, including the recommendations from the EA study and the Addendum, are illustrated in **Figure 7** below.

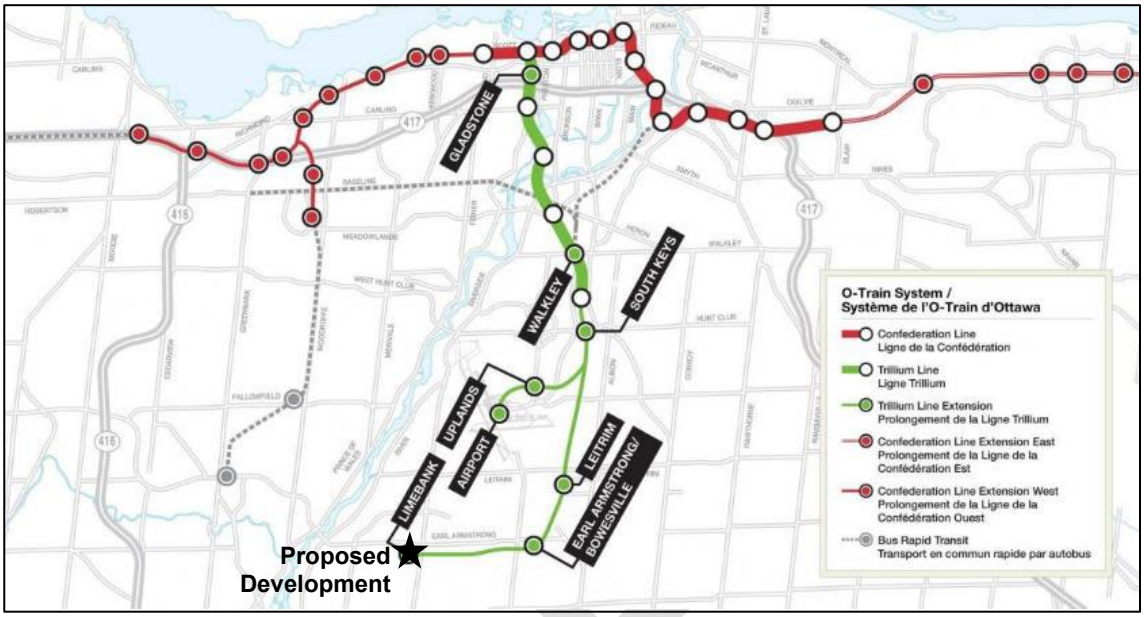
As shown previously in **Figure 3**, the Riverside South CDP and Secondary Plan identify the eventual construction of a BRT corridor extending west from the terminus of the Trillium Line Extension, connecting the Riverside Park and Ride with the future O-Train terminus at Limebank Road. The implementation of this corridor, however, is presently not expected to occur within the timeframe of this study.

Figure 6: Future 'Affordable RTTP Network Projects'



Source: 2013 Transportation Master Plan – Map 5 '2031 Affordable Network'

Figure 7: Stage 2 LRT - Trillium Line Extension



Source: City of Ottawa Stage 2 LRT Project Website – Trillium Line South Extension

3.4 Future Adjacent Developments

The City of Ottawa Transportation Impact Assessment (TIA) Guidelines specify that all significant developments proposed within the surrounding area which are likely to occur within the study's horizon year must be identified and taken into consideration in the development of future background traffic projections.

There are currently three development applications of significance in the vicinity of the proposed development, as shown in **Table 4** and **Exhibit 3** below.

Table 4: Future Adjacent Developments

DEVELOPMENT	LAND USE	EXPECTED BUILD-OUT YEAR
1515 Earl Armstrong	• 3,141m^2 grocery store • 2,961m^2 office space • 5,874m^2 retail space • 686m^2 restaurant space • 562m^2 daycare	2024-2025
1420 Earl Armstrong	• 19,319m^2 of retail space	2016-2021[1]
1423 Earl Armstrong	• 3,393m^2 grocery store • 3,228m^2 of retail space • 429m^2 bank • 369m^2 bank	2015[1]

Notes:

[1] – The build-out date identified in the TIA has passed therefore it is conservatively assumed that the development will be built-out by the 2028 analysis year of this study.

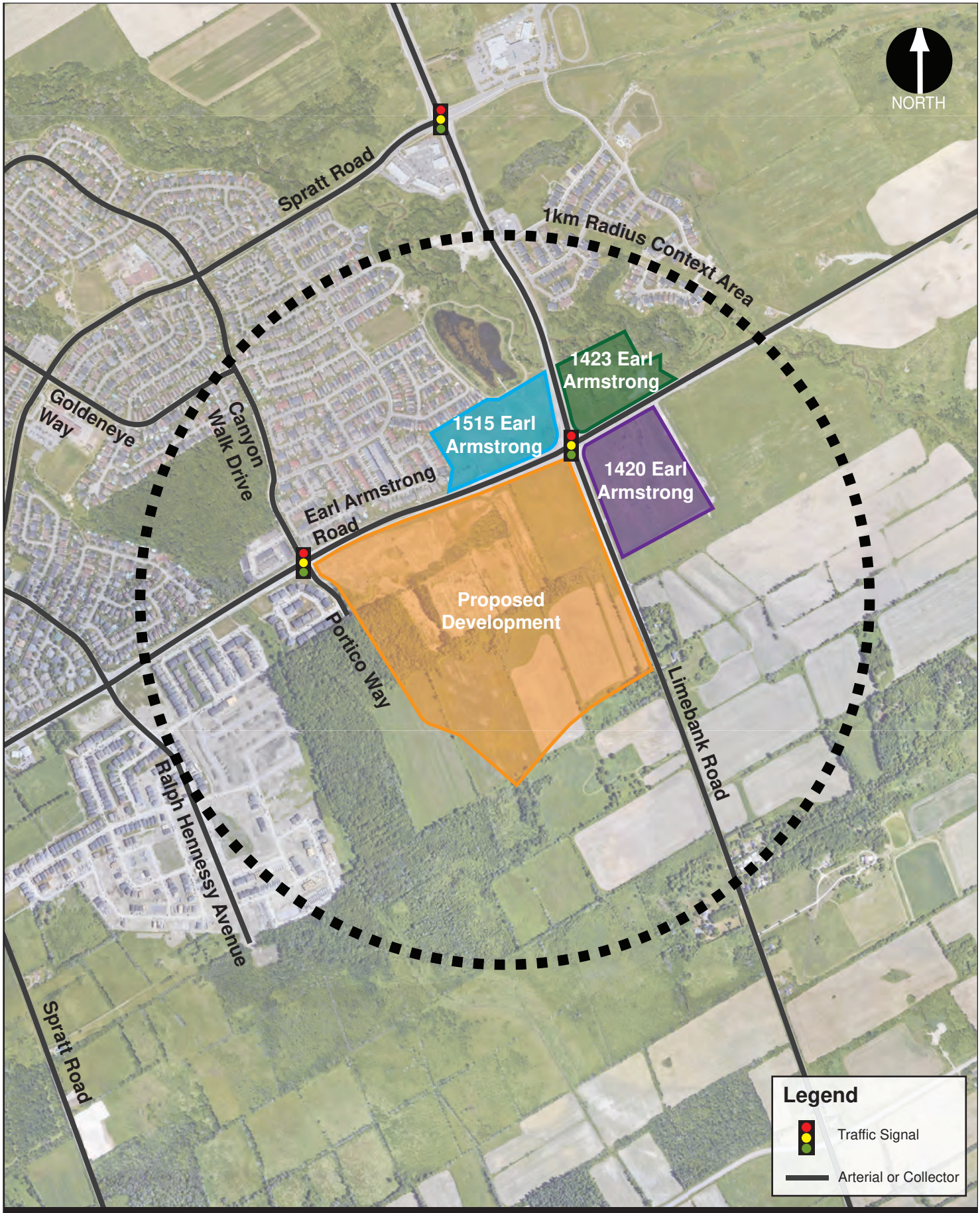


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Exhibit 3: Adjacent Developments

PROJECT No. 144320

SCALE: 0m 125m 250m

3.5 Time Periods

As the proposed development will consist of both residential and non-residential land uses, traffic generated during the weekday morning, weekday afternoon and Saturday midday peak hours are expected to result in the most significant impact to traffic operations on the adjacent network.

3.6 Analysis Years

The following future analysis years will be assessed in this study:

- Year 2028 – Buildout of Phase 1
- Year 2033 – Buildout of Phase 2
- Year 2038 – Full Buildout / Buildout of Phase 3

The new Official Plan considers a horizon year of 2046, however as the update to the TMP is still ongoing, transportation infrastructure requirements beyond 2031 have not been fully established. Given the long timeframe over which the proposed development will be built out and the uncertainty of future transportation infrastructure beyond 2031, a 5-year horizon beyond the full buildout year has not been considered in this study.

3.7 Study Area

With consideration of the information presented thus far, a study area bound by Earl Armstrong Road to the north, the future extension of Borbridge Avenue (Street #7) to the south, Limebank Road to the east and Portico Way to the west will provide a sufficient assessment of the development's impact on the adjacent transportation network.

The following intersections have been identified as being most impacted by the proposed development and will be assessed for vehicular capacity as part of this study:

- Earl Armstrong & Limebank
- Earl Armstrong & Canyon Walk/Portico
- Earl Armstrong & Main (future)
- Limebank & Town Square (future)
- Limebank & Borbridge (future)
- Main & Town Square (future)
- Main & Street #2 (future)
- Earl Armstrong & Street #1 (future)
- Limebank & Street #2 (future)
- Limebank & Street #5 (future)

An intersection-based Multi-Modal Level of Service (MMLOS) evaluation will be conducted for any existing or future signalized study area intersections listed above. Stop-controlled intersections and roundabouts are exempt from this analysis, as no methodology currently exists for evaluating MMLOS at unsignalized intersections. Segment-based MMLOS analysis will be conducted for the segments of Earl Armstrong Road and Limebank Road that are adjacent to the proposed development.

3.7.1 Roadways

Table 5 below summarizes the details of the existing streets within the study area while **Table 6** summarizes the details of the future streets planned within the proposed development.

Table 5: Existing Roadways

NAME	CLASS	JURISDICTION	ORIENTATION & EXTENTS	CROSS-SECTION	ROW (m)	SPEED LIMIT (km/h)
Earl Armstrong Road	Arterial	City of Ottawa	East-West, River Road to High Road	4-Lane, Urban, Divided	44.5	80
Limebank Road	Arterial	City of Ottawa	North-South, River Road to Mitch Owens Road	4-Lane, Urban, Divided	44.5	80
Canyon Walk Drive	Collector	City of Ottawa	North-South, Spratt Road to Earl Armstrong Road	2-Lane, Urban, Undivided	-	50
Portico Way	Collector	City of Ottawa	North-South, Earl Armstrong Road to Larimar Circle	2-Lane, Urban, Undivided	-	50

Source: Table 1 – Road Right-of-Way Protection, Official Plan (2021)

Table 6: Future Roadways

NAME	CLASS	JURISDICTION	ORIENTATION & EXTENTS	CROSS-SECTION	ROW (m)	TARGET SPEED LIMIT (km/h)
Street #1	Local	City of Ottawa	North-South, Earl Armstrong Road to Street #2	2-Lane, Urban, Undivided	20	30
Street #2	Collector	City of Ottawa	East-West, Portico Way to Main Street	2-Lane, Urban, Undivided	26	40
	Local	City of Ottawa	East-West, Main Street to Limebank Road	2-Lane, Urban, Undivided	18	30
Main Street	Collector	City of Ottawa	North-South, Earl Armstrong Road to Borbridge Avenue	2-Lane, Urban, Undivided	26	40
Town Square Boulevard	Collector	City of Ottawa	East-West, Portico Way to Limebank Road	2-Lane, Urban, Divided	43	40
Street #5	Local	City of Ottawa	East-West, Main Street to Limebank Road	2-Lane, Urban, Undivided	18	30
Borbridge Avenue	Collector	City of Ottawa	East-West, Portico Way to Limebank Road	2-Lane, Urban, Undivided	26	40

3.7.2 Existing Intersections

The following existing intersections are located within the study area:

- **Earl Armstrong Road & Limebank Road** is a four-legged signalized intersection with dual left-turn lanes, right-turn channels, and bike lanes on all approaches. The intersection was also designed with sufficient width to accommodate a dual southbound right-turn channel. Based on the Riverside South Community Design Plan (CDP), the intersection is designated as a Sub-Community Gateway.

- **Earl Armstrong Road & Canyon Walk Drive / Portico Way** is a four-legged signalized intersection with left-turn lanes and right-turn smart channels on all approaches, and bike lanes on the eastbound and westbound approaches. The Riverside South CDP designates this intersection as a Neighbourhood Gateway.

- **Earl Armstrong & Main Street** is a partially constructed intersection. The northbound and southbound approaches are currently closed to traffic and traffic signals have not been installed. The intersection has been designed with right-turn smart channels on all approaches and has provisioned for dual left-turn lanes on the eastbound approach and single left-turn lanes on the three remaining approaches. The northbound and southbound approaches were constructed with approximately 14m of width thereby provisioning for auxiliary lanes and on-road bicycle lanes. Based on field observations, below-grade traffic signal infrastructure is already in place. The Riverside South CDP designates this intersection as a Neighbourhood Gateway.

3.7.3 Existing Lane Configurations & Traffic Volumes

The following weekday morning, weekday afternoon and Saturday midday peak hour turning movement counts were obtained from the City of Ottawa and The Traffic Specialist:

- Weekday:
  - Earl Armstrong & Limebank (City of Ottawa, December 2019)
  - Earl Armstrong & Canyon Walk/Portico (City of Ottawa, December 2019)
- Saturday:
  - Earl Armstrong & Limebank (The Traffic Specialist, March 2022)
  - Earl Armstrong & Canyon Walk/Portico (The Traffic Specialist, March 2022)

In general, the City requires the use of traffic counts conducted within the last 3 years. The weekday peak hour traffic counts are slightly outside this timeframe but were collected prior to the COVID-19 pandemic and are therefore assumed to be representative of typical traffic conditions. As the majority of COVID-19 pandemic restrictions were lifted by March 2022, it is expected that the impacts of the pandemic on the Saturday traffic volumes will be negligible.

A growth rate was applied to the arterial roadway approaches of the above noted turning movement count data to approximate existing traffic volumes. Justification of background growth rates is discussed further in the Analysis section of this report.

Peak hour traffic volumes representative of typical conditions are shown in **Exhibit 4**. The traffic count data is provided in **Appendix C**. The lane configurations and intersection controls for the study area intersections are illustrated in **Exhibit 5**.

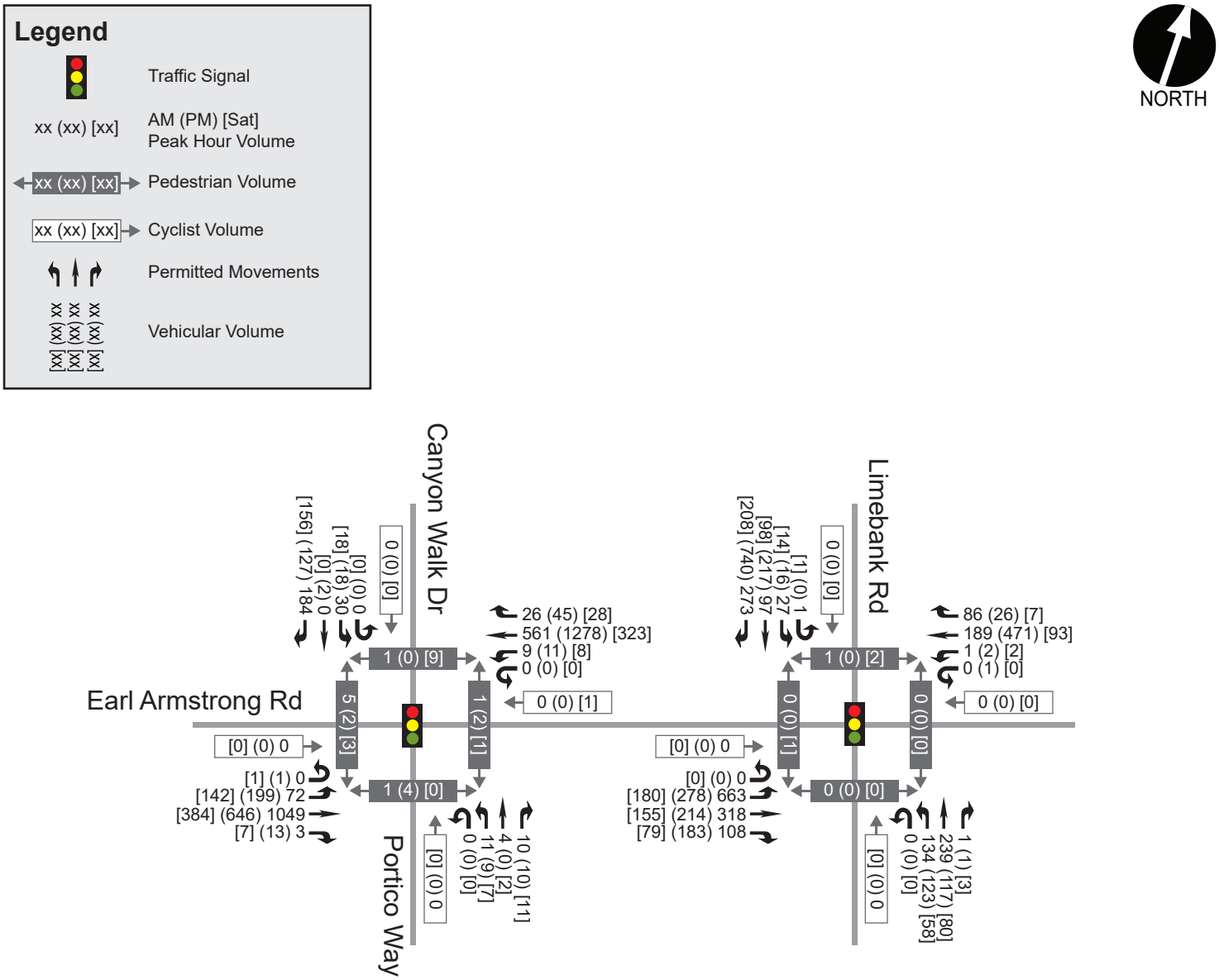

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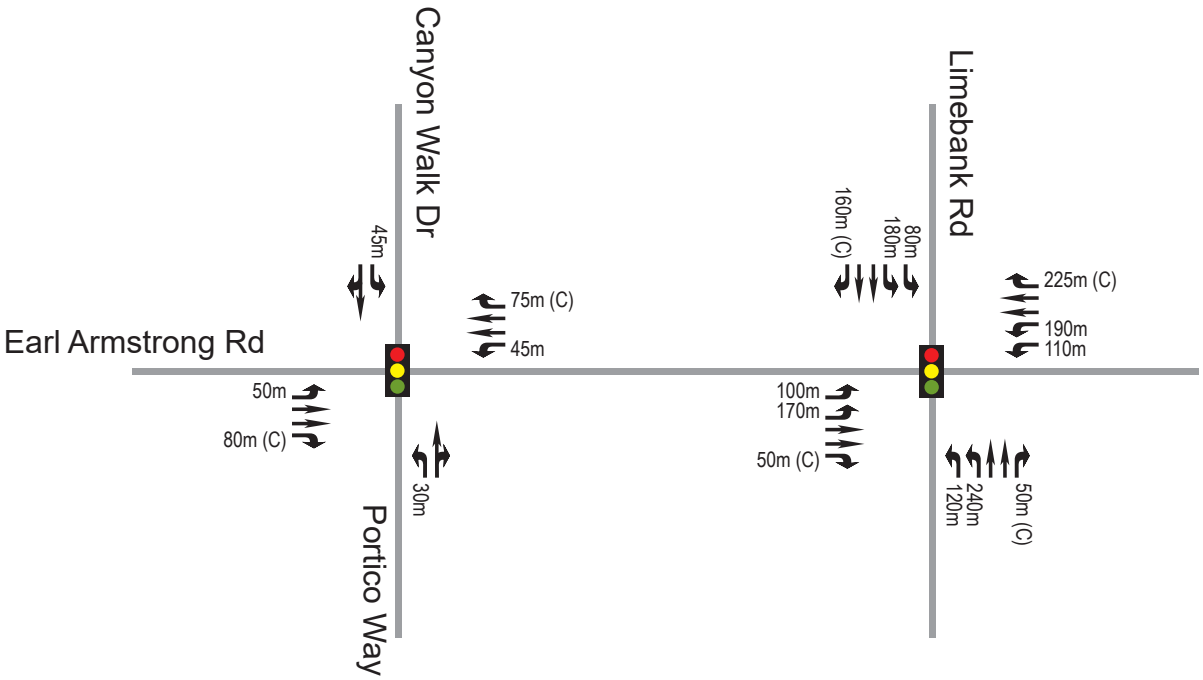
Exhibit 4:
Existing Traffic

PROJECT No. 144320

SCALE: N.T.S.



Legend

- Stop Sign
- Traffic Signal
- Lane Configurations
- xxxm Storage Lengths

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980 Earl Armstrong Road & 4700 Limebank Road, Riverside South Ph 7 Transportation Impact Assessment

Exhibit 5: Existing Lane Configuration & Traffic Controls

PROJECT No. 144320

SCALE: N.T.S.

3.7.4 Collision History

A review of historical collision data has been conducted for the road network surrounding the proposed development. The TIA Guidelines require a safety review if at least six collisions for any one movement or of a discernible pattern, over a five-year period have occurred. **Table 7** summarizes all reported collisions between January 1, 2016, and December 31, 2020. Data with any influence from the COVID-19 pandemic has been excluded from the analysis to identify trends under typical operating conditions.

Table 7: Reported Collisions within Vicinity of Proposed Development

LOCATION	# OF REPORTED COLLISIONS
INTERSECTIONS	
Earl Armstrong & Limebank	25
Earl Armstrong & Canyon Walk/Portico	13
SEGMENTS	
Earl Armstrong – Canyon Walk/Portico to Limebank	2

Based on the collision history noted above, both intersections meet the threshold for warranting further review.

Another method of evaluating the relative magnitude of collision frequency at one intersection compared to another is to quantify the average historical number of collisions against the daily volume of traffic entering the intersection. This is commonly expressed in terms of average collisions per year per Million Vehicles Entering (MVE) and a rate of greater than 1.0 is considered significant. The study area intersections have experienced the following collision rates:

- Earl Armstrong & Limebank: 0.67
- Earl Armstrong & Canyon Walk/Portico: 0.34

As indicated above, none of the study area intersections have experienced more than 1.0 collisions per MVE.

Detailed collision records are provided in **Appendix D**.

3.8 Demand Rationalization

The purpose of this section is to rationalize future travel demands within the study area to account for potential capacity limitations in the transportation network and its ability to effectively accommodate the additional demand generated by a new development. The results of the demand rationalization exercise will be used to inform the existing capacity constraints of the adjacent road network and define the site-generated trip characteristics for the proposed development.

3.8.1 Description of Capacity Issues

Table 8 below summarizes the existing traffic operational performance at the study area intersections based on Existing Traffic volumes. The intersection capacity analysis is based on locally-specific parameters as described in the TIA Guidelines and incorporates existing signal timing plans obtained from the City of Ottawa. As prescribed in the TIA Guidelines, a peak hour factor (PHF) of 0.90 has been considered in the analysis of existing conditions. The Synchro output files have been provided in **Appendix E**.

Table 8: Intersection Capacity Analysis: Existing Traffic

INTERSECTION	TRAFFIC CONTROL	PEAK HOUR	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Earl Armstrong & Limebank	Signalized	AM	B (0.61)	EBL (0.74)
		PM	D (0.81)	**SBR (1.13)[1]**
		SAT	A (0.35)	SBR (0.53)
Earl Armstrong & Canyon Walk/Portico	Signalized	AM	A (0.40)	EBT (0.40)
		PM	A (0.54)	EBL (0.56)
		SAT	A (0.29)	SBTR (0.32)

Note:

[1] – A v/c ratio greater than 1.00 is not possible for an observed/recorded volume therefore this result indicates that the movement is operating at capacity under existing conditions.

As indicated above, heavy southbound right-turn demand at the Earl Armstrong & Limebank intersection is resulting in that movement exceeding its theoretical capacity during the weekday afternoon. The 1515 Earl Armstrong Road TIA (Arcadis IBI Group, March 2023) recommended that dual southbound right-turn lanes be implemented at the intersection to address this issue. With this mitigation measure implemented, the TIA indicated that the intersection would operate at an acceptable Level of Service until 2030, although the eastbound left-, northbound left- and southbound right-turn movements were expected to be approaching their theoretical capacity (i.e., v/c ratios above 0.90).

3.8.2 Adjustment to Background Network Demands

Under existing or historical conditions, an analysis of observed (i.e., processed) volumes cannot result in a condition that is over an intersection's theoretical capacity (i.e., v/c > 1.0). In situations where projected traffic demand results in volumes that exceed capacity, it is expected that the traffic demand will either spread out over a greater period of time (i.e., peak spreading) or shift to alternatives modes of transportation such as transit. In the analysis of future conditions, a peak hour factor (PHF) of 1.0 will be utilized in accordance with the City of Ottawa TIA Guidelines. It is also expected that signal timing optimization will occur on a regular basis.

The current average transit mode share for residential land uses within the South Gloucester/Leitrim Traffic Assessment Zone (TAZ) is approximately 12% during the weekday morning and afternoon peak hour. Based on the latest evaluation of mode share targets from the Draft Riverside South CDP Transportation Update (IBI Group, March 2020), a community-wide transit mode share of 32% is now targeted for 2031. Given the constraints on further growth in vehicular traffic, it is expected that residents of the Riverside South community will gradually transition to transit when the Trillium Line Extension is completed at the end of 2023. Assuming transit mode share grows linearly between 2023 and 2031, this will result in an overall community-wide residential transit mode share of 25% in 2028 and 32% in 2033 and 2038.

The Trillium Line Extension is expected to be fully implemented in advance of the site's earliest occupancy and Limebank Station will be located near the centre of the proposed development. This places the site in a Transit-Oriented Development (TOD) policy area and therefore future conditions can be evaluated against an acceptable threshold of LOS 'E' for vehicles in accordance with the Multi-Modal Level of Service (MMLOS) Guidelines.

3.8.3 Adjustment to Development Generated Demands

The proposed development will connect to Earl Armstrong Road and Limebank Road at several locations. It will therefore be possible for site-generated to enter and exit the site without contributing significant traffic to the critical movements at the Earl Armstrong & Limebank intersection. The assignment of site-generated traffic will consider the capacity constraints present at the intersection.

For residential developments adjacent to rapid transit, the City of Ottawa has established mode share targets which aim for 80% of site-generated trips to be via non-auto modes of transportation (i.e., walking, cycling or transit). Given the constraints to continued growth in vehicular traffic and the proximity of the residential land uses to Limebank Station, it is expected that similar mode shares will be attainable for the residential portion of the site.

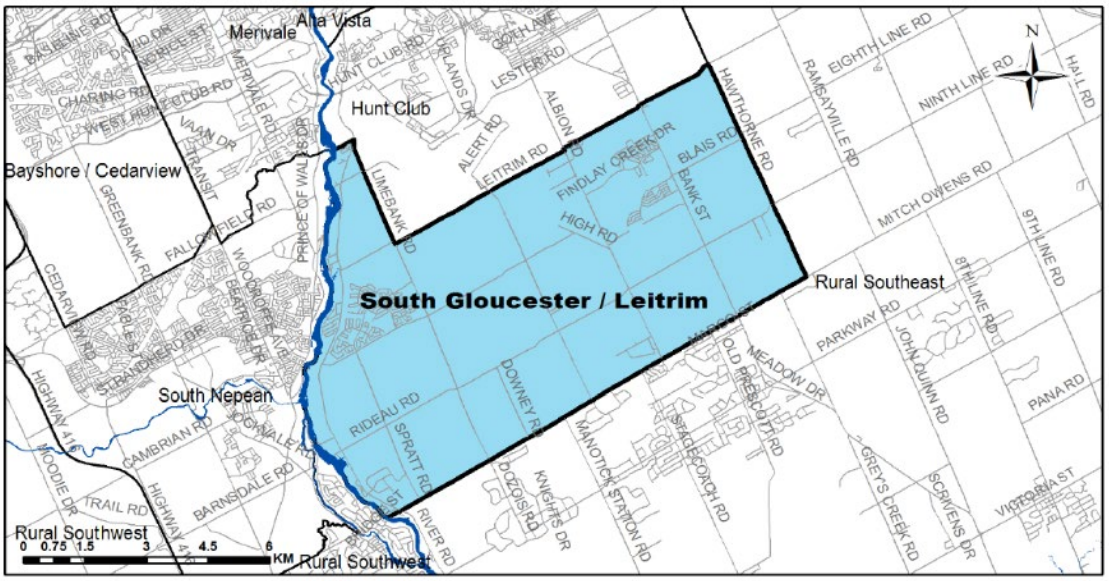
3.9 Development Generated Traffic

3.9.1 Trip Generation Methodology

The person-trip generation of the site was calculated based on data from the TRANS 2020 Trip Generation Manual (WSP, 2020), the Institute of Transportation Engineers' (ITE) Trip Generation Manual (11th Edition), and the TIA Guidelines. Internal person-trips between residential and retail land uses were calculated using the NCHRP 684 Internal Trip Capture Estimation Tool, while internal trips to/from the school and district park were estimated based on data from the 2011 NCR Household Origin-Destination Survey (TRANS, 2013). Mode share targets were established for the proposed development using data from the TRANS 2020 Trip Generation Manual and the 2011 O-D Survey, with consideration also given for the mode share targets established for other nearby developments of similar land use and context.

The mode share data was largely based on data for the South Gloucester/Leitrim Traffic Assessment Zone (TAZ) in which the proposed development is located and whose extents are illustrated in **Figure 8** below.

Figure 8: South Gloucester/Leitrim TAZ



Source: 2011 O-D Survey

3.9.2 Person-Trip Generation

Peak period person-trips and baseline vehicle trips associated with the proposed development have been estimated using appropriate trip generation rates from the TRANS 2020 Trip Generation Manual and the ITE Trip Generation Manual and converted to peak hour person-trips using appropriate conversion factors.

For the Saturday trip generation of the residential land uses, the baseline vehicle trips were estimated using the trip generation rates for sites not close to rapid transit. The rationale for using these rates, as opposed to the trip generation rates for sites close to rapid transit, is that the person-trip conversion factor provided in the TIA Guidelines is based on the assumption that the survey sites used for establishing the ITE trip generation rates are located in areas with high auto mode share and relatively low vehicle occupancy. As such, it is important to only use ITE trip generation rates that adhere to these assumptions, otherwise the person-trip conversion factor would not provide an accurate estimate of the person-trip generation of the site.

For the tennis court land use, there is no ITE data on the trip generation during the weekday morning and Saturday midday peak hour. As such, it was assumed that the tennis courts would generate the same volume of traffic during the weekday morning and Saturday midday as they do during the weekday afternoon.

There is also no ITE trip generation data available for baseball fields or basketball courts. As the trip generation of these land uses is expected to be roughly similar to soccer fields and tennis courts, respectively, the trip generation of these sports facilities has been estimated using the trip generation rates for soccer fields and tennis courts.

Table 9, **Table 10** and **Table 11** summarize the peak hour person-trips generated by each land use for each phase of development. The trip generation of each block within the proposed development was calculated separately and then summed to establish the total trip generation per land use.

Table 9: Phase 1 Peak Hour Person Trips

LAND USE	SIZE	PEAK HOUR	PERSON TRIPS (PPH)[1]		
			IN	OUT	TOTAL
Low-Rise Residential[2]	92 units	AM	19	44	63
		PM	36	28	64
		SAT	38	42	80
Mid/High-Rise Residential[3]	189 units	AM	24	52	76
		PM	44	31	75
		SAT	50	47	97
821: Shopping Plaza (40-150k)	14,874 m^2	AM	220	135	355
		PM	521	543	1,064
		SAT	693	641	1,334
495: Recreational Community Centre	1,997 m^2	AM	35	18	53
		PM	54	60	114
		SAT	32	28	60
590: Library	1,394 m^2	AM	10	5	15
		PM	76	82	158
		SAT	128	114	242
411: Public Park	10.6 hectares	AM	0	1	1
		PM	17	14	31
		SAT	22	19	41
488: Soccer Complex	3 fields	AM	3	1	4
		PM	65	33	98
		SAT	145	156	301
490: Tennis Courts	5 courts	AM	15	12	27
		PM	15	12	27
		SAT	15	12	27
Total		**AM**	**326**	**268**	**594**
		PM	**828**	**803**	**1,631**
		SAT	**1,123**	**1,059**	**2,182**

Notes: pph = person-trips per hour
[1] Peak hour person-trips were calculated on a block-by-block basis then summed to establish the total trip generation of the land use.
[2] Weekday morning and afternoon trips were calculated using the trip generation rates for Multi-Unit (Low-Rise) from the 2020 TRANS Trip Generation Manual (i.e., 1 to 2 storeys). Saturday trips were calculated using the trip generation rates for ITE land use 215: Single-Family Attached Housing.
[3] Weekday morning and afternoon trips were calculated using the trip generation rates for Multi-Unit (High-Rise) from the 2020 TRANS Trip Generation Manual (i.e., 3-storeys or more). Saturday trips were calculated using the trip generation rates for ITE land use 221: Multifamily Housing (Mid-Rise) (i.e., between 4 and 10 storeys).

Table 10: Phase 1 & 2 Peak Hour Person Trips

LAND USE	SIZE	PERIOD	GENERATED TRIPS (PPH)[1]		
			IN	OUT	TOTAL
Low-Rise Residential[2]	92 units	AM	19	44	63
		PM	36	28	64
		SAT	38	42	80
Mid/High-Rise Residential[3]	189 units	AM	24	52	76
		PM	44	31	75
		SAT	50	47	97
821: Shopping Plaza (40-150k)	25,826 m^2	AM	367	225	592
		PM	870	906	1,776
		SAT	1,181	1,090	2,271
495: Recreational Community Centre	1,997 m^2	AM	35	18	53
		PM	54	60	114
		SAT	32	28	60
590: Library	1,394 m^2	AM	10	5	15
		PM	76	82	158
		SAT	128	114	242
411: Public Park	10.6 hectares	AM	0	1	1
		PM	17	14	31
		SAT	22	19	41
488: Soccer Complex	3 fields	AM	3	1	4
		PM	65	33	98
		SAT	145	156	301
490: Tennis Courts	5 courts	AM	15	12	27
		PM	15	12	27
		SAT	15	12	27
Total		**AM**	**473**	**358**	**831**
		PM	**1,177**	**1,166**	**2,343**
		SAT	**1,611**	**1,508**	**3,119**

Notes: pph = person-trips per hour
[1] Peak hour person-trips were calculated on a block-by-block basis then summed to establish the total trip generation of the land use.
[2] Weekday morning and afternoon trips were calculated using the trip generation rates for Multi-Unit (Low-Rise) from the 2020 TRANS Trip Generation Manual (i.e., 1 to 2 storeys). Saturday trips were calculated using the trip generation rates for ITE land use 215: Single-Family Attached Housing.
[3] Weekday morning and afternoon trips were calculated using the trip generation rates for Multi-Unit (High-Rise) from the 2020 TRANS Trip Generation Manual (i.e., 3-storeys or more). Saturday trips were calculated using the trip generation rates for ITE land use 221: Multifamily Housing (Mid-Rise) (i.e., between 4 and 10 storeys).

Table 11: Phase 1-3 Peak Hour Person Trips

LAND USE	SIZE	PERIOD	GENERATED TRIPS (PPH)[1]		
			IN	OUT	TOTAL
Low-Rise Residential[2]	92 units	AM	19	44	63
		PM	36	28	64
		SAT	38	42	80
Mid/High-Rise Residential[3]	1,104 units	AM	139	305	444
		PM	254	183	437
		SAT	291	278	569
821: Shopping Plaza (40-150k)	25,826 m^2	AM	367	225	592
		PM	870	906	1,776
		SAT	1,181	1,090	2,271
525: High School	1,020 students	AM	488	229	717
		PM	88	94	182
		SAT	99	58	157
495: Recreational Community Centre	1,997 m^2	AM	35	18	53
		PM	54	60	114
		SAT	32	28	60
590: Library	1,394 m^2	AM	10	5	15
		PM	76	82	158
		SAT	128	114	242
411: Public Park	10.6 hectares	AM	0	1	1
		PM	17	14	31
		SAT	22	19	41
488: Soccer Complex	3 fields	AM	3	1	4
		PM	65	33	98
		SAT	145	156	301
490: Tennis Courts	5 courts	AM	15	12	27
		PM	15	12	27
		SAT	15	12	27
Total		**AM**	**1,076**	**840**	**1,916**
		PM	**1,475**	**1,412**	**2,887**
		SAT	**1,951**	**1,797**	**3,748**

Notes: pph = person-trips per hour
[1] Peak hour person-trips were calculated on a block-by-block basis then summed to establish the total trip generation of the land use.
[2] Weekday morning and afternoon trips were calculated using the trip generation rates for Multi-Unit (Low-Rise) from the 2020 TRANS Trip Generation Manual (i.e., 1 to 2 storeys). Saturday trips were calculated using the trip generation rates for ITE land use 215: Single-Family Attached Housing.
[3] Weekday morning and afternoon trips were calculated using the trip generation rates for Multi-Unit (High-Rise) from the 2020 TRANS Trip Generation Manual (i.e., 3-storeys or more). Saturday trips were calculated using the trip generation rates for ITE land use 221: Multifamily Housing (Mid-Rise) (i.e., between 4 and 10 storeys).

3.9.3 Internalization

Internal trips between the residential and retail land uses were estimated using the NCHRP 684 Internal Trip Capture Estimation Tool. Separate internalization calculations were completed for each phase of development and the results are provided in **Appendix F**.

For internal trips between residential, school and community centre land uses, trip purpose data from the 2011 O-D Survey was analyzed. For trips to/from schools, the percentage of students that would be going to high school was considered when determining the percentage of residential trips that would go to/from the high school.

Table 12 summarizes the percentage of trips to/from residential land uses that are expected to go to/from the school or community centre within the proposed development.

Table 12: Internal School and Community Centre Trips

DESTINATION	PERCENTAGE OF RESIDENTIAL TRIPS TO/FROM DESTINATION		
	WEEKDAY AM PEAK	WEEKDAY PM PEAK	SATURDAY MIDDAY PEAK
High School	9%	0%[1]	0%
Community Centre[2]	1%	5%	9%

Notes:

[1] The weekday afternoon peak hour of adjacent street traffic typically occurs well after the end of the school day. As such, few trips during the afternoon peak hour of adjacent street traffic are associated with school.

[2] It is assumed that trips classified as 'leisure' in the 2011 O-D Survey would include trips to community centres, libraries, and parks.

It is assumed that all internal trips will be made via active travel modes (i.e., walking or cycling).

3.9.4 Mode Share Targets

It is expected that the non-residential land uses within the proposed development will have a high auto mode share due to the following factors:

- Non-residential land uses within suburban communities generally attract the majority of their trips from within the local community.
- Transit does not presently represent a significant mode choice for shopping, school, and leisure trips, particularly for short trips within the broader community, based on 2011 O-D Survey data.
- The existing low-density built form of Riverside South is generally car-oriented and less supportive of walking or cycling for daily shopping, school, and service needs.
- The existing density of residential land uses surrounding the proposed development, barriers to active transportation and travel distance are not expected to support significant walk or bicycle mode shares from the broader community.

With consideration of these factors, the mode share targets for the non-residential portion of the proposed development have been established based on similar mode share targets as was assumed for the adjacent 1515 Earl Armstrong Road development. As the 1515 Earl Armstrong Road development will be entirely non-residential and is within the same context area, these targets are expected to be appropriate for this development as well.

For the residential land uses, the mode share targets that have been established are based on the typical City of Ottawa mode share targets for developments within TOD zones.

Table 13 illustrates the mode share targets established for the proposed development as well as the typical mode share targets for TOD zone developments.

Table 13: Mode Share Targets

MODE	TYPICAL TOD ZONE MODE SHARE TARGETS	RESIDENTIAL MODE SHARE TARGETS	NON-RESIDENTIAL MODE SHARE TARGETS
Auto Driver	20%	14%	53%
Auto Passenger		6%	13%
Transit/School Bus	65%	65%	22%
Bicycle	15%	2%	2%
Walk		13%	10%

3.9.5 Pass-By Trips

Based on the ITE Trip Generation Handbook (3rd Edition), it is expected that 60% and 69% of weekday afternoon and Saturday midday retail vehicle-trips, respectively, will be pass-by trips diverted from existing traffic on Earl Armstrong Road and Limebank Road. All weekday morning trips, and the remaining weekday afternoon and Saturday midday trips, are expected to be new trips that are added to the existing roads.

3.9.6 Trip Generation Summary

Table 14, **Table 15** and **Table 16** summarize the number of person-trips per mode generated by the proposed development for each phase of development.

Table 14: Phase 1 Peak Hour Person-Trips by Mode (External Trips Only)

MODE	AM			PM			SAT		
	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Auto Driver	155	103	258	390	378	768	535	496	1,031
New Trips	*155*	*103*	*258*	*230*	*218*	*448*	*304*	*265*	*569*
Pass-By	*0*	*0*	*0*	*160*	*160*	*320*	*231*	*231*	*462*
Auto Passenger	39	28	67	97	94	191	132	123	255
Transit	92	105	197	187	180	367	246	237	483
Cycling	7	6	13	15	15	30	21	19	40
Walking	34	31	65	79	76	155	105	99	204
Total	**327**	**273**	**600**	**768**	**743**	**1,511**	**1,039**	**974**	**2,013**

Table 15: Phase 1 & 2 Peak Hour Person-Trips by Mode (External Trips Only)

MODE	AM			PM			SAT		
	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Auto Driver	233	151	384	576	570	1,146	794	734	1,528
New Trips	*233*	*151*	*384*	*303*	*297*	*600*	*392*	*332*	*724*
Pass-By	*0*	*0*	*0*	*273*	*273*	*546*	*402*	*402*	*804*
Auto Passenger	58	39	97	142	141	283	196	181	377
Transit	124	125	249	264	261	525	353	336	689
Cycling	10	7	17	22	22	44	31	28	59
Walking	49	40	89	114	112	226	154	144	298
Total	**474**	**362**	**836**	**1,118**	**1,106**	**2,224**	**1,528**	**1,423**	**2,951**

Table 16: Phase 1-3 Peak Hour Person-Trips by Mode (External Trips Only)

MODE	AM			PM			SAT		
	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Auto Driver	492	296	788	614	579	1,193	827	718	1,545
New Trips	*492*	*296*	*788*	*362*	*327*	*689*	*453*	*344*	*797*
Pass-By	*0*	*0*	*0*	*252*	*252*	*504*	*374*	*374*	*748*
Auto Passenger	124	81	205	154	146	300	207	182	389
Transit	299	336	635	345	334	679	431	428	859
Cycling	21	17	38	26	24	50	33	30	63
Walking	111	96	207	134	128	262	171	158	329
Total	**1,047**	**826**	**1,873**	**1,273**	**1,211**	**2,484**	**1,669**	**1,516**	**3,185**

3.9.7 Trip Distribution and Assignment

The distribution of residential trips is expected to generally align with commuter travel patterns. Based on the distribution of trips from the district identified in the 2011 O-D Survey, residential trips have been distributed as follows:

- 60% to/from the North via Limebank Road
- 5% to/from the South via Limebank Road
- 10% to/from the East via Earl Armstrong Road
- 25% to/from the West via Earl Armstrong Road

The distribution of non-residential trips is expected to generally align with the distribution of trips to the district identified in the 2011 O-D Survey, although consideration has also been given to the distribution of existing residential development within the Riverside South community. Based on the above, non-residential trips have been distributed as follows:

- 30% to/from the North via Limebank Road
- 5% to/from the South via Limebank Road
- 10% to/from the East via Earl Armstrong Road
- 55% to/from the West via Earl Armstrong Road

Applying the estimated number of new auto trips to the above distributions, future site-generated traffic volumes for Phase 1, Phase 1 & 2 and Phase 1-3 are illustrated at each of the study area intersections in **Exhibit 6**, **Exhibit 7** and **Exhibit 8**, respectively.

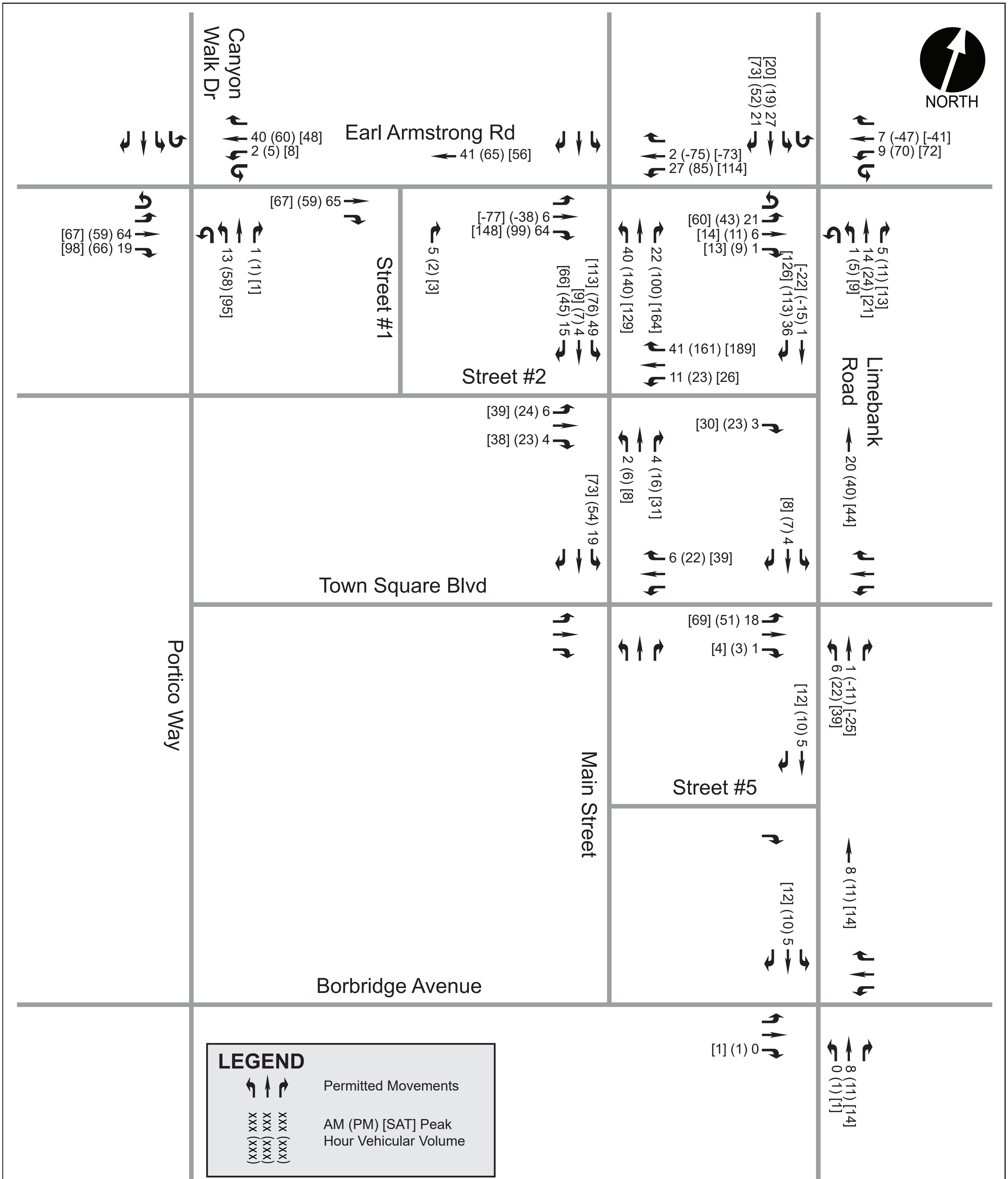


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Exhibit 6: Phase 1 Site-Generated Traffic

PROJECT No. 144320

SCALE: N.T.S.

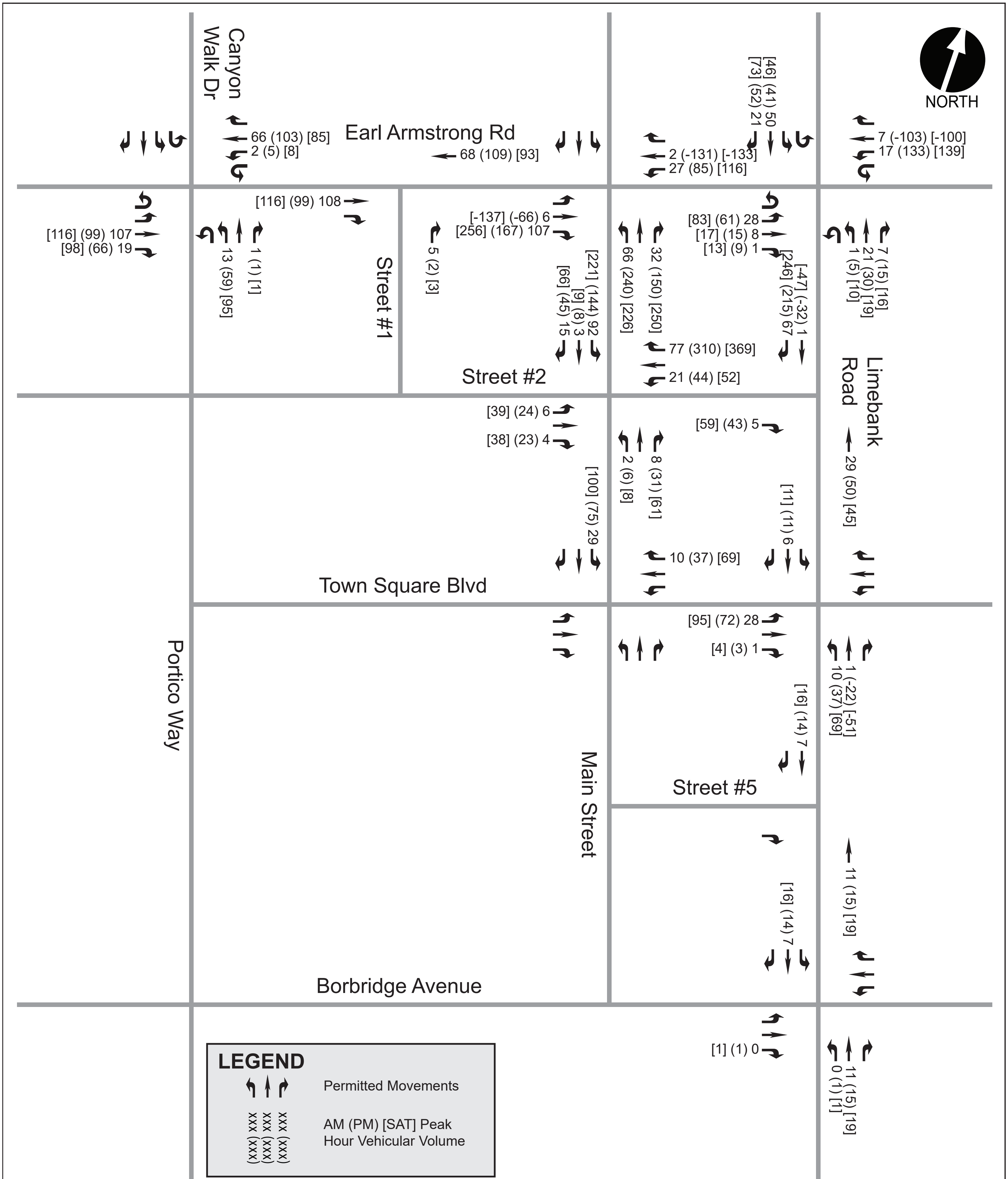

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Exhibit 7: Phase 1-2 Site-Generated Traffic

PROJECT No. 144320

SCALE: N.T.S.

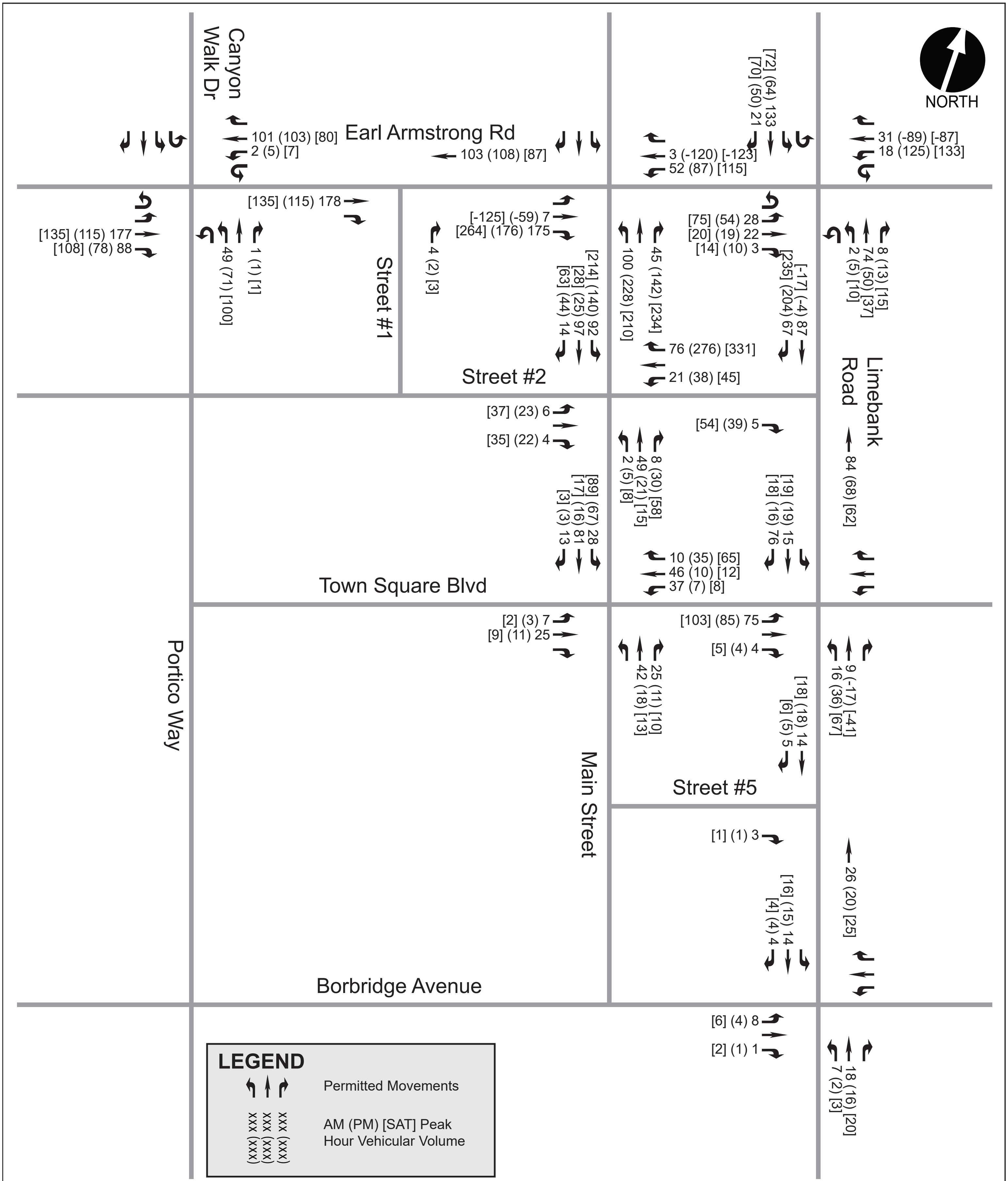

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Exhibit 8: Phase 1-3 Site-Generated Traffic

PROJECT No.	144320
SCALE:	N.T.S.

3.10 Exemptions Review

The TIA Guidelines provide exemption considerations for elements of the Design Review and Network Impact components. **Table 17** summarizes the TIA modules that are not applicable to this study.

Table 17: Exemptions Review

TIA MODULE	ELEMENT	EXEMPTION CONISDERATIONS	REQUIRED
DESIGN REVIEW COMPONENT			
4.1 Development Design	4.1.2 Circulation and Access	• Only required for site plans	✗
	4.1.3 New Street Networks	• Only required for plans of subdivision	✓
4.2 Parking	4.2.1 Parking Supply	• Only required for site plans	✗
	4.2.2 Spillover Parking	• No longer required based on the June 2023 revisions to the TIA guidelines.	✗
NETWORK IMPACT COMPONENT			
4.5 Transportation Demand Management	All Elements	• Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time	✓
4.6 Neighbourhood Traffic Calming	All Elements	• Only required when the following conditions are met: 1. Access via a collector or local road 2. Adjacent to a significant sensitive land use 3. Zoning By-Law Amendment or Draft Plan of Subdivision application 4. At least 75 vehicle-trips 5. Site-generated traffic will increase peak hour volumes by 50% or more	✗
4.8 Network Concept	All Elements	• Only required when proposed development generates more than 200 person-trips during the peak hour in excess of the equivalent volume permitted by established zoning	✓

Appendix A – Screening Form

City of Ottawa 2017 TIA Guidelines Screening Form

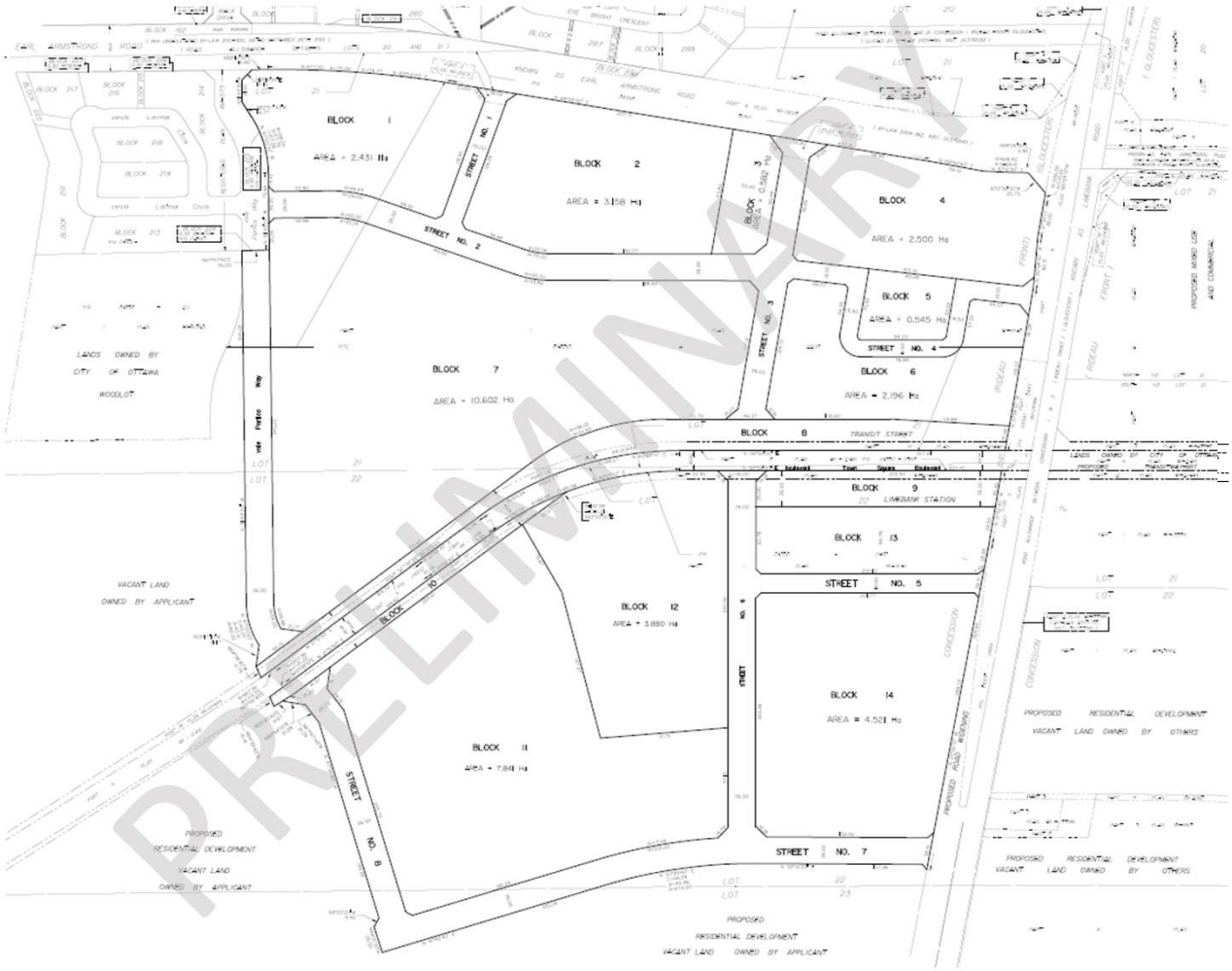
*Revised per City of Ottawa update to the TIA Guidelines, effective June 14, 2023

1. Description of Proposed Development

Municipal Address	980 Earl Armstrong Road & 4700 Limebank Road, Ottawa, Ontario
Description of Location	The proposed development occupies the south-west corner of the Earl Armstrong & Limebank intersection. It is bound by Earl Armstong Road to the north, Limebank Road to the east, undeveloped greenlands to the south and the future alignment of Portico Way to the west.
Land Use Classification	Mixed-Use (Residential & Commercial)
Development Size (units)	1,198
Development Size (m^2)	24,832
Number of Accesses and Locations	

Phase of Development	Three (3) Phases
Buildout Year	2028 (Phase 1) 2033 (Phase 2) 2038 (Phase 3)

If available, please attach a sketch of the development or site plan to this form.



2. Trip Gen Trigger

Considering the Development's Land Use Type and Size (as filled out in the previous section), please refer to the Trip Generation Trigger checks below.

Land Use Type*	Minimum Development Size (60 person trips)	
Single-Detached[1]	60 units	
Multi-Use Family (Low-Rise)[1]	90 units	
Multi-Use Family (High-Rise)[1]	150 Units	✓
Office[2]	1,400 m^2	
Industrial[2]	7,000 m^2	
Fast-food restaurant or coffee shop[2]	110 m^2	
Destination Retail[2]	1,800 m^2	✓
Gas Station or convenience market[2]	90 m^2	

**If the development has a land use type other than what is presented in the table above, estimates of person trip generation may be made based on average trip generation characteristics represented in the current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual.*

[1] *Table 2, Table 3 & Table 4 TRANS Trip Generation Summary Report*

[2] *ITE Trip Generation Manual 11.1 Ed.*

Based on the above, the Trip Generation Trigger is satisfied.

3. Location Triggers

	Yes	No
Does the development propose a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit or Cross-Town Bikeways?	✓	
Is the development in a Design Priority Area (DPA), Transit-oriented Development (TOD) zone or Hub?*	✓	

**DPA and TOD are identified in the City of Ottawa Official Plan (DPA in Section 2.5.1 and Schedules A and B; TOD in Annex 6) See Chapter 4 for a list of City of Ottawa Planning and Engineering documents that support the completion of TIA.*
Hubs are identified as Protected Major Transit Station Areas (PTMSAs) and identified in Schedule C1-Protected Major Transit Station Areas (PMTSAs).

Based on the above, the Location Trigger is satisfied.

4. Safety Triggers

	Yes	No
Are posted speed limits on a boundary street 80km/hr or greater?	✓	
Are there any horizontal/vertical curvatures on a boundary street that limit sight lines at a proposed driveway?		✓
Is the proposed driveway within the area of influence of an adjacent traffic signal or roundabout (i.e. within 300 m of intersection in rural conditions, or within 150 m of intersection in urban/suburban conditions?)	✓	
Is the proposed driveway within auxiliary lanes of an intersection?		✓
Does the proposed driveway make use of an existing median break that serves an existing site?		✓
Is there a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?	✓	
Does the development include a drive-thru facility?		✓

Based on the above, the Safety Trigger is satisfied.

5. Summary

	Yes	No
Does the development satisfy the Trip Generation Trigger?	✓	
Does the development satisfy the Location Trigger?	✓	
Does the development satisfy the Safety Trigger?	✓	

Based on the results of the TIA Screening Form, the Trip Generation, Location and Safety Triggers are satisfied. As such, a TIA is required for the proposed development.

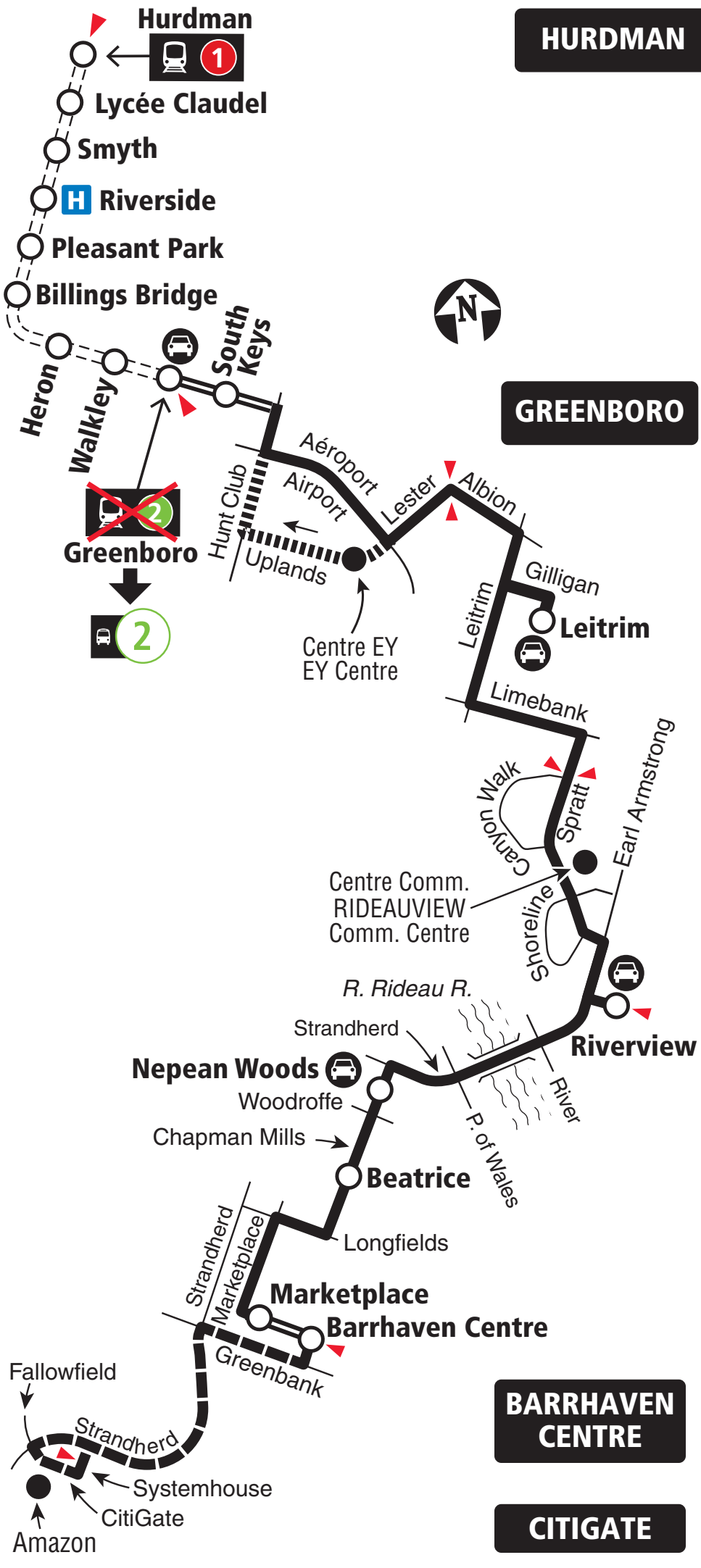
Appendix B – OC Transpo Routes

99 Rapide

CITIGATE
BARRHAVEN CENTRE

HURDMAN
GREENBORO

7 days a week / 7 jours par semaine



Transitway & Station

Transitway & Station
Peak period / Période de pointe

Saturday & Sunday only / Sam. et dim. seulement

Limited service / Service limité

Park & Ride / Parc-o-bus

Timepoint / Heures de passage

2021.09

Schedule / Horaire 613-560-1000

Text / Texto* 560560

plus your four digit bus stop number / *plus* votre numéro d'arrêt à quatre chiffres

*Standard message rates may apply / Les tarifs réguliers de messagerie texte peuvent s'appliquer

Customer Service
Service à la clientèle **613-560-5000**

Lost and Found / Objets perdus..... **613-563-4011**

Security / Sécurité **613-741-2478**

Effective September 5, 2021
En vigueur 5 septembre 2021

OC Transpo

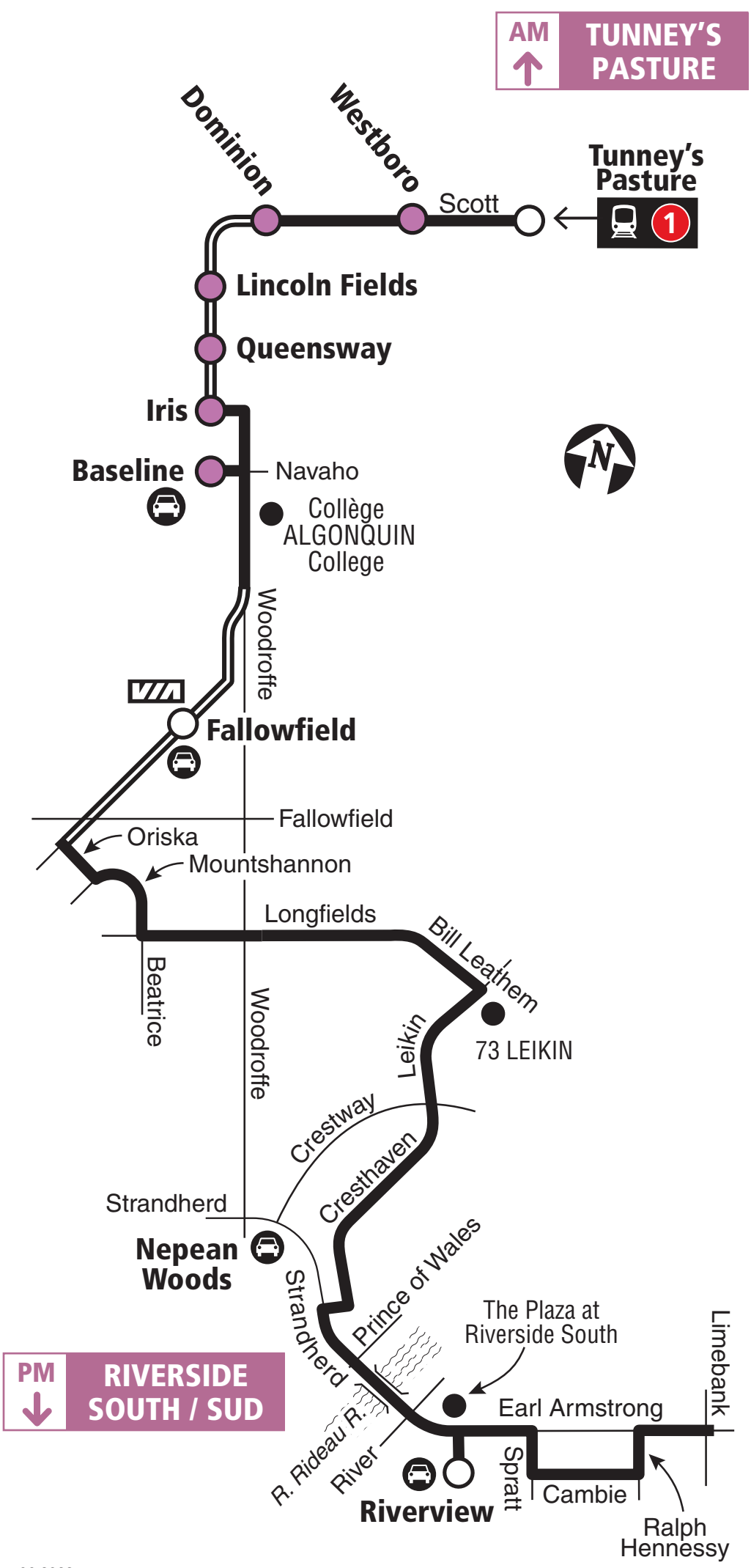
INFO 613-560-5000
octranspo.com

278 RIVERSIDE SOUTH / SUD
TUNNEY'S PASTURE

Connexion

Monday to Friday / Lundi au vendredi

Peak periods only
Périodes de pointe seulement



06.2022

Transitway & Station

Limited stops: Off only in AM / No stop in PM
Arrêts limités : débarquement en AM seulement / aucun arrêt en PM

Park & Ride / Parc-o-bus

2022.06

Schedule / Horaire 613-560-1000
Text / Texto* 560560
plus your four digit bus stop number / *plus* votre numéro d'arrêt à quatre chiffres

*Standard message rates may apply / Les tarifs réguliers de messagerie texte peuvent s'appliquer

Customer Service
Service à la clientèle **613-560-5000**

Lost and Found / Objets perdus..... **613-563-4011**

Security / Sécurité **613-741-2478**

Effective June 26, 2022
En vigueur 26 juin 2022

OC Transpo

INFO 613-560-5000
octranspo.com

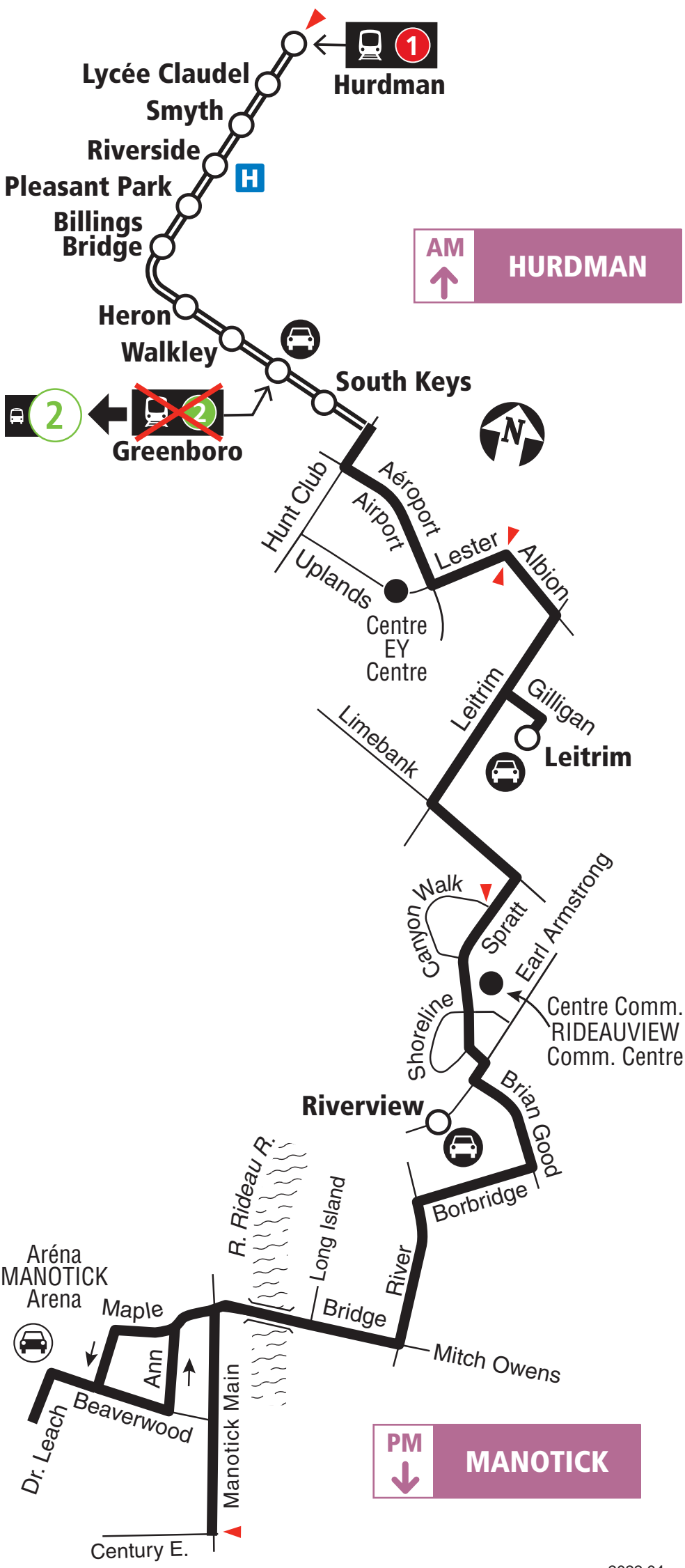
299 MANOTICK / HURDMAN

Connexion

Monday to Friday / Lundi au vendredi

Peak periods only

Périodes de pointe seulement



2022.04

Transitway & Station

Park & Ride / Parc-o-bus

Timepoint / Heures de passage

2022.04

Schedule / Horaire 613-560-1000

Text / Texto* 560560

plus your four digit bus stop number / *plus* votre numéro d'arrêt à quatre chiffres

*Standard message rates may apply / Les tarifs réguliers de messagerie texte peuvent s'appliquer

Customer Service
Service à la clientèle **613-560-5000**

Lost and Found / Objets perdus..... **613-563-4011**

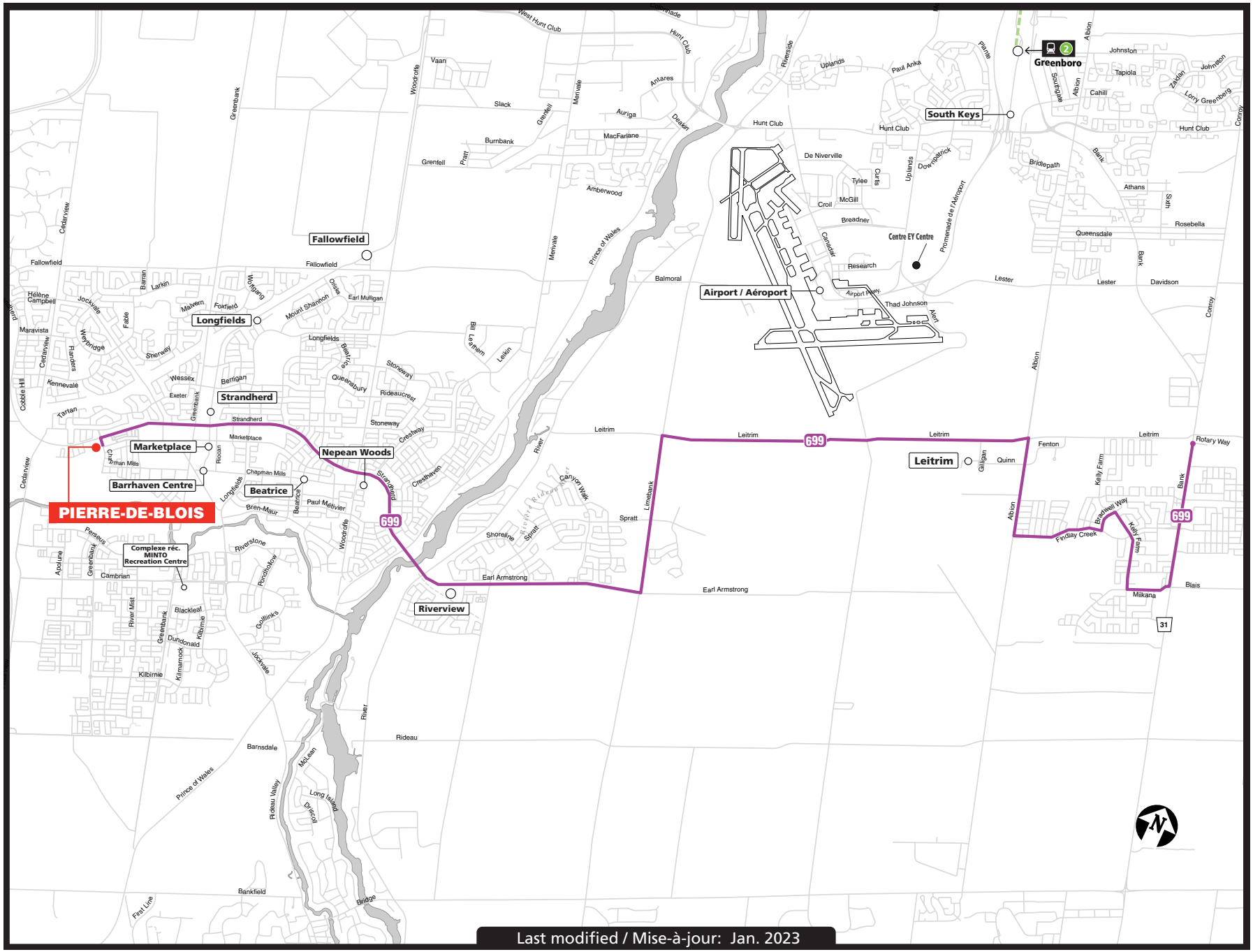
Security / Sécurité **613-741-2478**

Effective April 24, 2022

En vigueur 24 avril 2022

OC Transpo

INFO 613-560-5000
octranspo.com


PIERRE-DE-BLOIS
Marketplace
Barrhaven Centre
Beatrice
Nepean Woods
Strandherd
Longfields
Fallowfield
Airport / Aéroport
Centre EY Centre
South Keys
Greenboro
Leitrim
Riverview
699
31
Complexe réc. MINTO Recreation Centre
Last modified / Mise-à-jour: Jan. 2023

Appendix C – Traffic Data

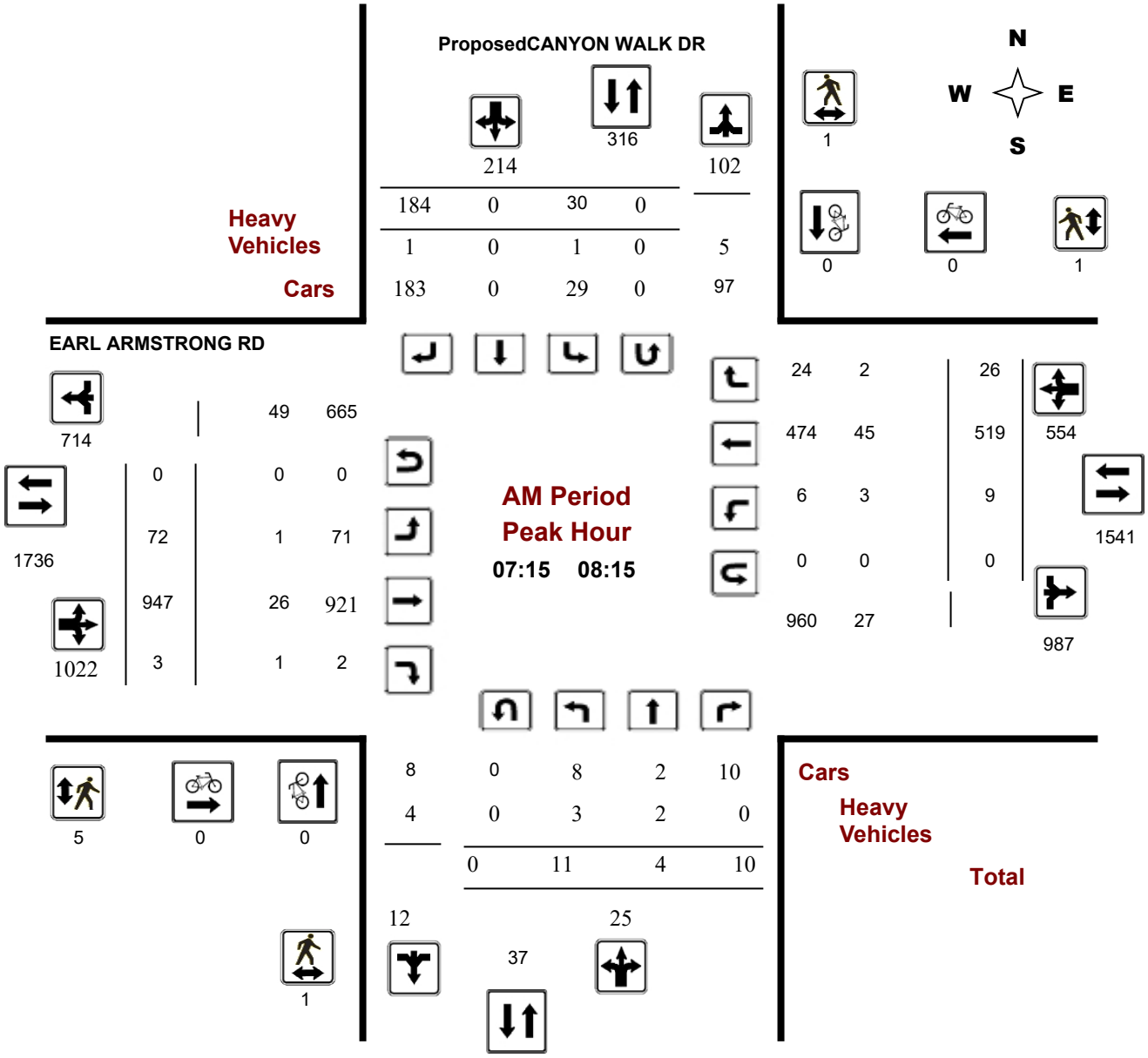
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ProposedCANYON WALK DR @ EARL ARMSTRONG RD

Survey Date: Wednesday, December 18, 2019 **WO No:** 39238

Start Time: 07:00 **Device:** Miovision



Comments

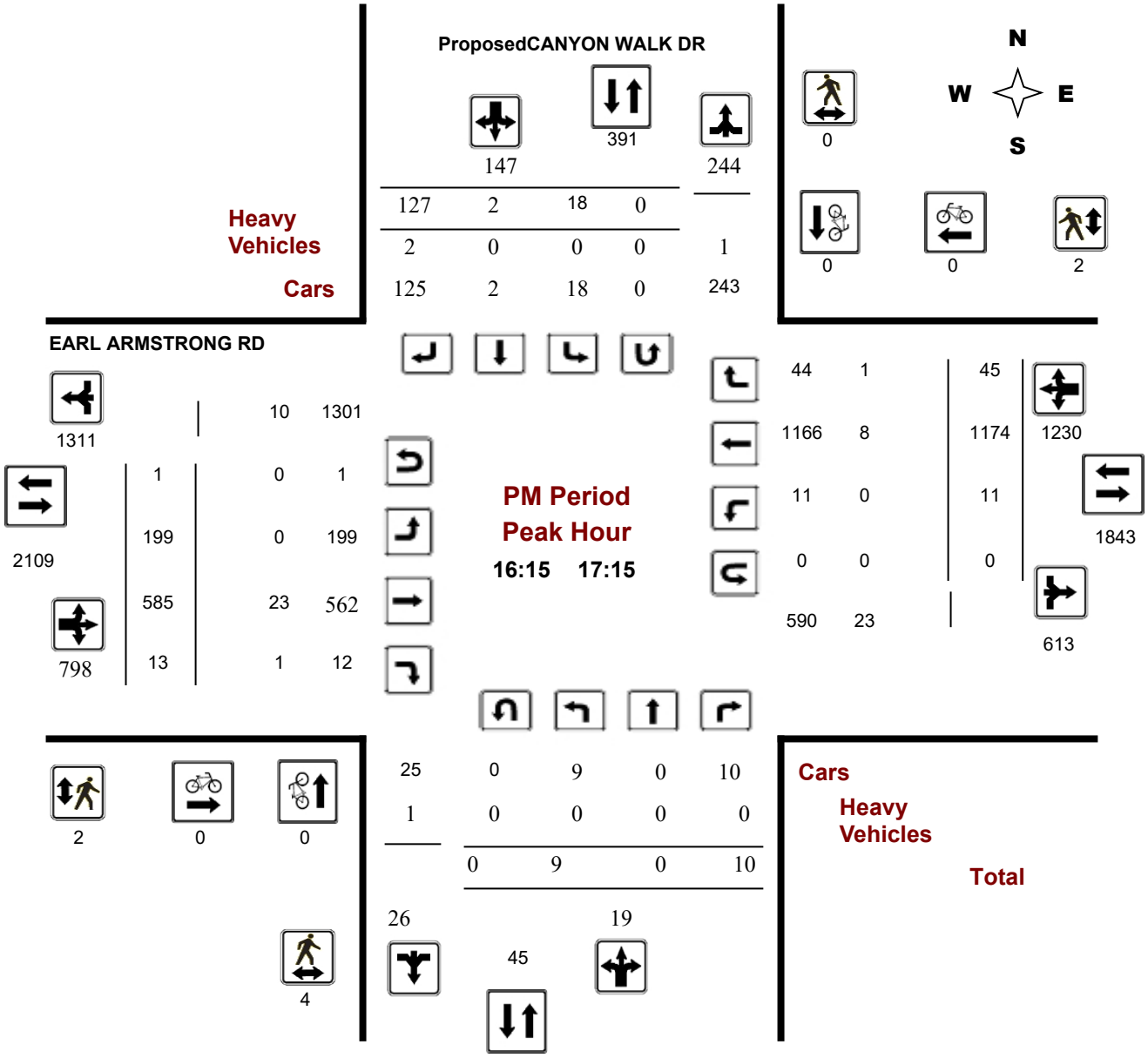
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ProposedCANYON WALK DR @ EARL ARMSTRONG RD

Survey Date: Wednesday, December 18, 2019 **WO No:** 39238

Start Time: 07:00 **Device:** Miovision



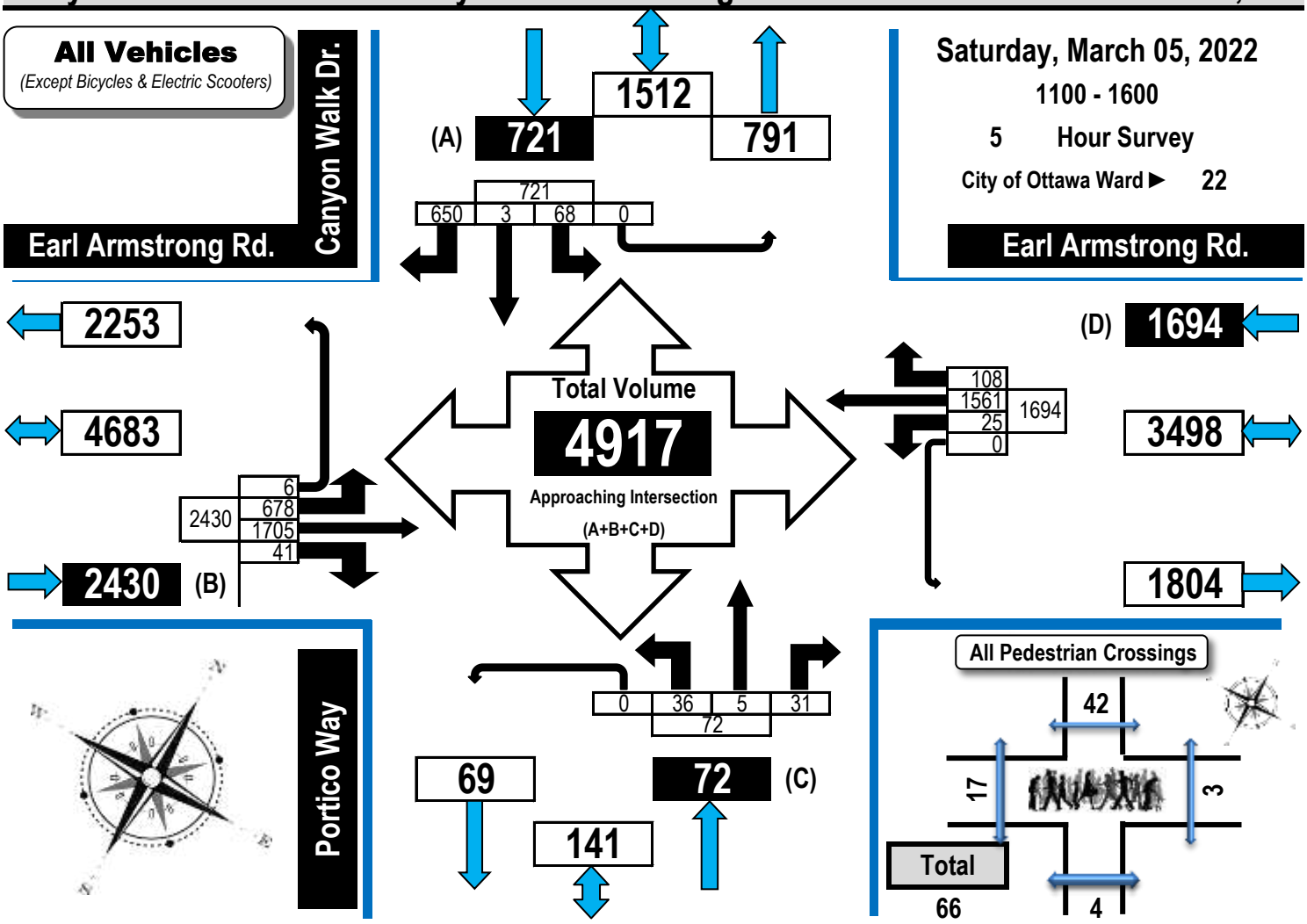
Comments

Turning Movement Count
Summary, OFF and PM Peak Hour Flow Diagrams
All Vehicles Except Bicycles

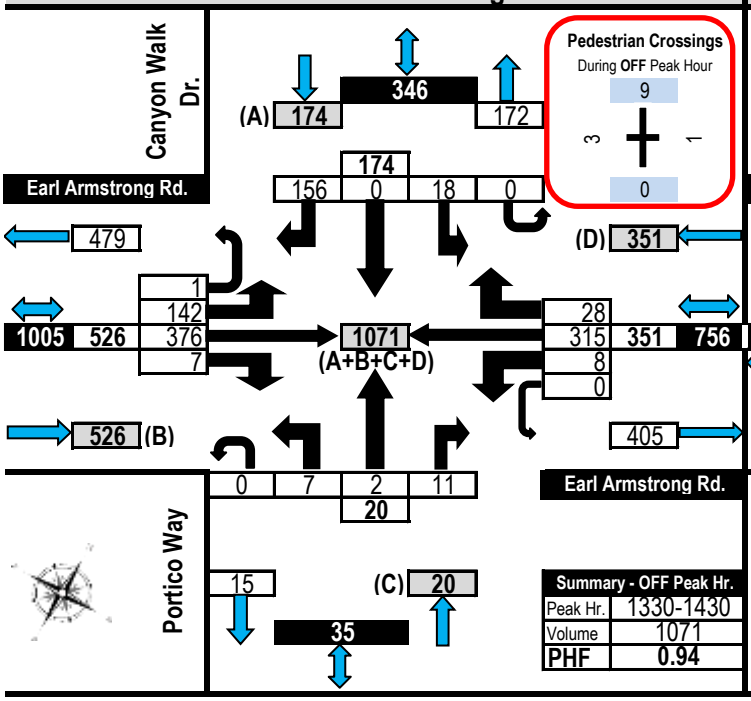
Canyon Walk Drive/Portico Way & Earl Armstrong Road — Gloucester, ON

All Vehicles
(Except Bicycles & Electric Scooters)

Saturday, March 05, 2022
1100 - 1600
5 Hour Survey
City of Ottawa Ward ▶ 22

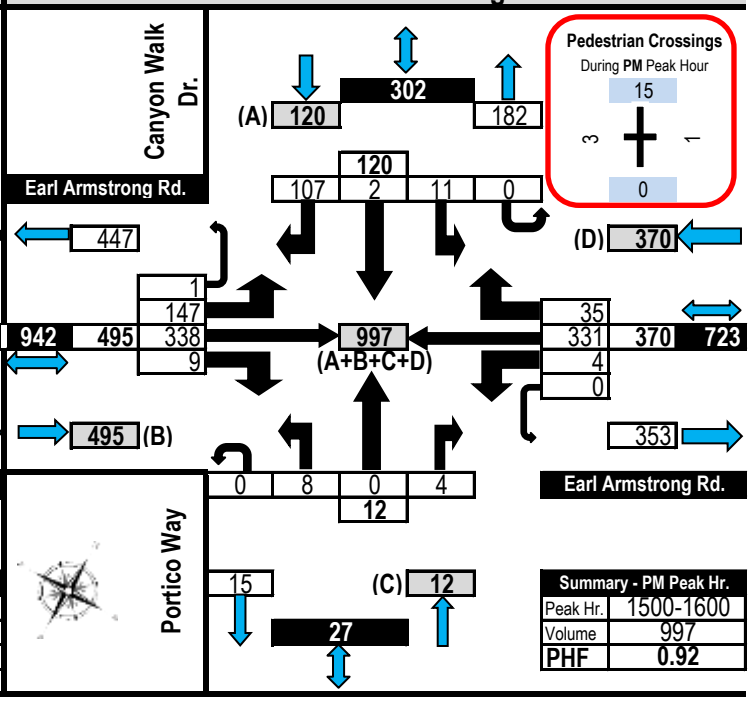


Off Peak Hour Flow Diagram



Summary - OFF Peak Hr.	
Peak Hr.	1330-1430
Volume	1071
PHF	0.94

PM Peak Hour Flow Diagram



Summary - PM Peak Hr.	
Peak Hr.	1500-1600
Volume	997
PHF	0.92

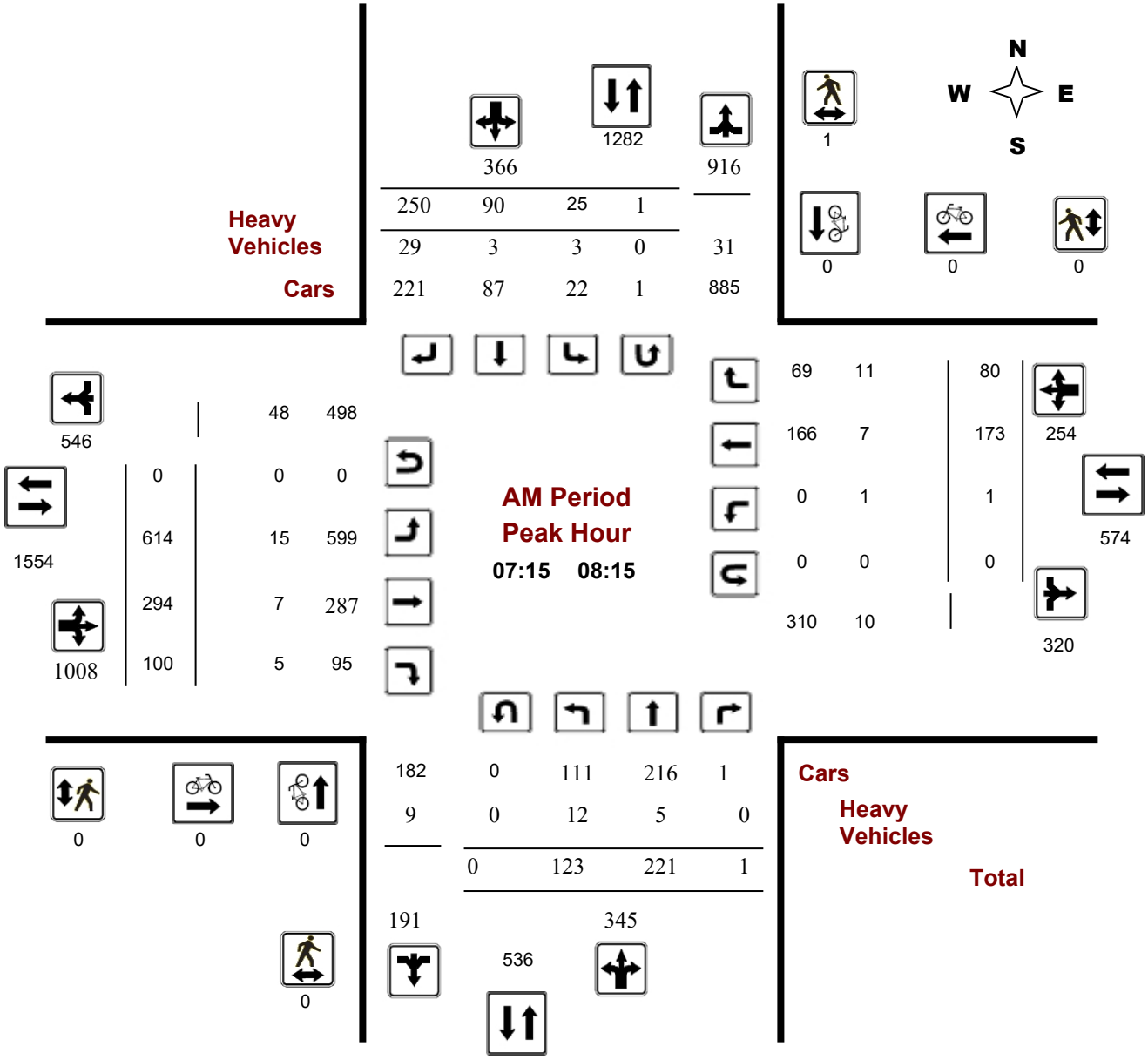
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

EARL ARMSTRONG RD @ LIMEBANK RD

Survey Date: Wednesday, December 18, 2019 **WO No:** 39237

Start Time: 07:00 **Device:** Miovision



Comments

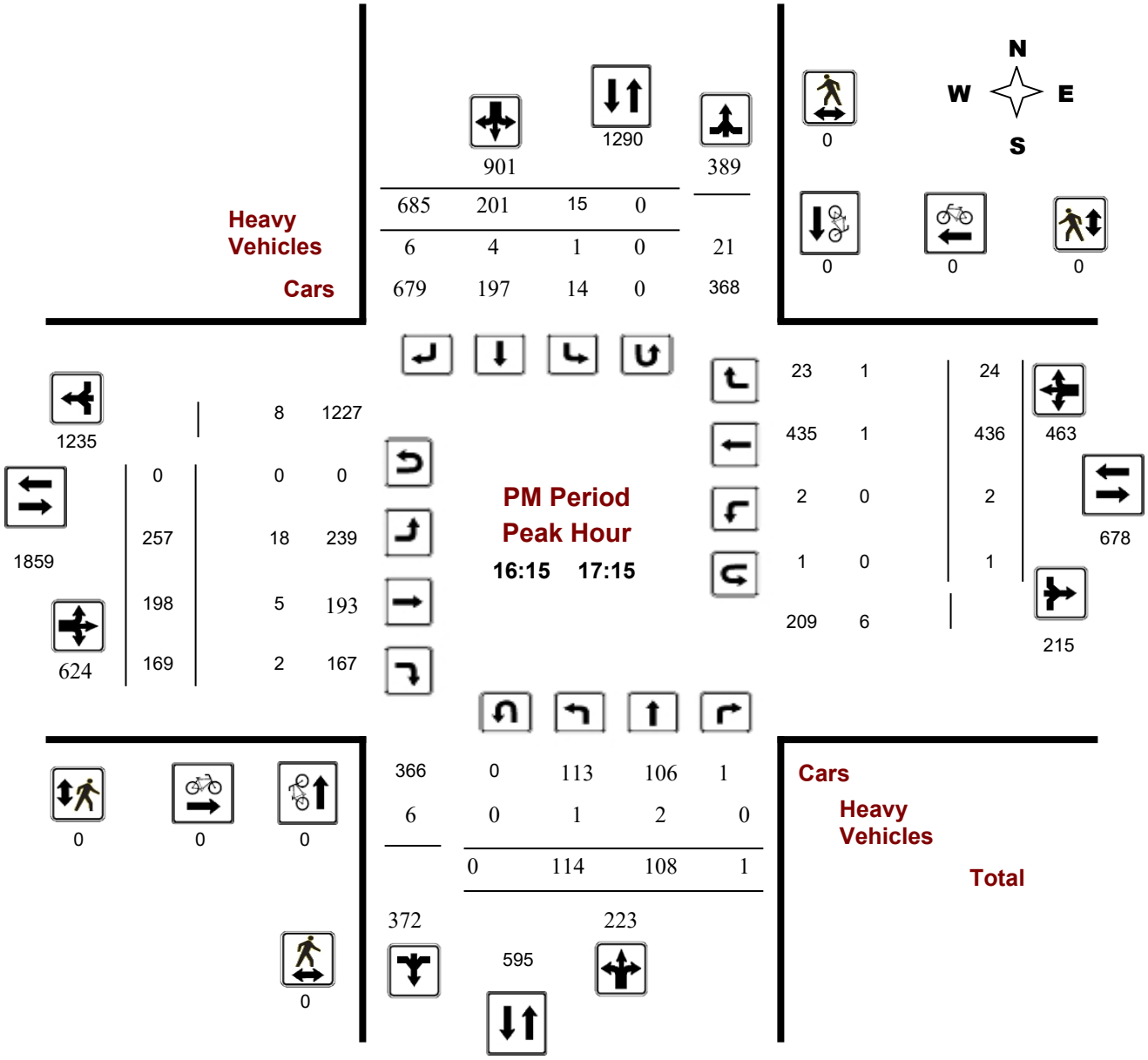
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

EARL ARMSTRONG RD @ LIMEBANK RD

Survey Date: Wednesday, December 18, 2019 **WO No:** 39237

Start Time: 07:00 **Device:** Miovision



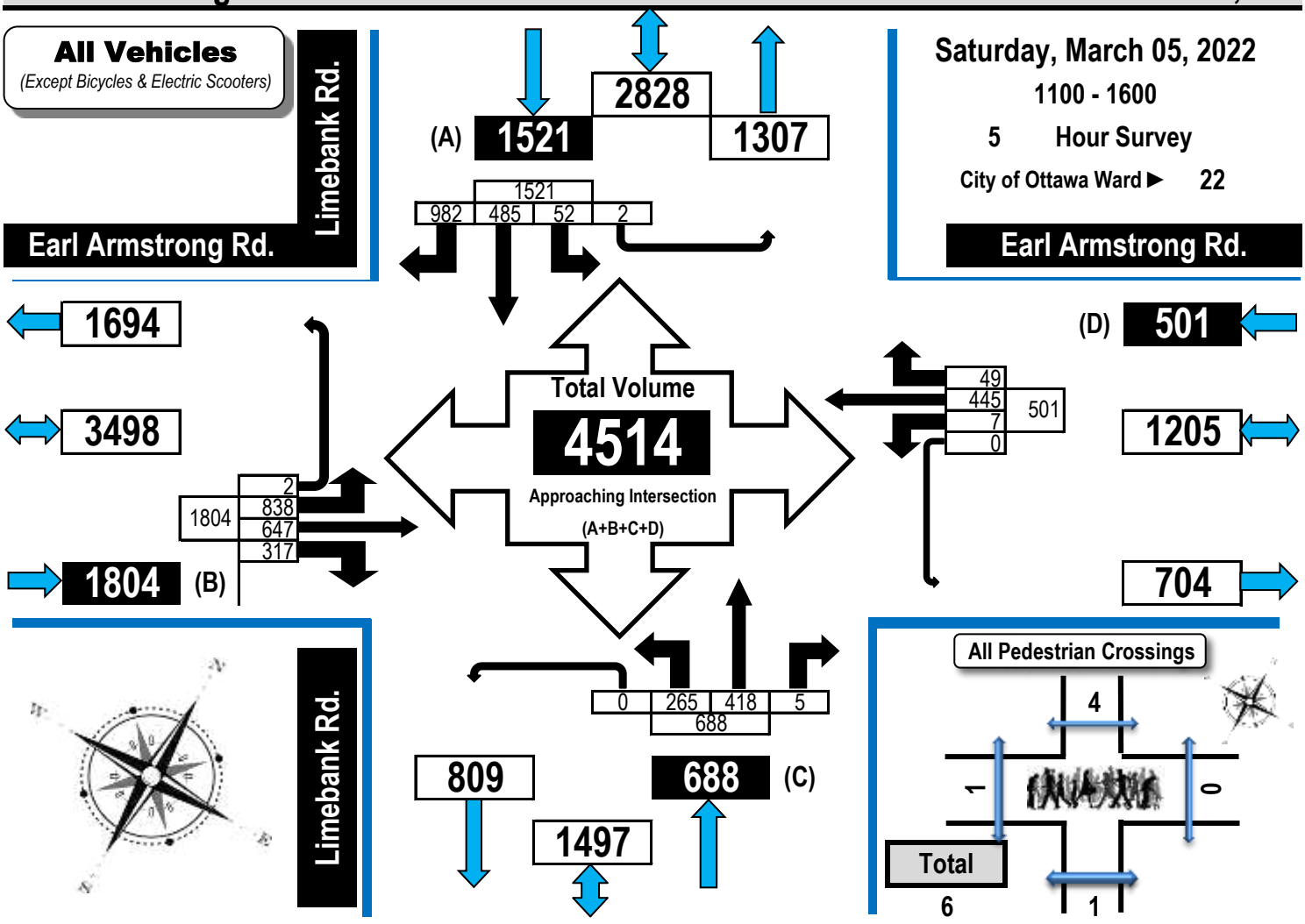
Comments

Turning Movement Count
Summary, OFF and PM Peak Hour Flow Diagrams
All Vehicles Except Bicycles

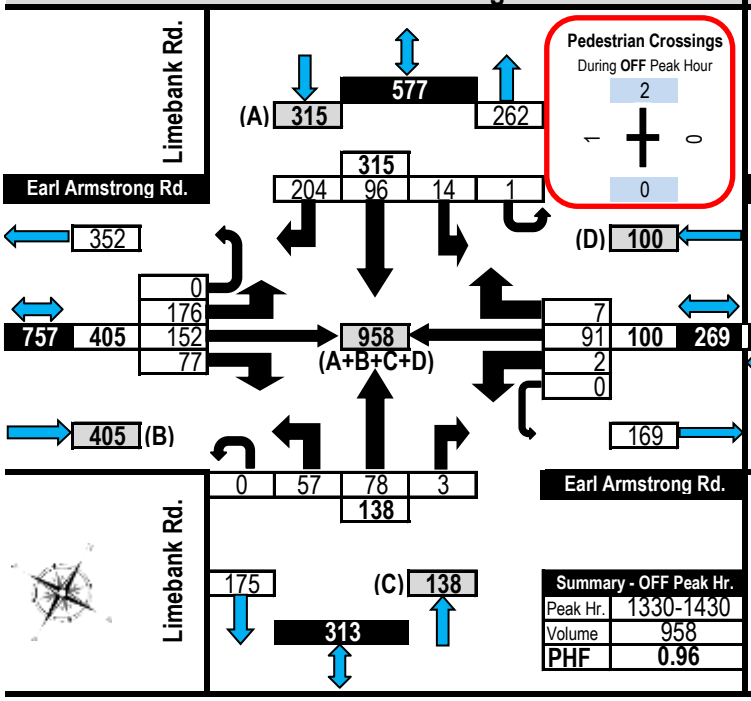
Earl Armstrong Road & Limebank Road — Gloucester, ON

All Vehicles
(Except Bicycles & Electric Scooters)

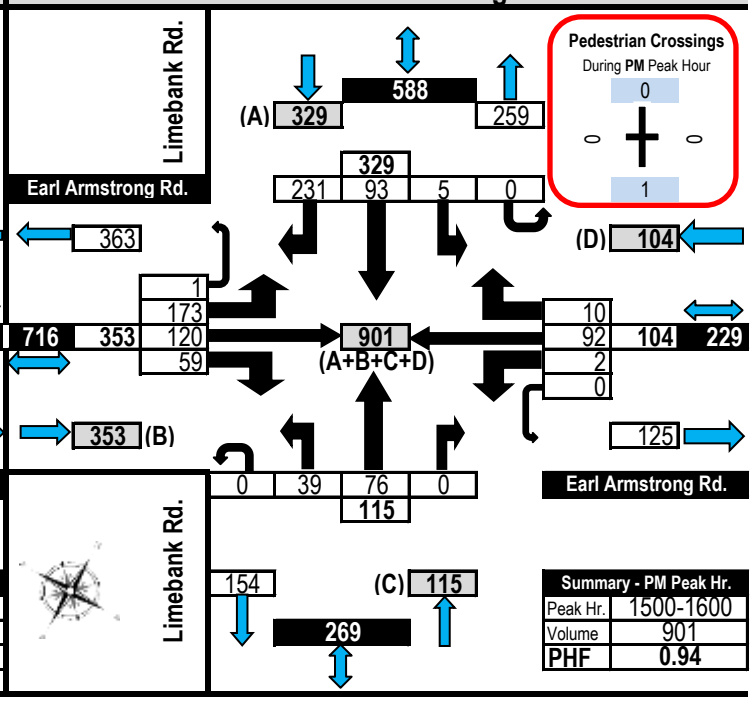
Saturday, March 05, 2022
1100 - 1600
5 Hour Survey
City of Ottawa Ward ► 22



Off Peak Hour Flow Diagram



PM Peak Hour Flow Diagram



Appendix D – Collision Data

Transportation Services - Traffic Services

Collision Details Report - Public Version

From: January 1, 2016 **To:** December 31, 2020

Location: EARL ARMSTRONG RD @ LIMEBANK RD

Traffic Control: Traffic signal **Total Collisions:** 25

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Feb-25, Thu,21:56	Snow	Sideswipe	P.D. only	Ice	South	Turning right	Pick-up truck	Skidding/sliding	0
					South	Turning right	Automobile, station wagon	Skidding/sliding	
2016-Apr-18, Mon,19:00	Clear	Rear end	P.D. only	Dry	South	Slowing or stopping	Pick-up truck	Other motor vehicle	0
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2016-Jun-23, Thu,17:35	Clear	Rear end	P.D. only	Dry	North	Turning right	Automobile, station wagon	Other motor vehicle	0
					North	Turning right	Pick-up truck	Other motor vehicle	
2016-Jul-21, Thu,13:39	Clear	Rear end	P.D. only	Dry	South	Turning right	Pick-up truck	Other motor vehicle	0
					South	Turning right	Automobile, station wagon	Other motor vehicle	
2016-Sep-20, Tue,13:32	Clear	Sideswipe	Non-fatal injury	Dry	North	Changing lanes	Pick-up truck	Other motor vehicle	0
					North	Stopped	Pick-up truck	Other motor vehicle	
2016-Oct-07, Fri,17:28	Clear	Rear end	P.D. only	Dry	North	Turning right	Automobile, station wagon	Other motor vehicle	0
					North	Turning right	Automobile, station wagon	Other motor vehicle	
2016-Nov-20, Sun,16:30	Drifting Snow	SMV other	Non-fatal injury	Loose snow	East	Slowing or stopping	Automobile, station wagon	Skidding/sliding	0
2017-Mar-24, Fri,18:44	Snow	SMV other	P.D. only	Loose snow	North	Turning left	Pick-up truck	Curb	0
2017-May-24, Wed,07:28	Clear	Rear end	P.D. only	Dry	North	Going ahead	Pick-up truck	Other motor vehicle	0
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2017-Jun-10, Sat,13:54	Clear	Rear end	Non-fatal injury	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle	0
					North	Turning left	Automobile, station wagon	Other motor vehicle	
2018-Jan-23, Tue,11:01	Freezing Rain	SMV other	Non-fatal injury	Ice	East	Going ahead	Automobile, station wagon	Pole (sign, parking meter)	0
2018-Apr-23, Mon,15:18	Clear	Rear end	P.D. only	Dry	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2018-May-28, Mon,17:20	Clear	Rear end	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle	0
					South	Turning right	Automobile, station wagon	Other motor vehicle	

Transportation Services - Traffic Services

Collision Details Report - Public Version

From: January 1, 2016 **To:** December 31, 2020

Location: EARL ARMSTRONG RD @ LIMEBANK RD

Traffic Control: Traffic signal **Total Collisions:** 25

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2018-Jun-13, Wed,15:42	Clear	Other	P.D. only	Dry	North	Reversing	Truck - open	Other motor vehicle	0
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2018-Jul-07, Sat,15:02	Clear	Rear end	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle	0
					South	Turning right	Automobile, station wagon	Other motor vehicle	
2018-Sep-12, Wed,13:15	Clear	Rear end	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle	0
					South	Turning right	Automobile, station wagon	Other motor vehicle	
2019-Feb-28, Thu,15:50	Clear	Rear end	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2019-Apr-03, Wed,16:00	Clear	Rear end	P.D. only	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle	0
					East	Turning right	Automobile, station wagon	Other motor vehicle	
2019-Jun-01, Sat,09:58	Clear	Angle	Non-fatal injury	Dry	East	Turning right	Automobile, station wagon	Cyclist	0
					South	Going ahead	Bicycle	Other motor vehicle	
					South	Going ahead	Bicycle	Other motor vehicle	
2019-Jul-11, Thu,15:50	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2019-Jul-29, Mon,17:20	Clear	Rear end	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle	0
					South	Turning right	Automobile, station wagon	Other motor vehicle	
2019-Oct-16, Wed,17:30	Rain	Rear end	P.D. only	Wet	West	Turning right	Automobile, station wagon	Other motor vehicle	0
					West	Turning right	Automobile, station wagon	Other motor vehicle	
2019-Nov-29, Fri,11:40	Clear	SMV other	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Curb	0
2020-Jan-22, Wed,14:20	Clear	Rear end	P.D. only	Wet	North	Turning right	Automobile, station wagon	Other motor vehicle	0
					North	Turning right	Passenger van	Other motor vehicle	

Transportation Services - Traffic Services

Collision Details Report - Public Version

From: January 1, 2016 **To:** December 31, 2020

Location: EARL ARMSTRONG RD @ LIMEBANK RD

Traffic Control: Traffic signal **Total Collisions:** 25

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2020-Feb-06, Thu,18:46	Snow	Angle	Non-fatal injury	Loose snow	South	Going ahead	Pick-up truck	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Stopped	Passenger van	Other motor vehicle	

Location: EARL ARMSTRONG RD btwn CANYON WALK DR & LIMEBANK RD

Traffic Control: No control **Total Collisions:** 2

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Apr-17, Sun,22:30	Clear	SMV other	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Cable guide rail	0
2018-Oct-02, Tue,07:08	Rain	SMV other	P.D. only	Wet	East	Going ahead	Automobile, station wagon	Animal - wild	0

Location: LIMEBANK RD @ SPRATT RD

Traffic Control: Traffic signal **Total Collisions:** 12

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Feb-13, Sat,19:20	Clear	Angle	P.D. only	Wet	East	Turning left	Automobile, station wagon	Other motor vehicle	0
					North	Going ahead	Pick-up truck	Other motor vehicle	
2016-Feb-25, Thu,23:23	Drifting Snow	Rear end	P.D. only	Ice	South	Turning right	Pick-up truck	Other motor vehicle	0
					South	Turning right	Pick-up truck	Other motor vehicle	
2016-Oct-21, Fri,16:20	Clear	Rear end	P.D. only	Wet	South	Turning right	Automobile, station wagon	Other motor vehicle	0
					South	Turning right	Passenger van	Other motor vehicle	
2017-Jun-21, Wed,15:45	Clear	Angle	P.D. only	Dry	East	Going ahead	Pick-up truck	Other motor vehicle	0
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Oct-18, Thu,17:36	Clear	Rear end	P.D. only	Dry	East	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2019-Feb-07, Thu,01:35	Clear	SMV other	P.D. only	Slush	South	Going ahead	Automobile, station wagon	Curb	0

Transportation Services - Traffic Services

Collision Details Report - Public Version

From: January 1, 2016 **To:** December 31, 2020

Location: LIMEBANK RD @ SPRATT RD

Traffic Control: Traffic signal **Total Collisions:** 12

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2019-Oct-16, Wed,07:40	Clear	Rear end	Non-fatal injury	Dry	North	Turning right	School bus	Other motor vehicle	0
					North	Turning right	School bus	Other motor vehicle	
2020-Jan-16, Thu,13:15	Clear	Angle	Non-fatal injury	Wet	South	Going ahead	Truck - open	Other motor vehicle	0
					East	Turning left	Automobile, station wagon	Other motor vehicle	
2020-Sep-26, Sat,01:11	Clear	SMV other	P.D. only	Dry	South	Turning right	Automobile, station wagon	Curb	0
2020-Oct-02, Fri,22:10	Clear	Rear end	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2020-Dec-09, Wed,08:30	Snow	SMV other	P.D. only	Loose snow	South	Turning left	Automobile, station wagon	Curb	0
2020-Dec-11, Fri,23:04	Clear	Rear end	P.D. only	Wet	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	

Location: LIMEBANK RD btwn EARL ARMSTRONG RD & SPRATT RD

Traffic Control: No control **Total Collisions:** 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Apr-19, Tue,16:00	Clear	Other	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Debris falling off vehicle	0
					South	Going ahead	Pick-up truck	Other	

Location: ProposedCANYON WALK DR @ EARL ARMSTRONG RD

Traffic Control: Traffic signal **Total Collisions:** 13

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Apr-06, Wed,17:34	Snow	Turning movement	P.D. only	Loose snow	West	Turning right	Pick-up truck	Other motor vehicle	0
					East	Turning left	Automobile, station wagon	Other motor vehicle	
2016-Sep-16, Fri,14:54	Clear	Angle	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					South	Turning left	Passenger van	Other motor vehicle	

Transportation Services - Traffic Services

Collision Details Report - Public Version

From: January 1, 2016 **To:** December 31, 2020

Location: ProposedCANYON WALK DR @ EARL ARMSTRONG RD

Traffic Control: Traffic signal **Total Collisions:** 13

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Oct-24, Mon,19:07	Clear	Turning movement	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Pick-up truck	Other motor vehicle	
2017-May-15, Mon,19:36	Clear	Turning movement	P.D. only	Dry	East	Turning left	Passenger van	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Jun-14, Wed,18:17	Clear	Turning movement	Non-fatal injury	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Jan-13, Sat,22:06	Clear	SMV other	P.D. only	Packed snow	South	Turning right	Automobile, station wagon	Ran off road	0
2018-Jun-06, Wed,16:20	Clear	Rear end	P.D. only	Dry	South	Turning right	Delivery van	Other motor vehicle	0
					South	Turning right	Pick-up truck	Other motor vehicle	
2018-Nov-05, Mon,12:23	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Unknown	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2018-Dec-14, Fri,18:03	Freezing Rain	SMV other	P.D. only	Loose snow	West	Turning left	Automobile, station wagon	Skidding/sliding	0
2018-Dec-14, Fri,20:14	Freezing Rain	SMV other	Non-fatal injury	Ice	East	Turning left	Automobile, station wagon	Pedestrian	1
2019-Nov-26, Tue,16:58	Clear	Turning movement	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2019-Dec-02, Mon,17:50	Clear	Turning movement	Non-fatal injury	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Pick-up truck	Other motor vehicle	
2020-May-05, Tue,06:42	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	

Appendix E – Intersection Capacity Analyses

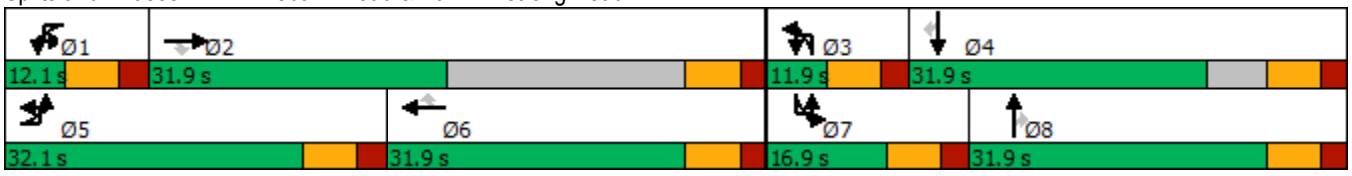
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	663	318	108	1	189	86	134	239	1	1	27	97
Future Volume (vph)	663	318	108	1	189	86	134	239	1	1	27	97
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	135.0		50.0	150.0		225.0	180.0		50.0		130.0	
Storage Lanes	2		1	2		1	2		1		2	
Taper Length (m)	7.5			7.5			7.5				7.5	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	0.95	0.97	0.95
Ped Bike Factor	1.00					0.99						
Frt			0.850			0.850			0.850			
Flt Protected	0.950			0.950			0.950				0.950	
Satd. Flow (prot)	3252	3353	1457	1659	3288	1342	3016	3353	1530	0	2972	3320
Flt Permitted	0.950			0.950			0.950				0.950	
Satd. Flow (perm)	3248	3353	1457	1659	3288	1325	3016	3353	1530	0	2972	3320
Right Turn on Red			Yes			Yes			Yes			
Satd. Flow (RTOR)			173			242			242			
Link Speed (k/h)		80			80			80				80
Link Distance (m)		820.1			192.4			139.2				489.4
Travel Time (s)		36.9			8.7			6.3				22.0
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	2%	5%	100%	4%	14%	10%	2%	0%	0%	12%	3%
Adj. Flow (vph)	737	353	120	1	210	96	149	266	1	1	30	108
Shared Lane Traffic (%)												
Lane Group Flow (vph)	737	353	120	1	210	96	149	266	1	0	31	108
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	Prot	NA
Protected Phases	5	2		1	6		3	8		7	7	4
Permitted Phases			2			6			8			
Detector Phase	5	2	2	1	6	6	3	8	8	7	7	4
Switch Phase												
Minimum Initial (s)	5.0	15.0	15.0	5.0	15.0	15.0	5.0	10.0	10.0	5.0	5.0	10.0
Minimum Split (s)	12.1	36.9	36.9	12.1	36.9	36.9	11.9	36.9	36.9	11.9	11.9	36.9
Total Split (s)	32.1	31.9	31.9	12.1	31.9	31.9	11.9	31.9	31.9	16.9	16.9	31.9
Total Split (%)	28.5%	28.3%	28.3%	10.7%	28.3%	28.3%	10.5%	28.3%	28.3%	15.0%	15.0%	28.3%
Maximum Green (s)	25.0	25.0	25.0	5.0	25.0	25.0	5.0	25.0	25.0	10.0	10.0	25.0
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.5	2.3	2.3	2.5	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	7.1	6.9	6.9	7.1	6.9	6.9	6.9	6.9	6.9		6.9	6.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None	None	None	Min	Min	None	None	Min
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0			7.0
Flash Dont Walk (s)		23.0	23.0		23.0	23.0		23.0	23.0			23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0			0
Act Effct Green (s)	25.0	44.9	44.9	5.0	15.0	15.0	5.0	17.1	17.1		6.4	13.3
Actuated g/C Ratio	0.29	0.52	0.52	0.06	0.17	0.17	0.06	0.20	0.20		0.07	0.15
v/c Ratio	0.78	0.20	0.14	0.01	0.37	0.22	0.85	0.40	0.00		0.14	0.21

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	273
Future Volume (vph)	273
Ideal Flow (vphpl)	1800
Storage Length (m)	160.0
Storage Lanes	1
Taper Length (m)	
Lane Util. Factor	1.00
Ped Bike Factor	
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1366
Flt Permitted	
Satd. Flow (perm)	1366
Right Turn on Red	Yes
Satd. Flow (RTOR)	303
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	0.90
Heavy Vehicles (%)	12%
Adj. Flow (vph)	303
Shared Lane Traffic (%)	
Lane Group Flow (vph)	303
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Detector Phase	4
Switch Phase	
Minimum Initial (s)	10.0
Minimum Split (s)	36.9
Total Split (s)	31.9
Total Split (%)	28.3%
Maximum Green (s)	25.0
Yellow Time (s)	4.6
All-Red Time (s)	2.3
Lost Time Adjust (s)	0.0
Total Lost Time (s)	6.9
Lead/Lag	Lag
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	Min
Walk Time (s)	7.0
Flash Dont Walk (s)	23.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	13.3
Actuated g/C Ratio	0.15
v/c Ratio	0.65

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Control Delay	35.6	12.9	1.4	40.0	34.2	1.2	81.2	33.9	0.0		39.6	32.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	35.6	12.9	1.4	40.0	34.2	1.2	81.2	33.9	0.0		39.6	32.4
LOS	D	B	A	D	C	A	F	C	A		D	C
Approach Delay		25.6			23.9			50.7				18.4
Approach LOS		C			C			D				B
Queue Length 50th (m)	52.7	13.3	0.0	0.1	14.9	0.0	11.8	20.1	0.0		2.3	7.6
Queue Length 95th (m)	#81.9	29.5	3.7	0.8	25.7	0.0	#28.8	31.5	0.0		6.3	14.1
Internal Link Dist (m)		796.1			168.4			115.2				465.4
Turn Bay Length (m)	135.0		50.0	150.0		225.0	180.0		50.0		130.0	
Base Capacity (vph)	944	1819	869	96	955	556	175	974	615		345	1157
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Reduced v/c Ratio	0.78	0.19	0.14	0.01	0.22	0.17	0.85	0.27	0.00		0.09	0.09

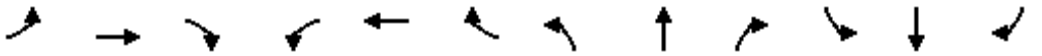
Intersection Summary			
Area Type:	Other		
Cycle Length: 112.8			
Actuated Cycle Length: 86.2			
Natural Cycle: 120			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 28.4		Intersection LOS: C	
Intersection Capacity Utilization 77.9%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 1: Limebank Road & Earl Armstrong Road



Lane Group	SBR
Control Delay	11.2
Queue Delay	0.0
Total Delay	11.2
LOS	B
Approach Delay	
Approach LOS	
Queue Length 50th (m)	0.0
Queue Length 95th (m)	20.0
Internal Link Dist (m)	
Turn Bay Length (m)	160.0
Base Capacity (vph)	673
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.45

Intersection Summary

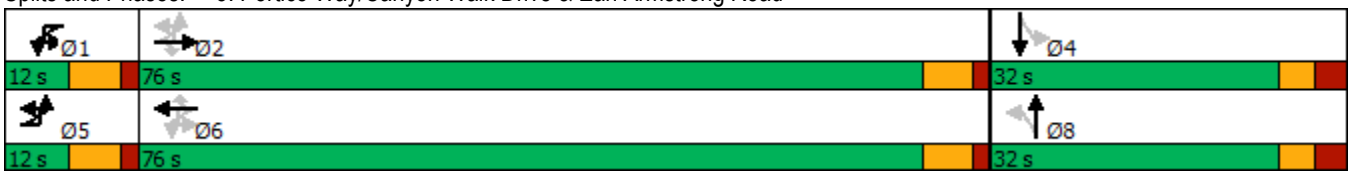


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	1049	3	9	561	26	11	4	10	30	0	184
Future Volume (vph)	72	1049	3	9	561	26	11	4	10	30	0	184
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	50.0		80.0	45.0		75.0	30.0		0.0	45.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98			0.98	1.00	0.99		1.00	0.98	
Frt			0.850			0.850		0.890			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1693	3320	1150	1286	3138	1417	1346	1400	0	1660	1486	0
Flt Permitted	0.390			0.223			0.392			0.748		
Satd. Flow (perm)	694	3320	1124	302	3138	1384	553	1400	0	1305	1486	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			87			87		11			327	
Link Speed (k/h)		80			80			50			50	
Link Distance (m)		160.9			820.1			170.7			152.1	
Travel Time (s)		7.2			36.9			12.3			11.0	
Confl. Peds. (#/hr)	1		1	1		1	5		1	1		5
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	1%	3%	33%	33%	9%	8%	27%	50%	0%	3%	0%	1%
Adj. Flow (vph)	80	1166	3	10	623	29	12	4	11	33	0	204
Shared Lane Traffic (%)												
Lane Group Flow (vph)	80	1166	3	10	623	29	12	15	0	33	204	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		
Detector Phase	5	2	2	1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	11.3	25.1	25.1	11.3	25.1	25.1	31.3	31.3		31.3	31.3	
Total Split (s)	12.0	76.0	76.0	12.0	76.0	76.0	32.0	32.0		32.0	32.0	
Total Split (%)	10.0%	63.3%	63.3%	10.0%	63.3%	63.3%	26.7%	26.7%		26.7%	26.7%	
Maximum Green (s)	5.7	69.9	69.9	5.7	69.9	69.9	25.7	25.7		25.7	25.7	
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3		3.3	3.3	
All-Red Time (s)	1.7	1.5	1.5	1.7	1.5	1.5	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.3	6.1	6.1	6.3	6.1	6.1	6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Max	Max	None	Max	Max	None	None		None	None	
Walk Time (s)		10.0	10.0		10.0	10.0	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		9.0	9.0		9.0	9.0	18.0	18.0		18.0	18.0	
Pedestrian Calls (#/hr)		0	0		0	0	0	0		0	0	
Act Effct Green (s)	78.9	78.0	78.0	75.1	70.9	70.9	10.2	10.2		10.2	10.2	
Actuated g/C Ratio	0.77	0.76	0.76	0.73	0.69	0.69	0.10	0.10		0.10	0.10	
v/c Ratio	0.14	0.46	0.00	0.04	0.29	0.03	0.22	0.10		0.26	0.46	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	3.3	6.0	0.0	3.1	7.1	0.0	53.6	27.0		49.0	3.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	3.3	6.0	0.0	3.1	7.1	0.0	53.6	27.0		49.0	3.4	
LOS	A	A	A	A	A	A	D	C		D	A	
Approach Delay		5.8			6.8			38.8			9.8	
Approach LOS		A			A			D			A	
Queue Length 50th (m)	2.7	30.2	0.0	0.3	22.5	0.0	2.1	0.7		5.8	0.0	
Queue Length 95th (m)	5.6	68.6	0.0	1.3	31.3	0.0	7.6	6.4		14.4	0.0	
Internal Link Dist (m)		136.9			796.1			146.7			128.1	
Turn Bay Length (m)	50.0		80.0	45.0		75.0	30.0			45.0		
Base Capacity (vph)	587	2513	872	275	2160	979	138	358		325	616	
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	0.14	0.46	0.00	0.04	0.29	0.03	0.09	0.04		0.10	0.33	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 103			
Natural Cycle: 80			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.46			
Intersection Signal Delay: 6.9		Intersection LOS: A	
Intersection Capacity Utilization 64.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 3: Portico Way/Canyon Walk Drive & Earl Armstrong Road



Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	278	214	183	1	2	471	26	123	117	1	16	217
Future Volume (vph)	278	214	183	1	2	471	26	123	117	1	16	217
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	135.0		50.0		150.0		225.0	180.0		50.0	130.0	
Storage Lanes	2		1		2		1	2		1	2	
Taper Length (m)	7.5				7.5			7.5			7.5	
Lane Util. Factor	0.97	0.95	1.00	0.95	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95
Frt			0.850				0.850			0.850		
Flt Protected	0.950				0.950			0.950			0.950	
Satd. Flow (prot)	3100	3320	1515	0	3317	3420	1471	3285	3353	1530	3100	3353
Flt Permitted	0.950				0.950			0.950			0.950	
Satd. Flow (perm)	3100	3320	1515	0	3317	3420	1471	3285	3353	1530	3100	3353
Right Turn on Red			Yes				Yes			Yes		
Satd. Flow (RTOR)			203				265			265		
Link Speed (k/h)		80				80			80			80
Link Distance (m)		820.1				192.4			139.2			489.4
Travel Time (s)		36.9				8.7			6.3			22.0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	7%	3%	1%	0%	0%	0%	4%	1%	2%	0%	7%	2%
Adj. Flow (vph)	309	238	203	1	2	523	29	137	130	1	18	241
Shared Lane Traffic (%)												
Lane Group Flow (vph)	309	238	203	0	3	523	29	137	130	1	18	241
Turn Type	Prot	NA	Perm	Prot	Prot	NA	Perm	Prot	NA	Perm	Prot	NA
Protected Phases	5	2		1	1	6		3	8		7	4
Permitted Phases			2				6			8		
Detector Phase	5	2	2	1	1	6	6	3	8	8	7	4
Switch Phase												
Minimum Initial (s)	5.0	15.0	15.0	5.0	5.0	15.0	15.0	5.0	10.0	10.0	5.0	10.0
Minimum Split (s)	12.1	36.9	36.9	12.1	12.1	36.9	36.9	11.9	36.9	36.9	11.9	36.9
Total Split (s)	22.1	31.9	31.9	12.1	12.1	31.9	31.9	16.9	31.9	31.9	16.9	31.9
Total Split (%)	21.5%	31.0%	31.0%	11.8%	11.8%	31.0%	31.0%	16.4%	31.0%	31.0%	16.4%	31.0%
Maximum Green (s)	15.0	25.0	25.0	5.0	5.0	25.0	25.0	10.0	25.0	25.0	10.0	25.0
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.5	2.3	2.3	2.5	2.5	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	6.9	6.9		7.1	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Lead/Lag	Lead	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None	None	None	None	Min	Min	None	Min
Walk Time (s)		7.0	7.0			7.0	7.0		7.0	7.0		7.0
Flash Dont Walk (s)		23.0	23.0			23.0	23.0		23.0	23.0		23.0
Pedestrian Calls (#/hr)		0	0			0	0		0	0		0
Act Effct Green (s)	13.5	38.1	38.1		5.0	19.7	19.7	8.8	35.8	35.8	6.1	25.1
Actuated g/C Ratio	0.14	0.40	0.40		0.05	0.21	0.21	0.09	0.38	0.38	0.06	0.26
v/c Ratio	0.71	0.18	0.28		0.02	0.74	0.06	0.45	0.10	0.00	0.09	0.27
Control Delay	49.1	19.6	4.3		46.0	42.3	0.2	47.0	23.2	0.0	45.2	30.1
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	740
Future Volume (vph)	740
Ideal Flow (vphpl)	1800
Storage Length (m)	160.0
Storage Lanes	1
Taper Length (m)	
Lane Util. Factor	1.00
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1515
Flt Permitted	
Satd. Flow (perm)	1515
Right Turn on Red	Yes
Satd. Flow (RTOR)	277
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Peak Hour Factor	0.90
Heavy Vehicles (%)	1%
Adj. Flow (vph)	822
Shared Lane Traffic (%)	
Lane Group Flow (vph)	822
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Detector Phase	4
Switch Phase	
Minimum Initial (s)	10.0
Minimum Split (s)	36.9
Total Split (s)	31.9
Total Split (%)	31.0%
Maximum Green (s)	25.0
Yellow Time (s)	4.6
All-Red Time (s)	2.3
Lost Time Adjust (s)	0.0
Total Lost Time (s)	6.9
Lead/Lag	Lag
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	Min
Walk Time (s)	7.0
Flash Dont Walk (s)	23.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	25.1
Actuated g/C Ratio	0.26
v/c Ratio	1.36
Control Delay	195.1
Queue Delay	0.0

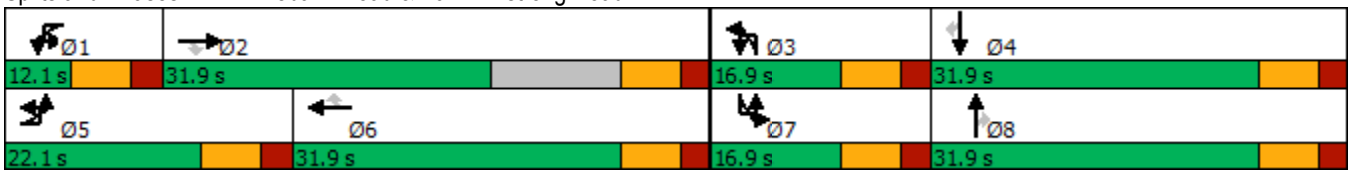
Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Total Delay	49.1	19.6	4.3		46.0	42.3	0.2	47.0	23.2	0.0	45.2	30.1
LOS	D	B	A		D	D	A	D	C	A	D	C
Approach Delay		27.6				40.1			35.3			155.8
Approach LOS		C				D			D			F
Queue Length 50th (m)	26.1	12.8	0.0		0.2	44.8	0.0	11.7	6.8	0.0	1.5	17.5
Queue Length 95th (m)	41.1	24.6	13.6		1.6	61.3	0.0	21.1	16.3	0.0	4.8	29.0
Internal Link Dist (m)		796.1				168.4			115.2			465.4
Turn Bay Length (m)	135.0		50.0		150.0		225.0	180.0		50.0	130.0	
Base Capacity (vph)	491	1352	737		175	903	583	347	1261	741	327	886
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0		0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.18	0.28		0.02	0.58	0.05	0.39	0.10	0.00	0.06	0.27

Intersection Summary			
Area Type:	Other		
Cycle Length: 102.8			
Actuated Cycle Length: 95.1			
Natural Cycle: 130			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.36			
Intersection Signal Delay: 83.2		Intersection LOS: F	
Intersection Capacity Utilization 97.8%		ICU Level of Service F	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Limebank Road & Earl Armstrong Road



Lane Group	SBR
Total Delay	195.1
LOS	F
Approach Delay	
Approach LOS	
Queue Length 50th (m)	~152.4
Queue Length 95th (m)	#231.1
Internal Link Dist (m)	
Turn Bay Length (m)	160.0
Base Capacity (vph)	604
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	1.36

Intersection Summary

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	1	199	646	13	11	1278	45	9	0	10	18	2
Future Volume (vph)	1	199	646	13	11	1278	45	9	0	10	18	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)		50.0		80.0	45.0		75.0	30.0		0.0	45.0	
Storage Lanes		1		1	1		1	1		0	1	
Taper Length (m)		7.5			7.5			7.5			7.5	
Lane Util. Factor	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor				0.97	1.00			1.00	0.99		1.00	0.99
Frt				0.850			0.850		0.850			0.852
Flt Protected		0.950			0.950			0.950			0.950	
Satd. Flow (prot)	0	1710	3288	1417	1710	3386	1500	1710	1507	0	1710	1482
Flt Permitted		0.113			0.379			0.469			0.750	
Satd. Flow (perm)	0	203	3288	1371	680	3386	1500	842	1507	0	1346	1482
Right Turn on Red				Yes			Yes			Yes		
Satd. Flow (RTOR)				87			87		285			141
Link Speed (k/h)			80			80			50			50
Link Distance (m)			160.9			820.1			170.7			152.1
Travel Time (s)			7.2			36.9			12.3			11.0
Confl. Peds. (#/hr)				4	4			2		2	2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	4%	8%	0%	1%	2%	0%	0%	0%	0%	0%
Adj. Flow (vph)	1	221	718	14	12	1420	50	10	0	11	20	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	222	718	14	12	1420	50	10	11	0	20	143
Turn Type	pm+pt	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA
Protected Phases	5	5	2		1	6			8			4
Permitted Phases	2	2		2	6		6	8			4	
Detector Phase	5	5	2	2	1	6	6	8	8		4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0		10.0	10.0
Minimum Split (s)	11.3	11.3	25.1	25.1	11.3	25.1	25.1	31.3	31.3		31.3	31.3
Total Split (s)	15.0	15.0	73.0	73.0	15.0	73.0	73.0	32.0	32.0		32.0	32.0
Total Split (%)	12.5%	12.5%	60.8%	60.8%	12.5%	60.8%	60.8%	26.7%	26.7%		26.7%	26.7%
Maximum Green (s)	8.7	8.7	66.9	66.9	8.7	66.9	66.9	25.7	25.7		25.7	25.7
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3		3.3	3.3
All-Red Time (s)	1.7	1.7	1.5	1.5	1.7	1.5	1.5	3.0	3.0		3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)		6.3	6.1	6.1	6.3	6.1	6.1	6.3	6.3		6.3	6.3
Lead/Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes					
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
Recall Mode	None	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None
Walk Time (s)			10.0	10.0		10.0	10.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)			9.0	9.0		9.0	9.0	18.0	18.0		18.0	18.0
Pedestrian Calls (#/hr)			0	0		0	0	0	0		0	0
Act Effct Green (s)		96.8	92.1	92.1	80.1	74.7	74.7	10.6	10.6		10.6	10.6
Actuated g/C Ratio		0.81	0.77	0.77	0.67	0.62	0.62	0.09	0.09		0.09	0.09
v/c Ratio		0.61	0.28	0.01	0.02	0.67	0.05	0.14	0.03		0.17	0.55

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	127
Future Volume (vph)	127
Ideal Flow (vphpl)	1800
Storage Length (m)	0.0
Storage Lanes	0
Taper Length (m)	
Lane Util. Factor	1.00
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Right Turn on Red	Yes
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	2
Peak Hour Factor	0.90
Heavy Vehicles (%)	2%
Adj. Flow (vph)	141
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Maximum Green (s)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	
Recall Mode	
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Control Delay		18.5	5.1	0.0	4.0	17.3	0.7	54.1	0.1		53.6	17.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay		18.5	5.1	0.0	4.0	17.3	0.7	54.1	0.1		53.6	17.1
LOS		B	A	A	A	B	A	D	A		D	B
Approach Delay			8.2			16.6			25.8			21.6
Approach LOS			A			B			C			C
Queue Length 50th (m)		11.7	15.4	0.0	0.4	94.9	0.0	2.0	0.0		4.1	0.4
Queue Length 95th (m)		35.9	38.0	0.0	1.5	137.7	1.4	7.0	0.0		11.1	17.8
Internal Link Dist (m)			136.9			796.1			146.7			128.1
Turn Bay Length (m)		50.0		80.0	45.0		75.0	30.0			45.0	
Base Capacity (vph)		365	2524	1072	546	2106	966	180	546		288	428
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		0.61	0.28	0.01	0.02	0.67	0.05	0.06	0.02		0.07	0.33

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 105 (88%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 13.9		Intersection LOS: B	
Intersection Capacity Utilization 74.0%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 3: Portico Way/Canyon Walk Drive & Earl Armstrong Road

Lane Group	SBR
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

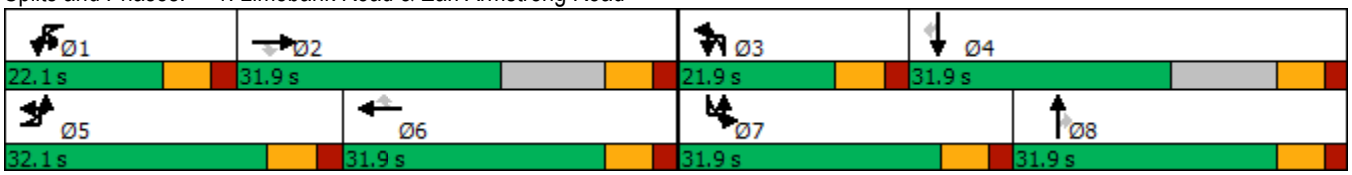
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	180	155	79	2	93	7	58	80	3	1	14	98
Future Volume (vph)	180	155	79	2	93	7	58	80	3	1	14	98
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	135.0		50.0	150.0		225.0	180.0		50.0		130.0	
Storage Lanes	2		1	2		1	2		1		2	
Taper Length (m)	7.5			7.5			7.5				7.5	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	0.95	0.97	0.95
Ped Bike Factor	1.00					0.99	1.00					
Frt			0.850			0.850			0.850			
Flt Protected	0.950			0.950			0.950				0.950	
Satd. Flow (prot)	3317	3386	1515	3317	3386	1530	3190	3386	1530	0	3317	3386
Flt Permitted	0.950			0.950			0.950				0.950	
Satd. Flow (perm)	3305	3386	1515	3317	3386	1508	3184	3386	1530	0	3317	3386
Right Turn on Red			Yes			Yes			Yes			
Satd. Flow (RTOR)			212			272			272			
Link Speed (k/h)		80			80			80				80
Link Distance (m)		820.1			192.4			139.2				489.4
Travel Time (s)		36.9			8.7			6.3				22.0
Confl. Peds. (#/hr)	2					2	1					
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	1%	1%	0%	1%	0%	4%	1%	0%	0%	0%	1%
Adj. Flow (vph)	200	172	88	2	103	8	64	89	3	1	16	109
Shared Lane Traffic (%)												
Lane Group Flow (vph)	200	172	88	2	103	8	64	89	3	0	17	109
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	Prot	NA
Protected Phases	5	2		1	6		3	8		7	7	4
Permitted Phases			2			6			8			
Detector Phase	5	2	2	1	6	6	3	8	8	7	7	4
Switch Phase												
Minimum Initial (s)	5.0	15.0	15.0	5.0	15.0	15.0	5.0	10.0	10.0	5.0	5.0	10.0
Minimum Split (s)	12.1	36.9	36.9	12.1	36.9	36.9	11.9	36.9	36.9	11.9	11.9	36.9
Total Split (s)	32.1	31.9	31.9	22.1	31.9	31.9	21.9	31.9	31.9	31.9	31.9	31.9
Total Split (%)	25.1%	25.0%	25.0%	17.3%	25.0%	25.0%	17.1%	25.0%	25.0%	25.0%	25.0%	25.0%
Maximum Green (s)	25.0	25.0	25.0	15.0	25.0	25.0	15.0	25.0	25.0	25.0	25.0	25.0
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.5	2.3	2.3	2.5	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	7.1	6.9	6.9	7.1	6.9	6.9	6.9	6.9	6.9		6.9	6.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None	None	None	Min	Min	None	None	Min
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0			7.0
Flash Dont Walk (s)		23.0	23.0		23.0	23.0		23.0	23.0			23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0			0
Act Effct Green (s)	12.3	26.3	26.3	5.9	15.9	15.9	7.1	18.9	18.9		6.2	10.9
Actuated g/C Ratio	0.19	0.41	0.41	0.09	0.25	0.25	0.11	0.29	0.29		0.10	0.17
v/c Ratio	0.32	0.12	0.12	0.01	0.12	0.01	0.18	0.09	0.00		0.05	0.19

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	208
Future Volume (vph)	208
Ideal Flow (vphpl)	1800
Storage Length (m)	160.0
Storage Lanes	1
Taper Length (m)	
Lane Util. Factor	1.00
Ped Bike Factor	0.99
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1500
Flt Permitted	
Satd. Flow (perm)	1480
Right Turn on Red	Yes
Satd. Flow (RTOR)	231
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	1
Peak Hour Factor	0.90
Heavy Vehicles (%)	2%
Adj. Flow (vph)	231
Shared Lane Traffic (%)	
Lane Group Flow (vph)	231
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Detector Phase	4
Switch Phase	
Minimum Initial (s)	10.0
Minimum Split (s)	36.9
Total Split (s)	31.9
Total Split (%)	25.0%
Maximum Green (s)	25.0
Yellow Time (s)	4.6
All-Red Time (s)	2.3
Lost Time Adjust (s)	0.0
Total Lost Time (s)	6.9
Lead/Lag	Lag
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	Min
Walk Time (s)	7.0
Flash Dont Walk (s)	23.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	10.9
Actuated g/C Ratio	0.17
v/c Ratio	0.52

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Control Delay	28.7	14.5	0.3	31.5	23.7	0.0	30.8	20.0	0.0		31.1	27.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	28.7	14.5	0.3	31.5	23.7	0.0	30.8	20.0	0.0		31.1	27.9
LOS	C	B	A	C	C	A	C	B	A		C	C
Approach Delay		18.0			22.2			24.1				16.1
Approach LOS		B			C			C				B
Queue Length 50th (m)	11.4	5.8	0.0	0.1	5.2	0.0	3.7	3.6	0.0		0.9	6.1
Queue Length 95th (m)	20.6	15.4	0.0	1.0	11.5	0.0	8.9	10.5	0.0		3.7	12.8
Internal Link Dist (m)		796.1			168.4			115.2				465.4
Turn Bay Length (m)	135.0		50.0	150.0		225.0	180.0		50.0		130.0	
Base Capacity (vph)	1367	1954	963	820	1396	781	789	1396	790		1367	1954
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Reduced v/c Ratio	0.15	0.09	0.09	0.00	0.07	0.01	0.08	0.06	0.00		0.01	0.06

Intersection Summary			
Area Type:	Other		
Cycle Length: 127.8			
Actuated Cycle Length: 64.3			
Natural Cycle: 100			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.52			
Intersection Signal Delay: 18.7		Intersection LOS: B	
Intersection Capacity Utilization 48.8%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Limebank Road & Earl Armstrong Road



Lane Group	SBR
Control Delay	9.4
Queue Delay	0.0
Total Delay	9.4
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (m)	0.0
Queue Length 95th (m)	16.3
Internal Link Dist (m)	
Turn Bay Length (m)	160.0
Base Capacity (vph)	951
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.24

Intersection Summary

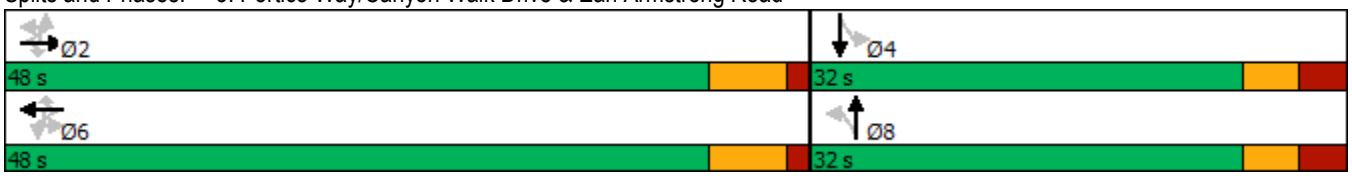
Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	1	142	384	7	8	323	28	7	2	11	18	0
Future Volume (vph)	1	142	384	7	8	323	28	7	2	11	18	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)		50.0		80.0	45.0		75.0	30.0		0.0	45.0	
Storage Lanes		1		1	1		1	1		0	1	
Taper Length (m)		7.5			7.5			7.5			7.5	
Lane Util. Factor	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99					0.96	1.00	0.99		1.00	0.99
Frt				0.850			0.850		0.871			0.850
Flt Protected		0.950			0.950			0.950			0.950	
Satd. Flow (prot)	0	1710	3386	1530	1710	3320	1530	1710	1550	0	1710	1492
Flt Permitted		0.537			0.503			0.648			0.748	
Satd. Flow (perm)	0	955	3386	1530	905	3320	1470	1164	1550	0	1345	1492
Right Turn on Red				Yes			Yes			Yes		
Satd. Flow (RTOR)				45			45		12			411
Link Speed (k/h)			80			80			50			50
Link Distance (m)			160.9			820.1			170.7			152.1
Travel Time (s)			7.2			36.9			12.3			11.0
Confl. Peds. (#/hr)		9					9	3		1	1	
Confl. Bikes (#/hr)							1					
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	1%	0%	0%	3%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	1	158	427	8	9	359	31	8	2	12	20	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	159	427	8	9	359	31	8	14	0	20	173
Turn Type	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA
Protected Phases			2			6			8			4
Permitted Phases	2	2		2	6		6	8			4	
Detector Phase	2	2	2	2	6	6	6	8	8		4	4
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0
Minimum Split (s)	25.1	25.1	25.1	25.1	25.1	25.1	25.1	31.3	31.3		31.3	31.3
Total Split (s)	48.0	48.0	48.0	48.0	48.0	48.0	48.0	32.0	32.0		32.0	32.0
Total Split (%)	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	40.0%	40.0%		40.0%	40.0%
Maximum Green (s)	41.9	41.9	41.9	41.9	41.9	41.9	41.9	25.7	25.7		25.7	25.7
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3		3.3	3.3
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	3.0	3.0		3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)		6.1	6.1	6.1	6.1	6.1	6.1	6.3	6.3		6.3	6.3
Lead/Lag												
Lead-Lag Optimize?												
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
Recall Mode	Max	Max	Max	Max	Max	Max	Max	None	None		None	None
Walk Time (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	9.0	9.0	9.0	9.0	9.0	9.0	9.0	18.0	18.0		18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0		0	0
Act Effct Green (s)		45.1	45.1	45.1	45.1	45.1	45.1	10.1	10.1		10.1	10.1
Actuated g/C Ratio		0.67	0.67	0.67	0.67	0.67	0.67	0.15	0.15		0.15	0.15

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	156
Future Volume (vph)	156
Ideal Flow (vphpl)	1800
Storage Length (m)	0.0
Storage Lanes	0
Taper Length (m)	
Lane Util. Factor	1.00
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Right Turn on Red	Yes
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	3
Confl. Bikes (#/hr)	
Peak Hour Factor	0.90
Heavy Vehicles (%)	1%
Adj. Flow (vph)	173
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Maximum Green (s)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	
Recall Mode	
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
v/c Ratio		0.25	0.19	0.01	0.01	0.16	0.03	0.05	0.06		0.10	0.30
Control Delay		5.8	4.6	0.0	4.0	4.5	1.1	24.0	14.8		24.8	1.4
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay		5.8	4.6	0.0	4.0	4.5	1.1	24.0	14.8		24.8	1.4
LOS		A	A	A	A	A	A	C	B		C	A
Approach Delay			4.9			4.2			18.1			3.8
Approach LOS			A			A			B			A
Queue Length 50th (m)		6.1	8.2	0.0	0.3	6.7	0.0	0.8	0.2		1.9	0.0
Queue Length 95th (m)		12.9	12.5	0.0	1.4	10.6	1.5	3.8	4.1		6.7	0.0
Internal Link Dist (m)			136.9			796.1			146.7			128.1
Turn Bay Length (m)		50.0		80.0	45.0		75.0	30.0			45.0	
Base Capacity (vph)		636	2257	1034	603	2213	995	445	599		514	824
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		0.25	0.19	0.01	0.01	0.16	0.03	0.02	0.02		0.04	0.21

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 67.7			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.30			
Intersection Signal Delay: 4.7		Intersection LOS: A	
Intersection Capacity Utilization 51.1%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Portico Way/Canyon Walk Drive & Earl Armstrong Road



Lane Group	SBR
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Appendix F – Trip Generation Data

3.2 Recommended Residential Trip Generation Rates

A blended trip rate was developed from the three data sources through application of a rank-sum weighting process, considering the strengths and weaknesses of each dataset for the dwelling type in question. The recommended blended **residential person-trip rates** are presented in **Table 3**. All rates represent person-trips per dwelling unit and are to be applied to the **AM or PM peak period.**

Table 3: Recommended Residential Person-trip Rates

ITE Land Use Code	Dwelling Unit Type	Period	Person-Trip Rate
210	Single-detached	AM	2.05
		PM	2.48
220	Multi-Unit (Low-Rise)	AM	1.35
		PM	1.58
221 & 222	Multi-Unit (High-Rise)	AM	0.80
		PM	0.90

3.3 Adjustment Factors – Peak Period to Peak Hour

The various trip generation data sources require some adjustment to standardize the data for developing robust blended trip rates. The peak period conversion factor in **Table 4** may be used where applicable to develop trip generation rate estimates in the desired format.

Table 4: Adjustment Factors for Residential Trip Generation Rates

Factor	Application	Apply To	Period	Value
Peak Period Conversion Factor	**Peak period to peak hour conversion.** Because the 2020 TRANS Trip Generation Study reports trip generation rates by peak period, factors must be applied if the practitioner requires peak hour rates. In practice, the conversion to peak hour trip rates should occur **after** the application of modal shares.	Person-trip rates per peak period	AM	0.50
			PM	0.44
		Vehicle trip rates per peak period	AM	0.48
			PM	0.44
		Transit trip rates per peak period	AM	0.55
			PM	0.47
		Cycling trip rates per peak period	AM	0.58
			PM	0.48
		Walking trip rates per peak period	AM	0.58
			PM	0.52

5 RESIDENTIAL DIRECTIONAL SPLITS

After calculating the total person trips generated by the development and applying the appropriate modal shares, directional factors can be applied to estimate the number of inbound and outbound trips by vehicle. The vehicle trip directional splits were developed for both the AM and PM peak periods[2]. The vehicle trip directional splits, as shown in **Table 9**, have been developed for the NCR based on a review of the local trip generator surveys as well as the latest published data in the ITE *Trip Generation Manual* (10th Edition).

Table 9: Recommended Vehicle Trip Directional Splits (Peak Period)

ITE Land Use Code	Dwelling Unit Type	Period	Inbound	Outbound
210	Single-detached	AM	30%	70%
		PM	62%	38%
220	Multi-Unit (Low-Rise)	AM	30%	70%
		PM	56%	44%
221 & 222	Multi-Unit (High-Rise)	AM	31%	69%
		PM	58%	42%

6 NON-RESIDENTIAL MODE SHARE

Mode shares were developed for three types of non-residential development: schools (elementary and high school); employment generators; and commercial (retail) generators. These mode shares were developed through data provided by the Ville de Gatineau from local school surveys as well as the TRANS Origin-Destination Survey. The non-residential mode shares presented below are limited and do not capture all development types. For data on the travel characteristics associated with colleges and universities, transportation terminals, and sports and entertainment venues in the National Capital Region, practitioners should refer to the various reports for the TRANS *Special Generators Survey* (2013), which are posted on the TRANS website. For other development types, practitioners may need to carry out their own local generator data collection where necessary.

[2] A directional split for active transportation was calculated based on the local generator surveys for low-rise and mid-rise land uses. The splits are mostly in-line with the vehicle directional splits, which could be used as a rough assumption for areas with lower vehicle mode share.

Single-Family Attached Housing
(215)

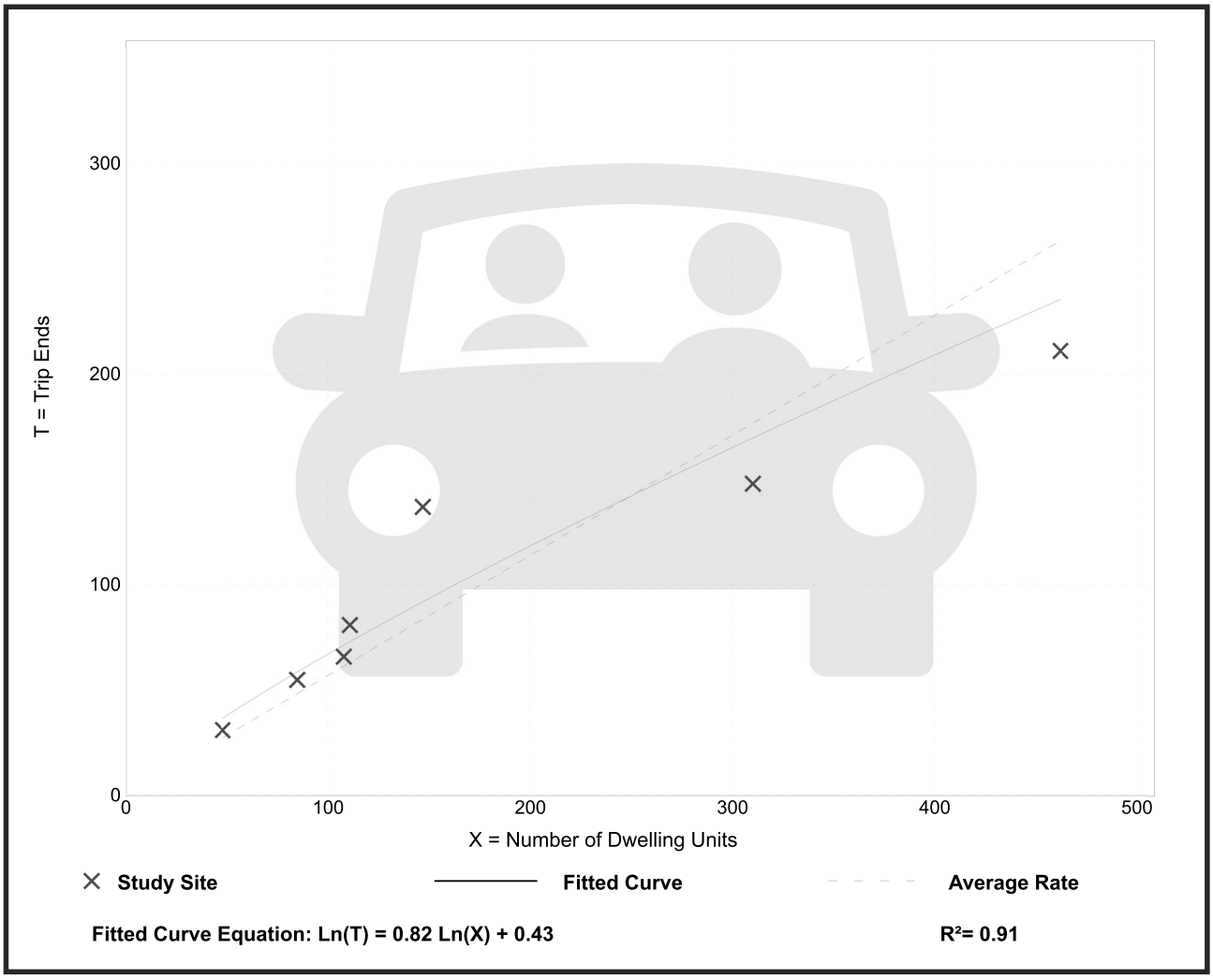
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Saturday, Peak Hour of Generator**

Setting/Location: **General Urban/Suburban**
Number of Studies: 7
Avg. Num. of Dwelling Units: 182
Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.57	0.46 - 0.93	0.17

Data Plot and Equation



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

Vehicle Trip Ends vs: **Dwelling Units**
On a: **Saturday, Peak Hour of Generator**

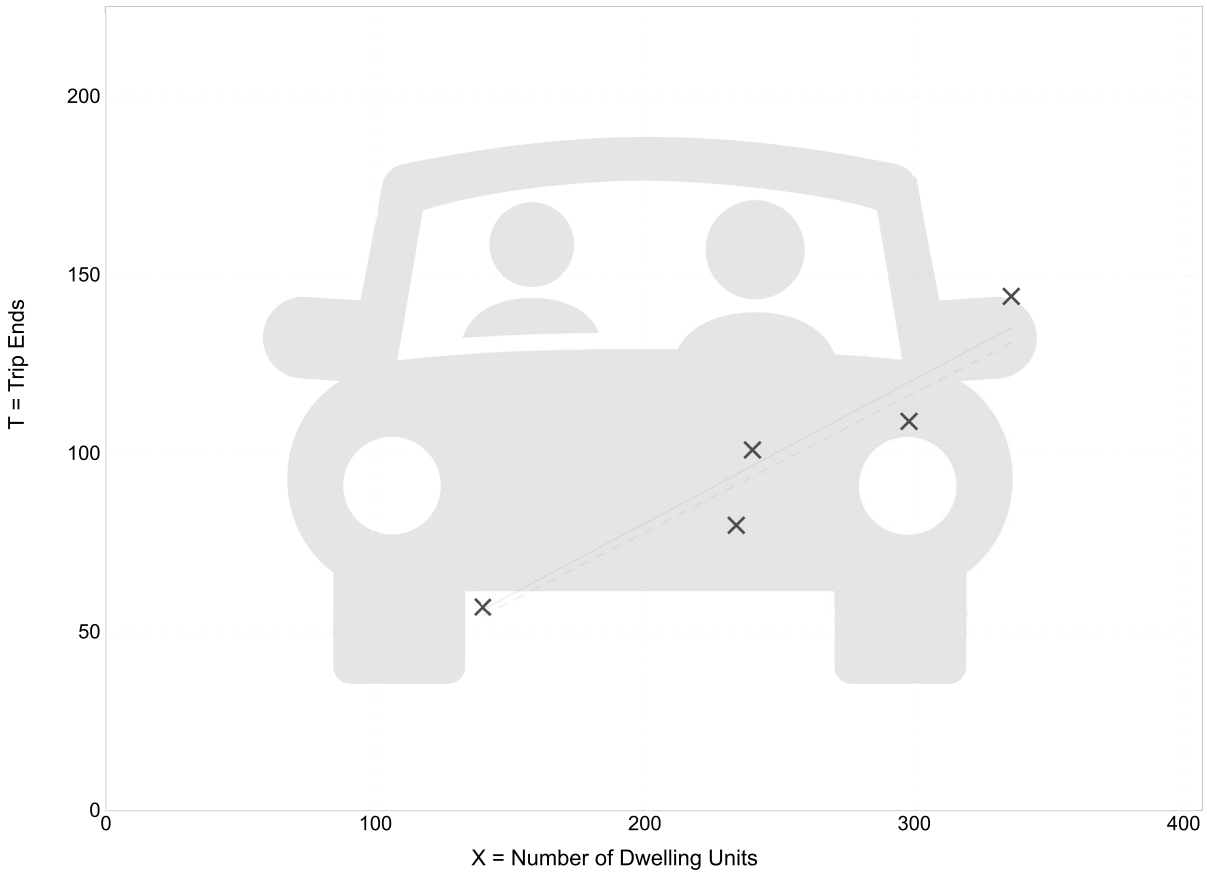
Setting/Location: **General Urban/Suburban**
Number of Studies: 5
Avg. Num. of Dwelling Units: 250
Directional Distribution: 51% entering, 49% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.39	0.34 - 0.43	0.04

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Ln(T) = 1.00 Ln(X) - 0.91 **R^2= 0.92**

Public Park
(411)

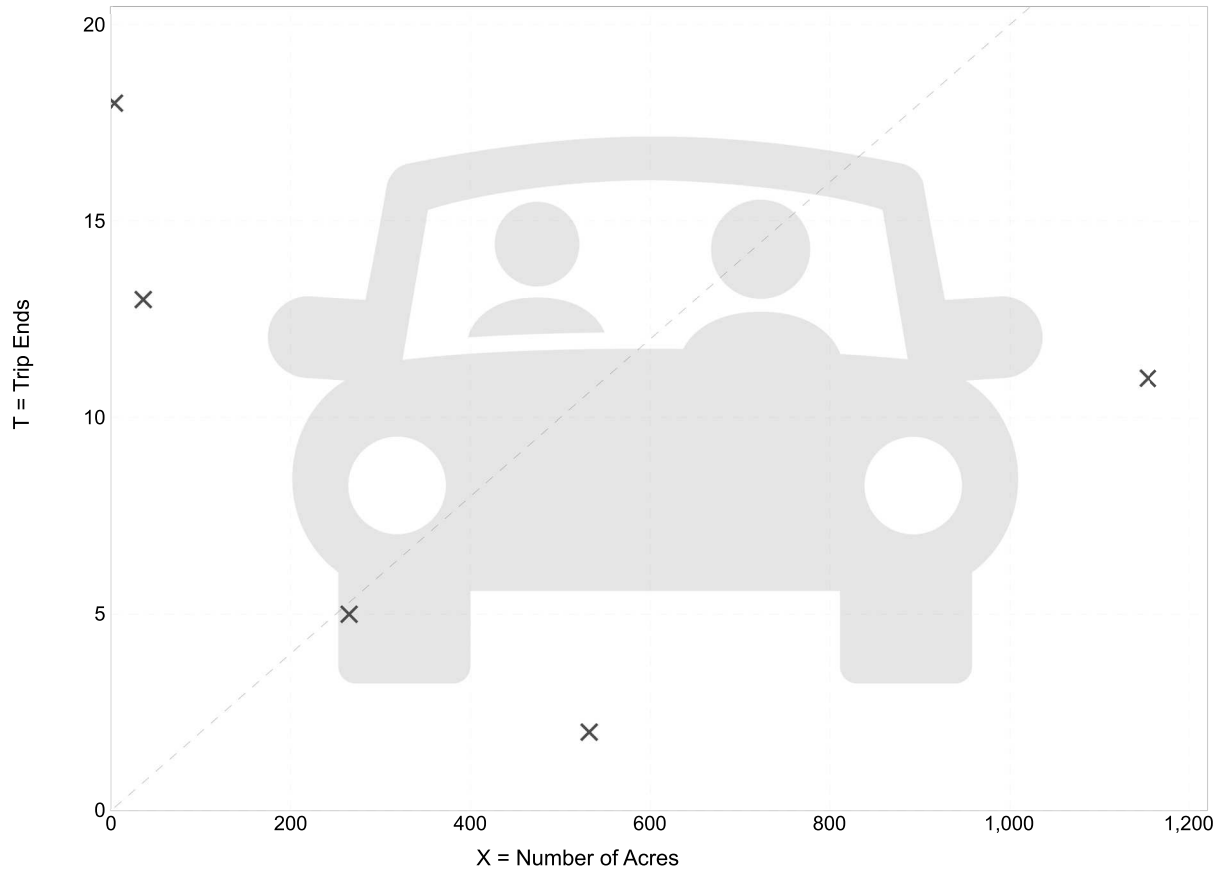
Vehicle Trip Ends vs:	**Acres**
On a:	**Weekday,** **Peak Hour of Adjacent Street Traffic,** **One Hour Between 7 and 9 a.m.**
Setting/Location:	**General Urban/Suburban**
Number of Studies:	5
Avg. Num. of Acres:	398
Directional Distribution:	59% entering, 41% exiting

Vehicle Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
0.02	0.00 - 4.50	0.23

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= ****

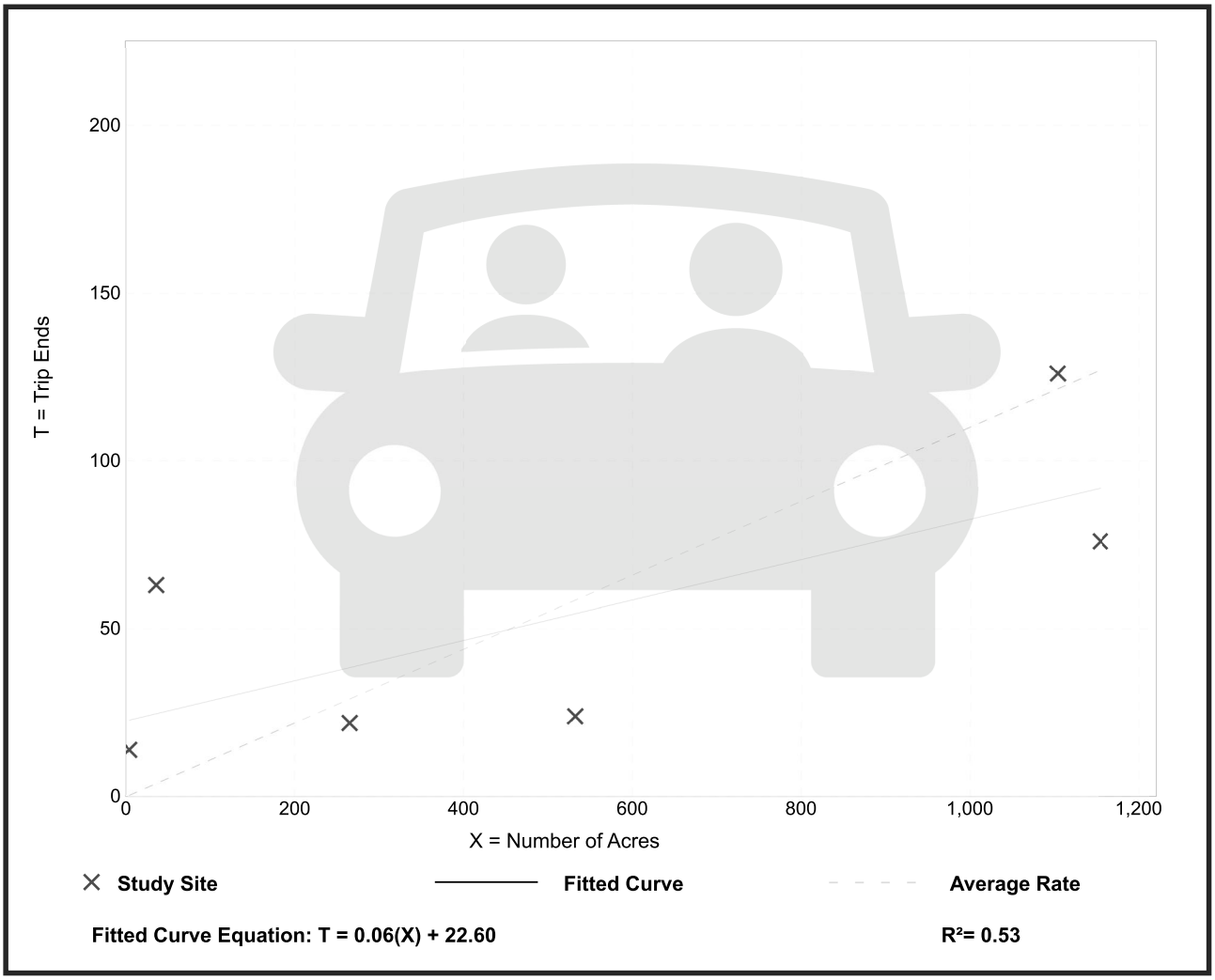
Public Park
(411)

Vehicle Trip Ends vs: **Acres**
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: 6
Avg. Num. of Acres: 516
Directional Distribution: 55% entering, 45% exiting

Vehicle Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
0.11	0.05 - 3.50	0.24

Data Plot and Equation



Public Park
(411)

Vehicle Trip Ends vs: **Acres**
On a: **Saturday, Peak Hour of Generator**

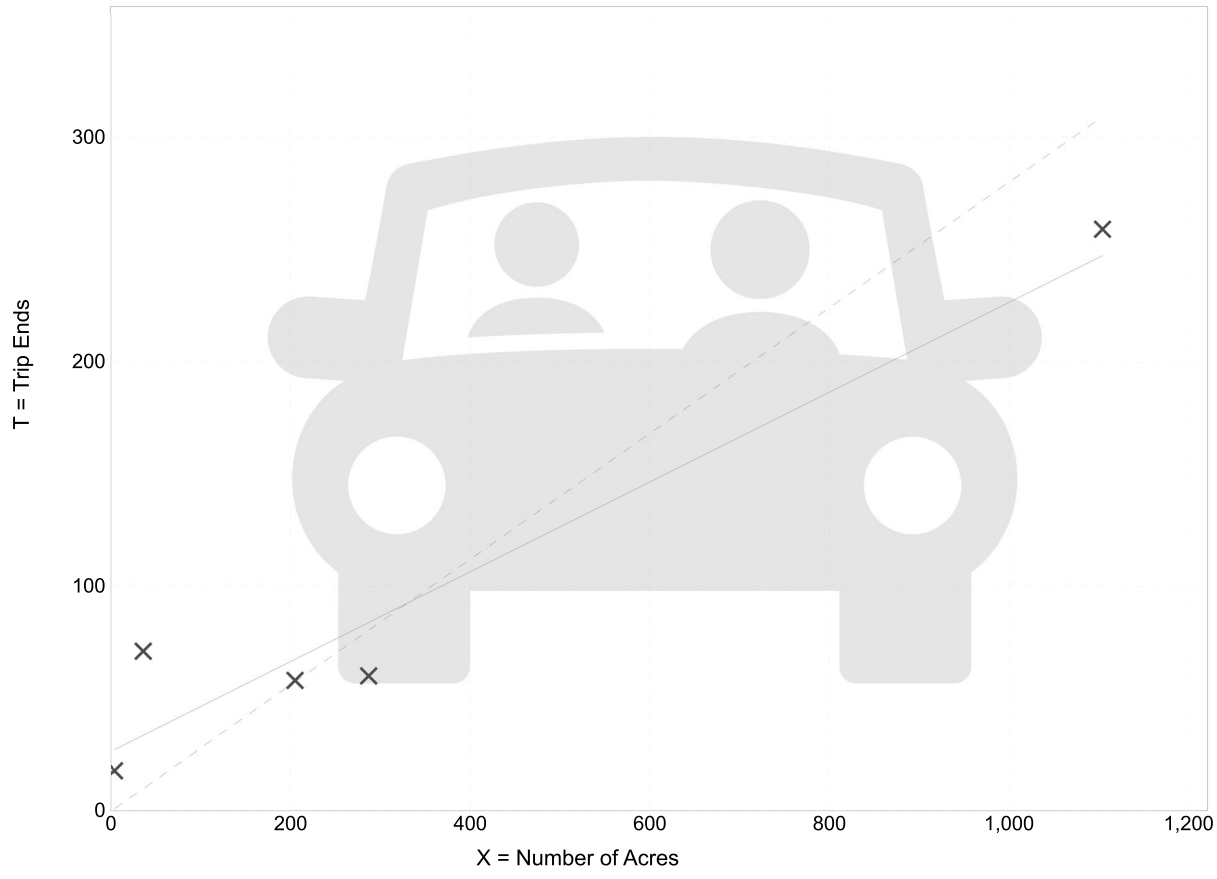
Setting/Location: **General Urban/Suburban**
Number of Studies: 5
Avg. Num. of Acres: 327
Directional Distribution: 55% entering, 45% exiting

Vehicle Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
0.28	0.21 - 4.50	0.37

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: T = 0.20(X) + 26.40

R^2= 0.94

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Soccer Complex
(488)

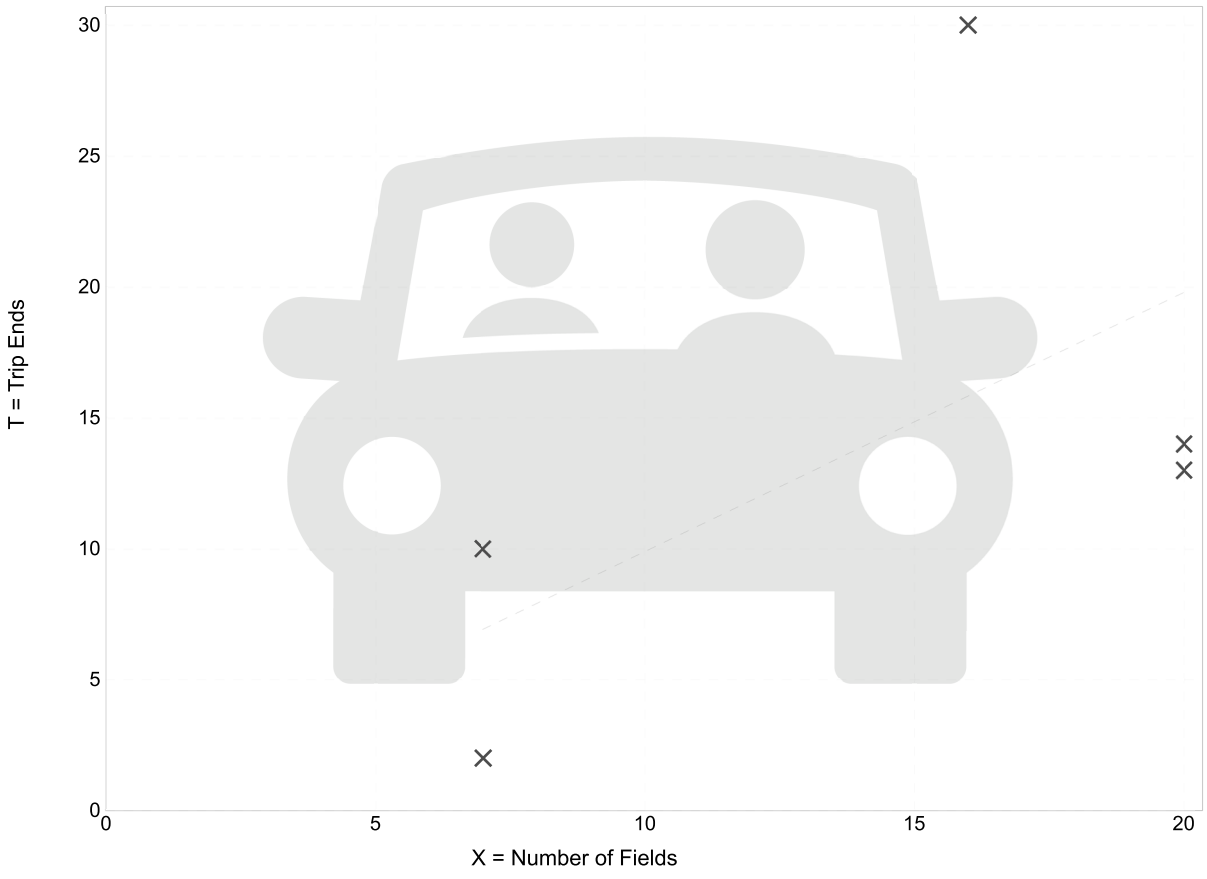
Vehicle Trip Ends vs:	**Fields**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	5
Avg. Num. of Fields:	14
Directional Distribution:	61% entering, 39% exiting

Vehicle Trip Generation per Field

Average Rate	Range of Rates	Standard Deviation
0.99	0.29 - 1.88	0.62

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= ****

Soccer Complex
(488)

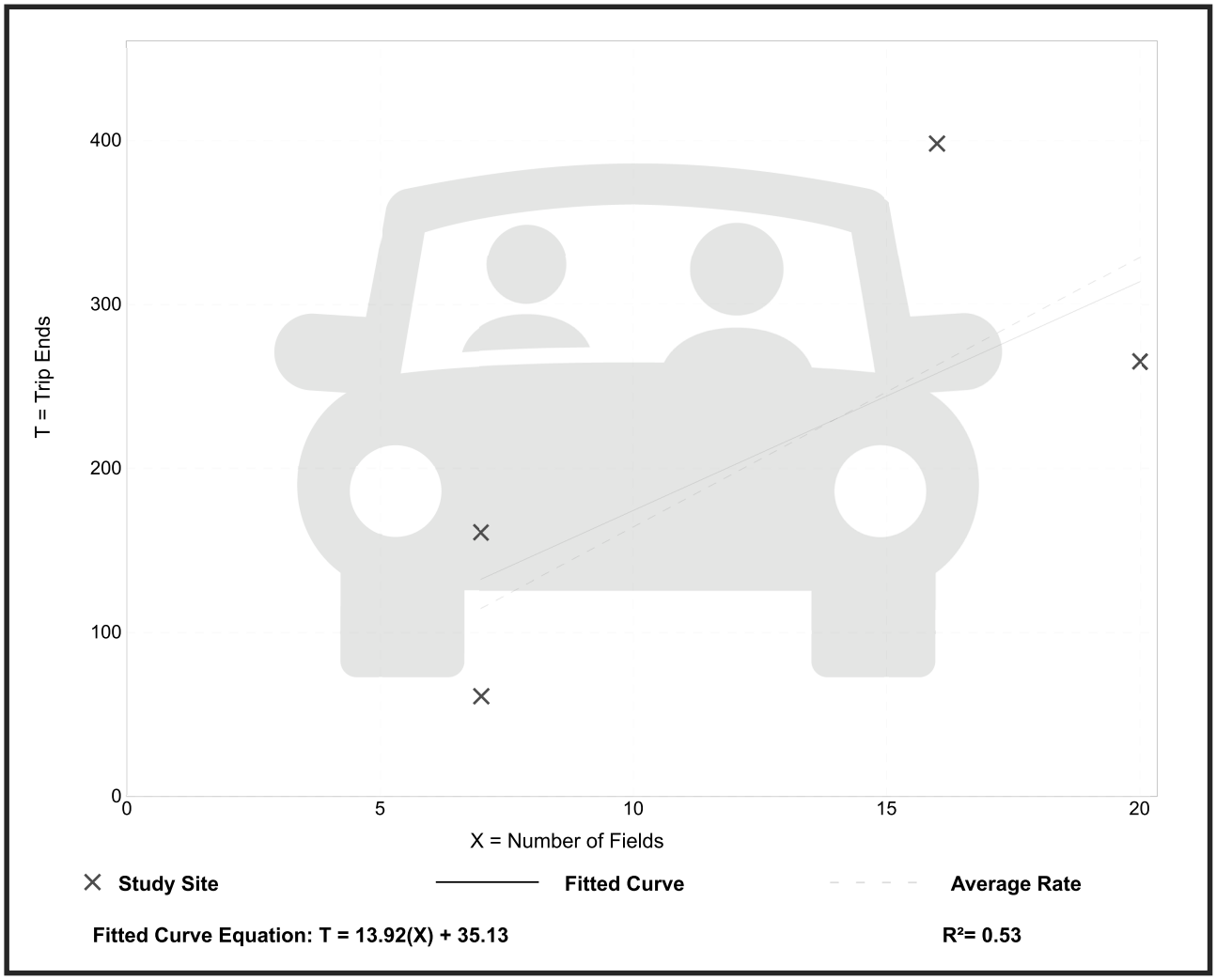
Vehicle Trip Ends vs: **Fields**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 5
Avg. Num. of Fields: 14
Directional Distribution: 66% entering, 34% exiting

Vehicle Trip Generation per Field

Average Rate	Range of Rates	Standard Deviation
16.43	8.71 - 24.88	6.36

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: T = 13.92(X) + 35.13

R^2= 0.53

Soccer Complex
(488)

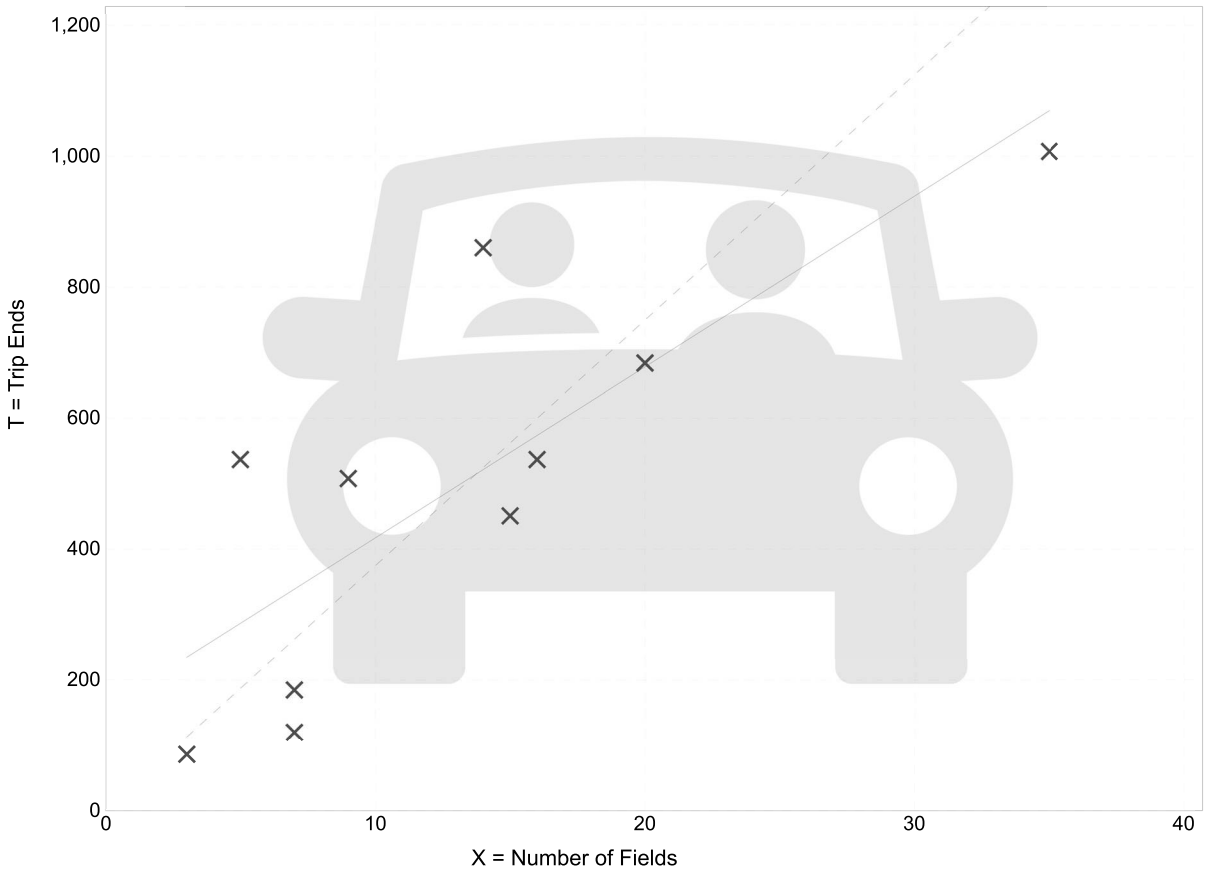
Vehicle Trip Ends vs: **Fields**
On a: **Saturday, Peak Hour of Generator**

Setting/Location: **General Urban/Suburban**
Number of Studies: 11
Avg. Num. of Fields: 14
Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per Field

Average Rate	Range of Rates	Standard Deviation
37.48	17.14 - 107.40	17.87

Data Plot and Equation



Fitted Curve Equation: T = 26.09(X) + 156.36

R^2= 0.66

Tennis Courts
(490)

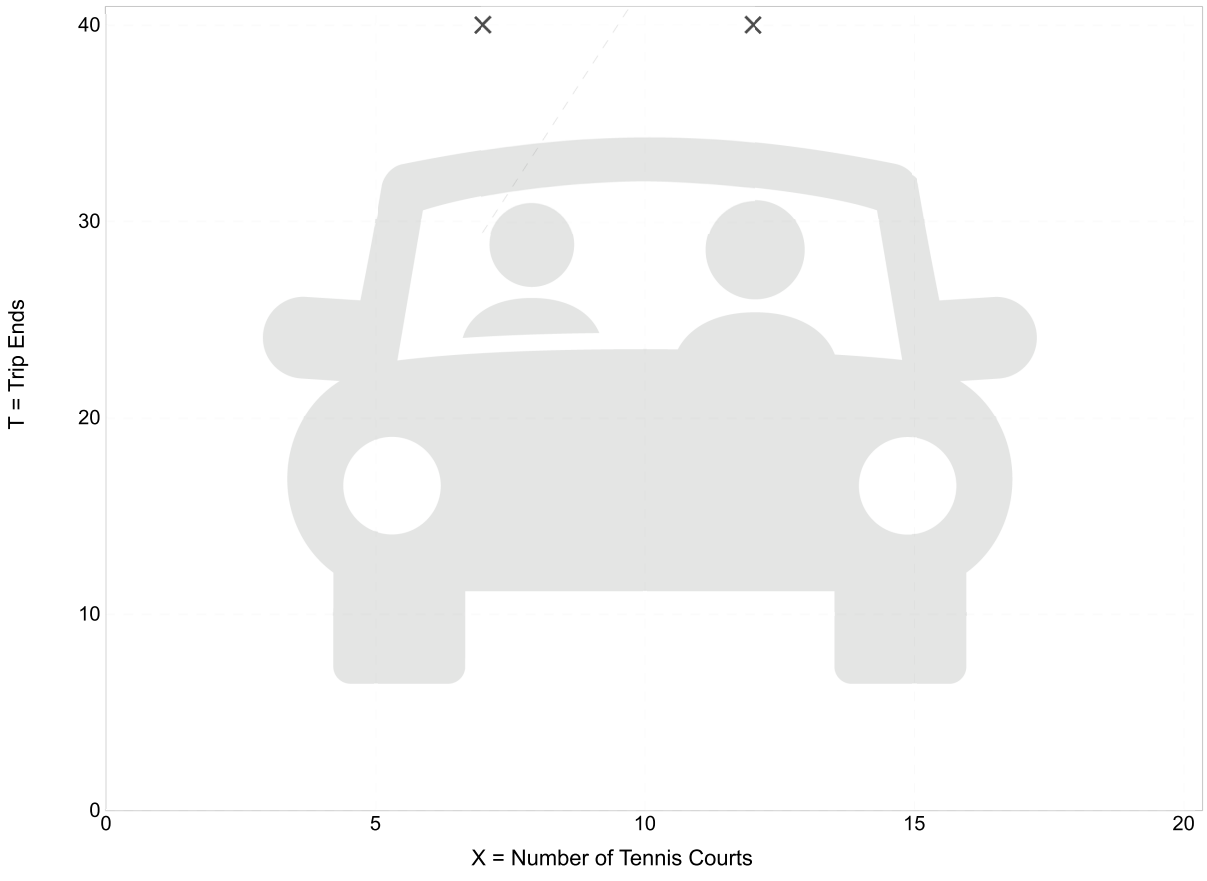
Vehicle Trip Ends vs:	**Tennis Courts**
On a:	**Weekday,** **Peak Hour of Adjacent Street Traffic,** **One Hour Between 4 and 6 p.m.**
Setting/Location:	**General Urban/Suburban**
Number of Studies:	2
Avg. Num. of Tennis Courts:	10
Directional Distribution:	Not Available

Vehicle Trip Generation per Tennis Court

Average Rate	Range of Rates	Standard Deviation
4.21	3.33 - 5.71	*

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= **

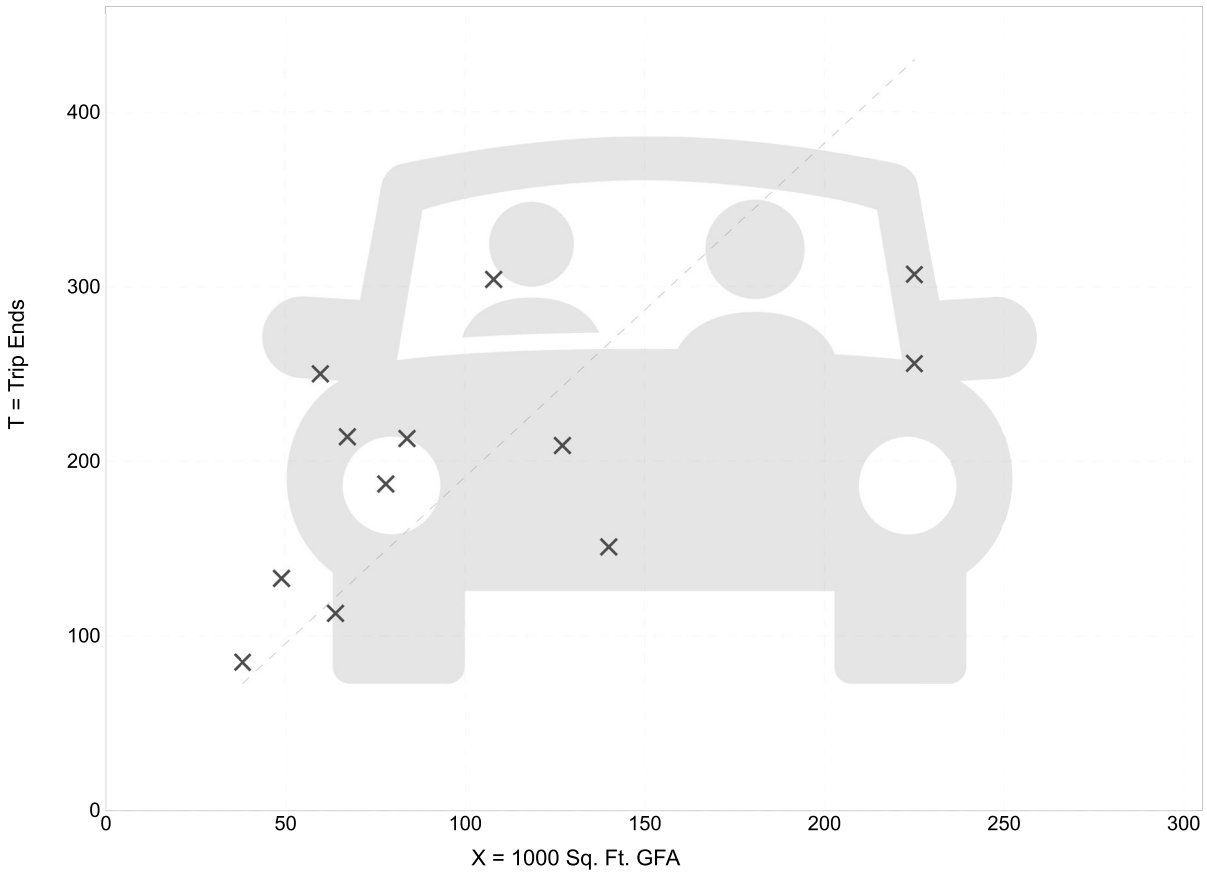
Recreational Community Center
(495)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
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: 12
Avg. 1000 Sq. Ft. GFA: 105
Directional Distribution: 66% entering, 34% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.91	1.08 - 4.18	0.88

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ****

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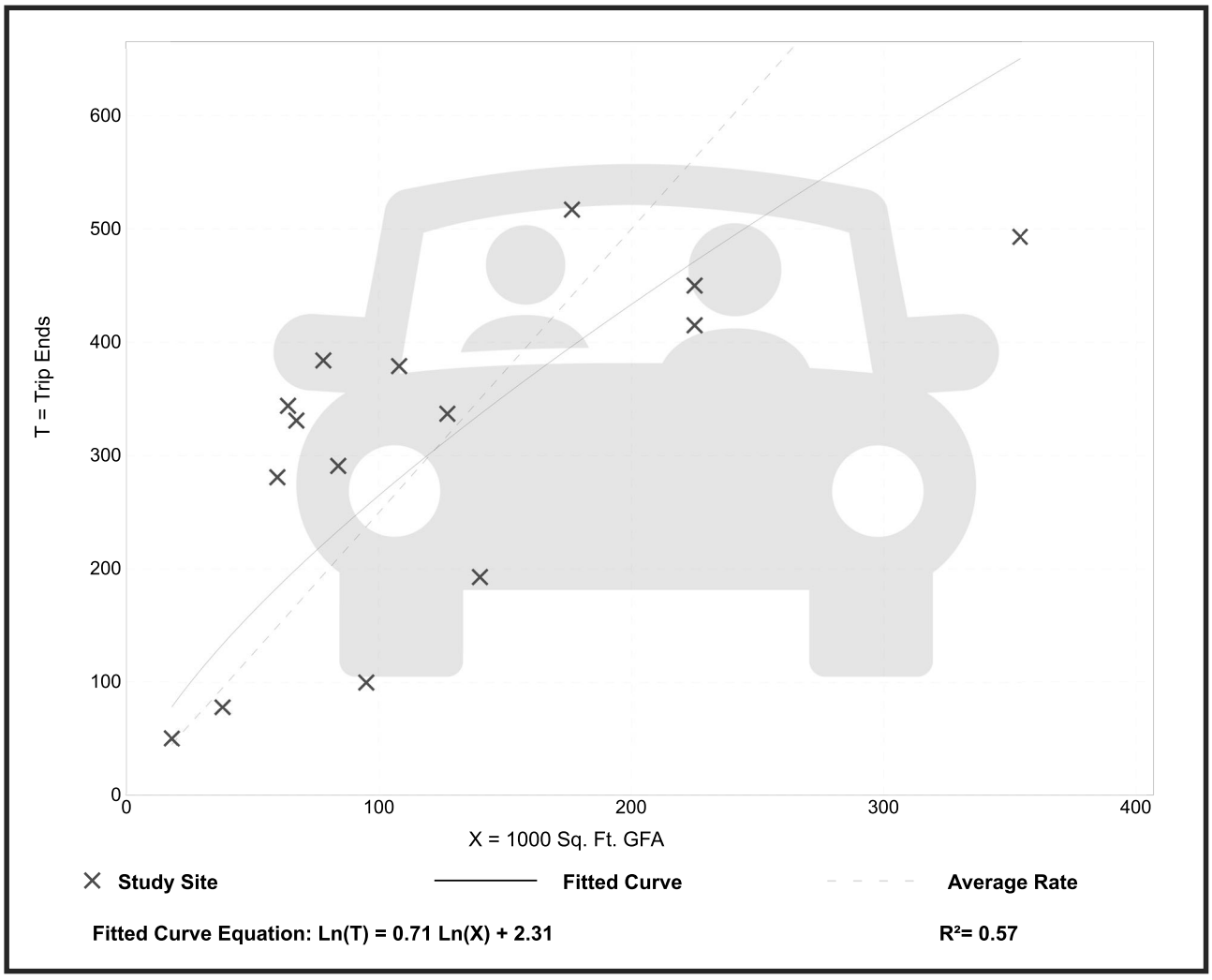
Recreational Community Center
(495)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
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: 15
Avg. 1000 Sq. Ft. GFA: 124
Directional Distribution: 47% entering, 53% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
2.50	1.05 - 5.37	1.28

Data Plot and Equation



Recreational Community Center
(495)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Saturday, Peak Hour of Generator**

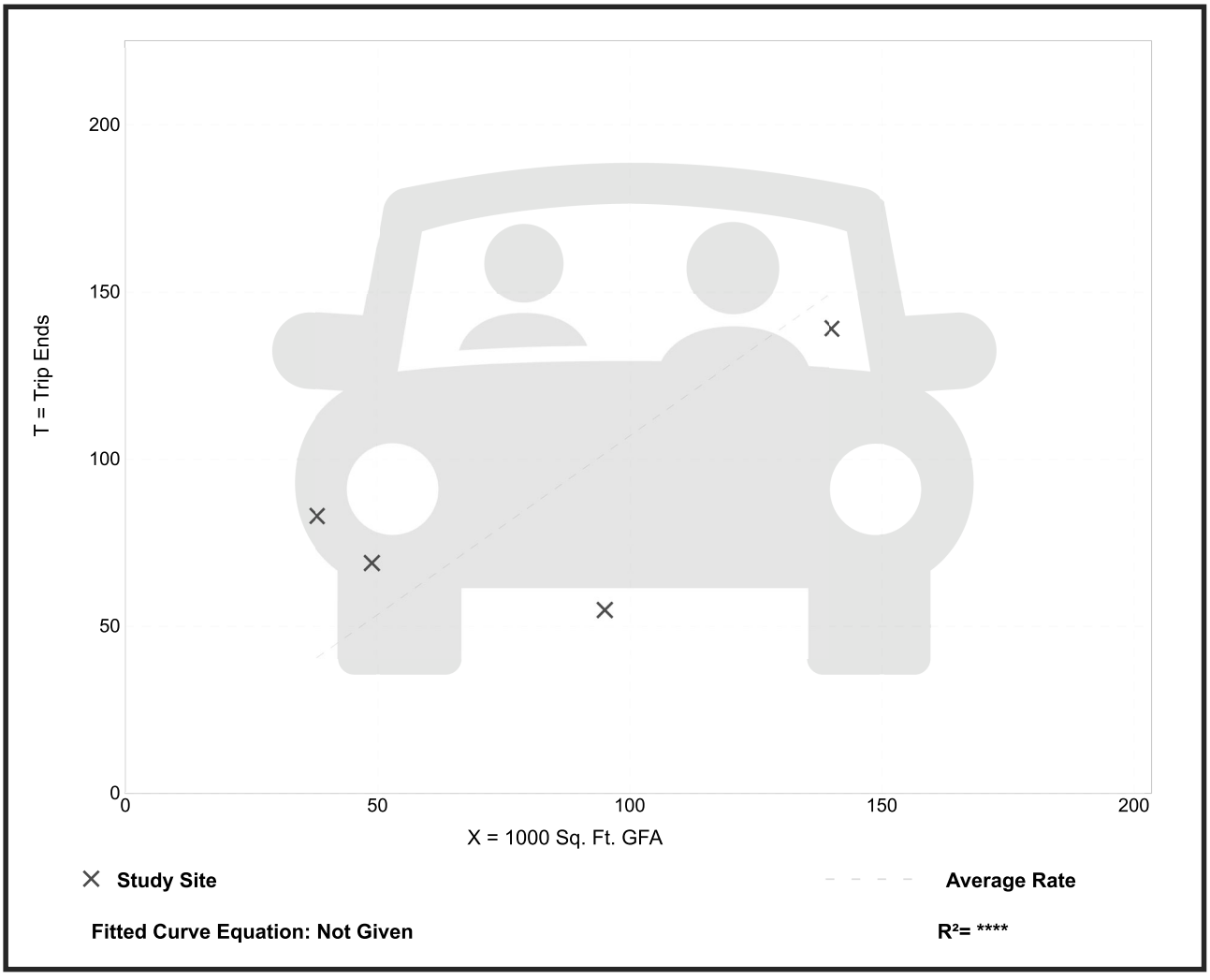
Setting/Location: **General Urban/Suburban**
Number of Studies: 4
Avg. 1000 Sq. Ft. GFA: 81
Directional Distribution: 54% entering, 46% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.07	0.58 - 2.18	0.56

Data Plot and Equation

Caution – Small Sample Size



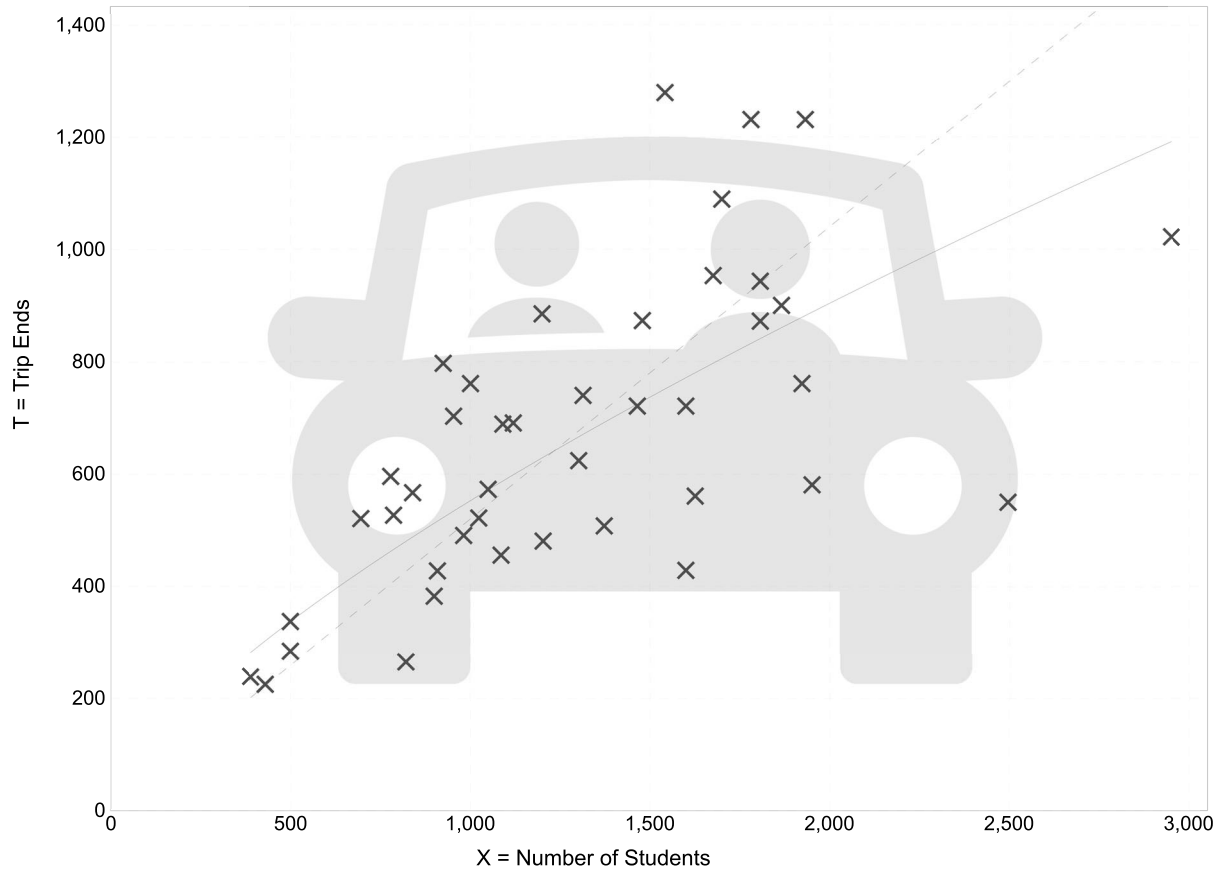
High School
(525)

Vehicle Trip Ends vs:	**Students**
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:	42
Avg. Num. of Students:	1295
Directional Distribution:	68% entering, 32% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.52	0.22 - 0.86	0.16

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.71 Ln(X) + 1.41 **R^2= 0.56**

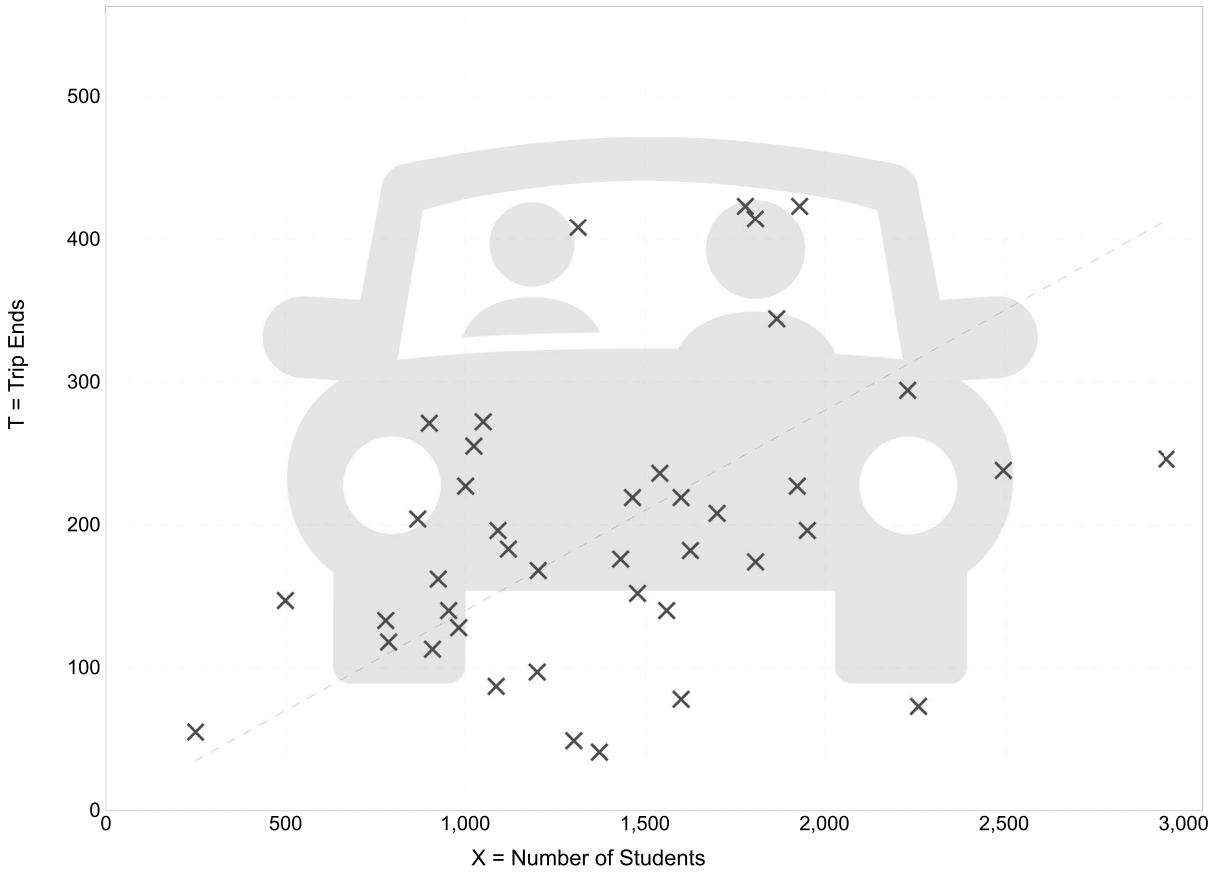
High School
(525)

Vehicle Trip Ends vs: **Students**
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: 41
Avg. Num. of Students: 1405
Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.14	0.03 - 0.31	0.07

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ****

High School
(525)

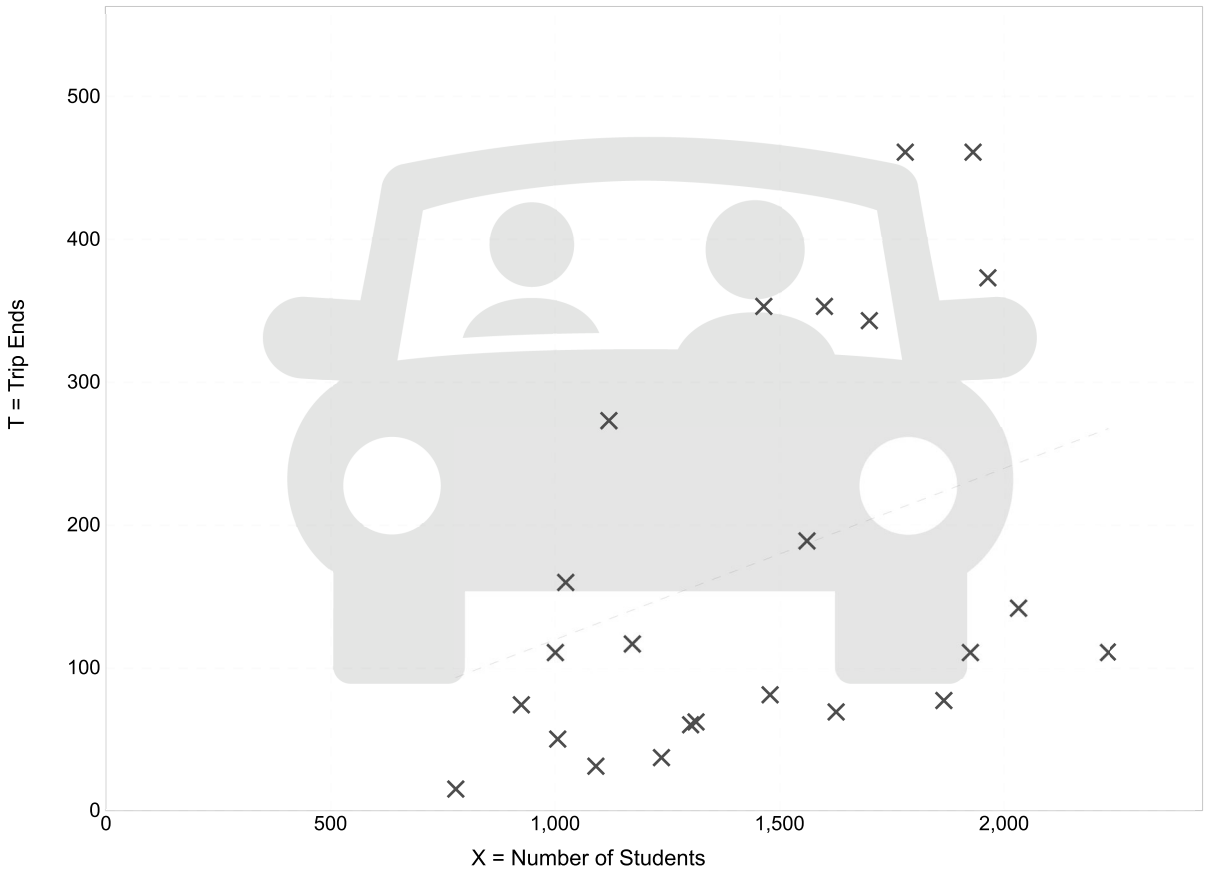
Vehicle Trip Ends vs: **Students**
On a: **Saturday, Peak Hour of Generator**

Setting/Location: **General Urban/Suburban**
Number of Studies: 24
Avg. Num. of Students: 1464
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.12	0.02 - 0.26	0.08

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ****

Library
(590)

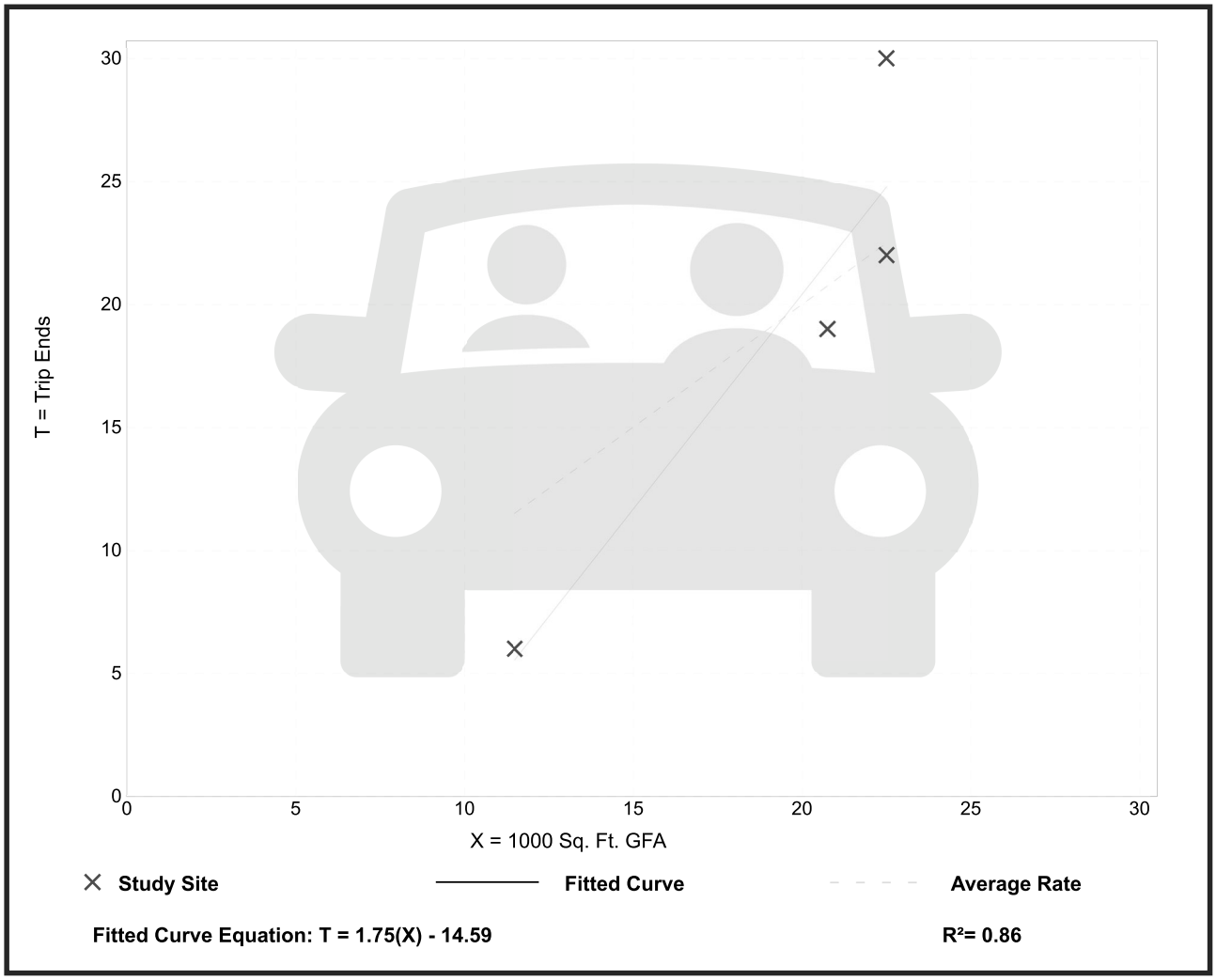
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 4
Avg. 1000 Sq. Ft. GFA: 19
Directional Distribution: 71% entering, 29% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.00	0.52 - 1.33	0.30

Data Plot and Equation

Caution – Small Sample Size



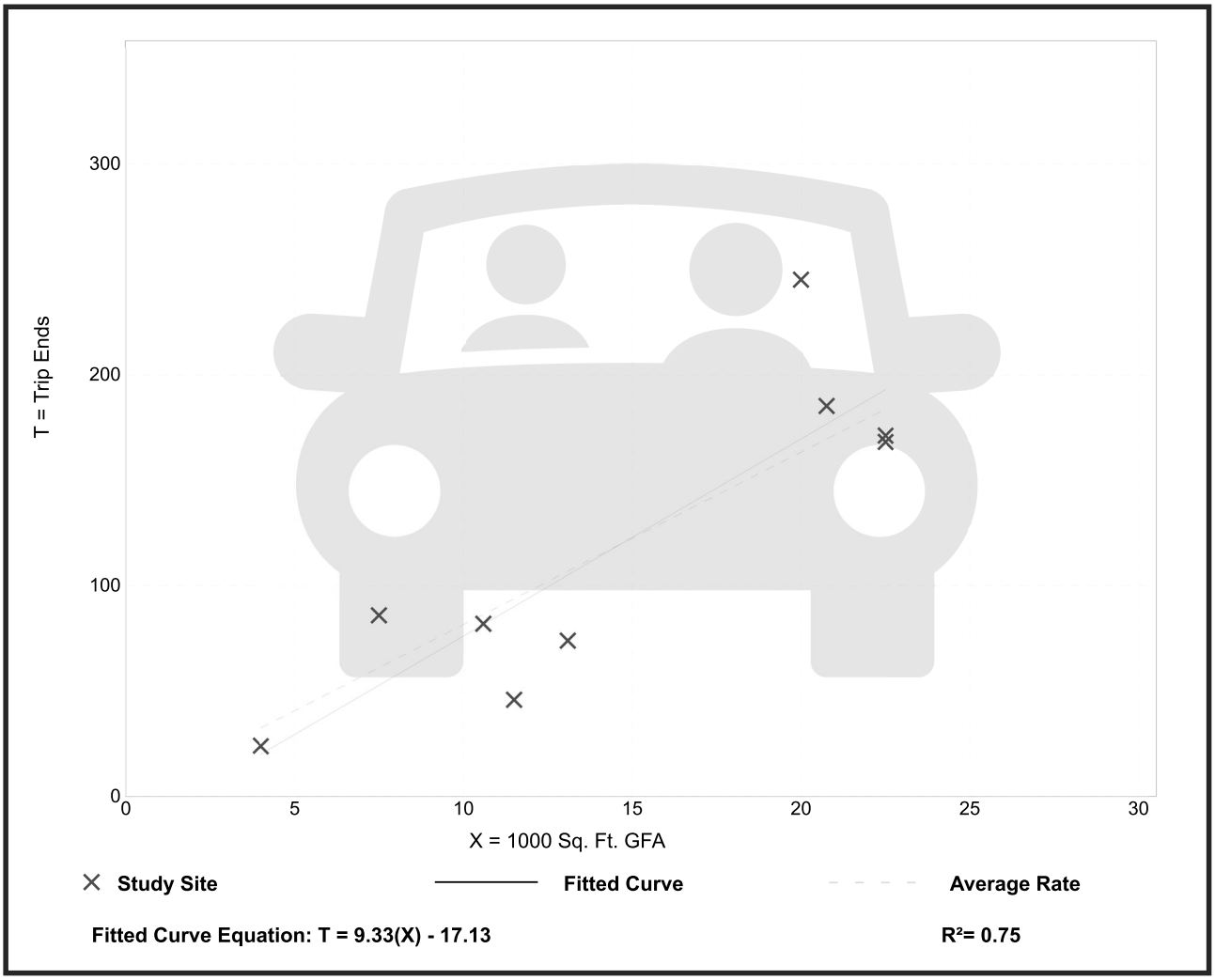
Library
(590)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
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: 9
Avg. 1000 Sq. Ft. GFA: 15
Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
8.16	4.00 - 12.25	2.52

Data Plot and Equation



Library
(590)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Saturday, Peak Hour of Generator**

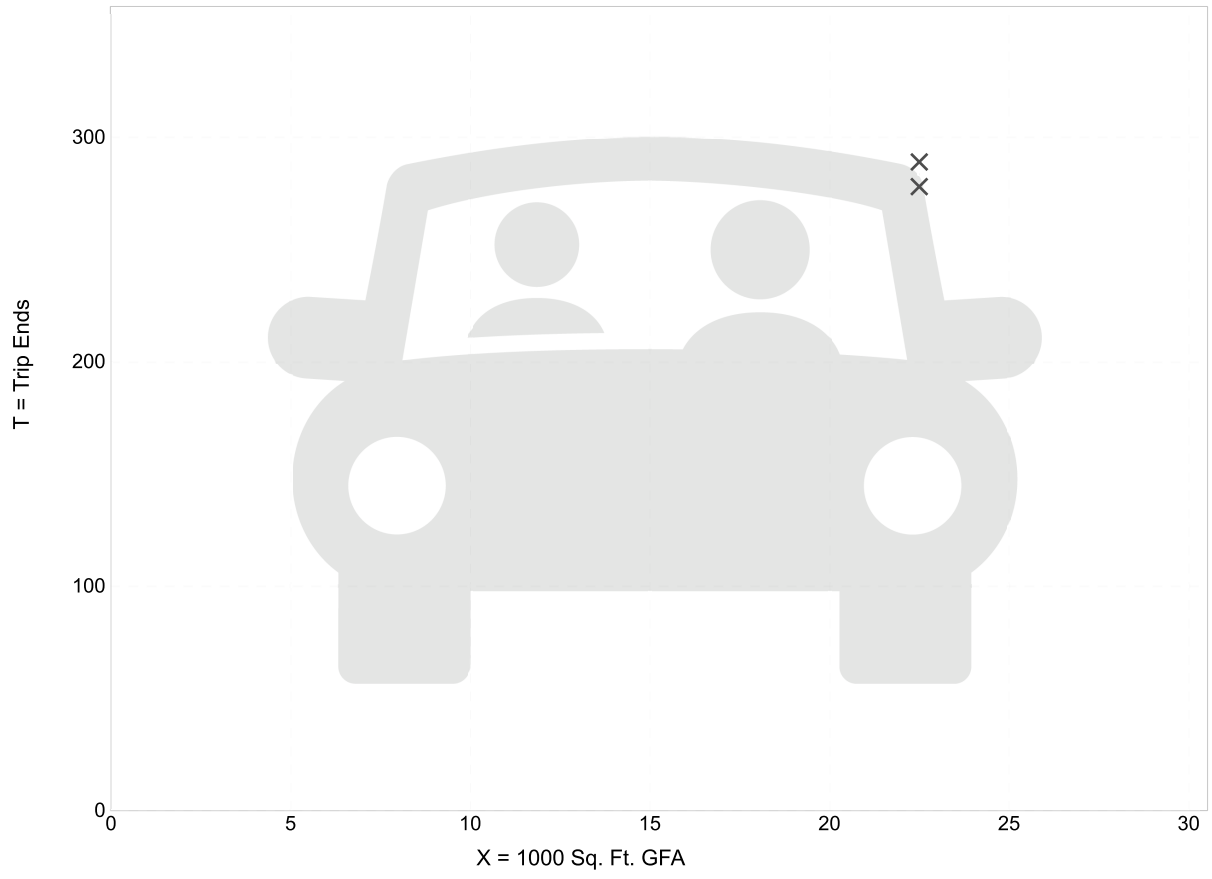
Setting/Location: **General Urban/Suburban**
Number of Studies: 2
Avg. 1000 Sq. Ft. GFA: 23
Directional Distribution: 53% entering, 47% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
12.60	12.36 - 12.84	*

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= **

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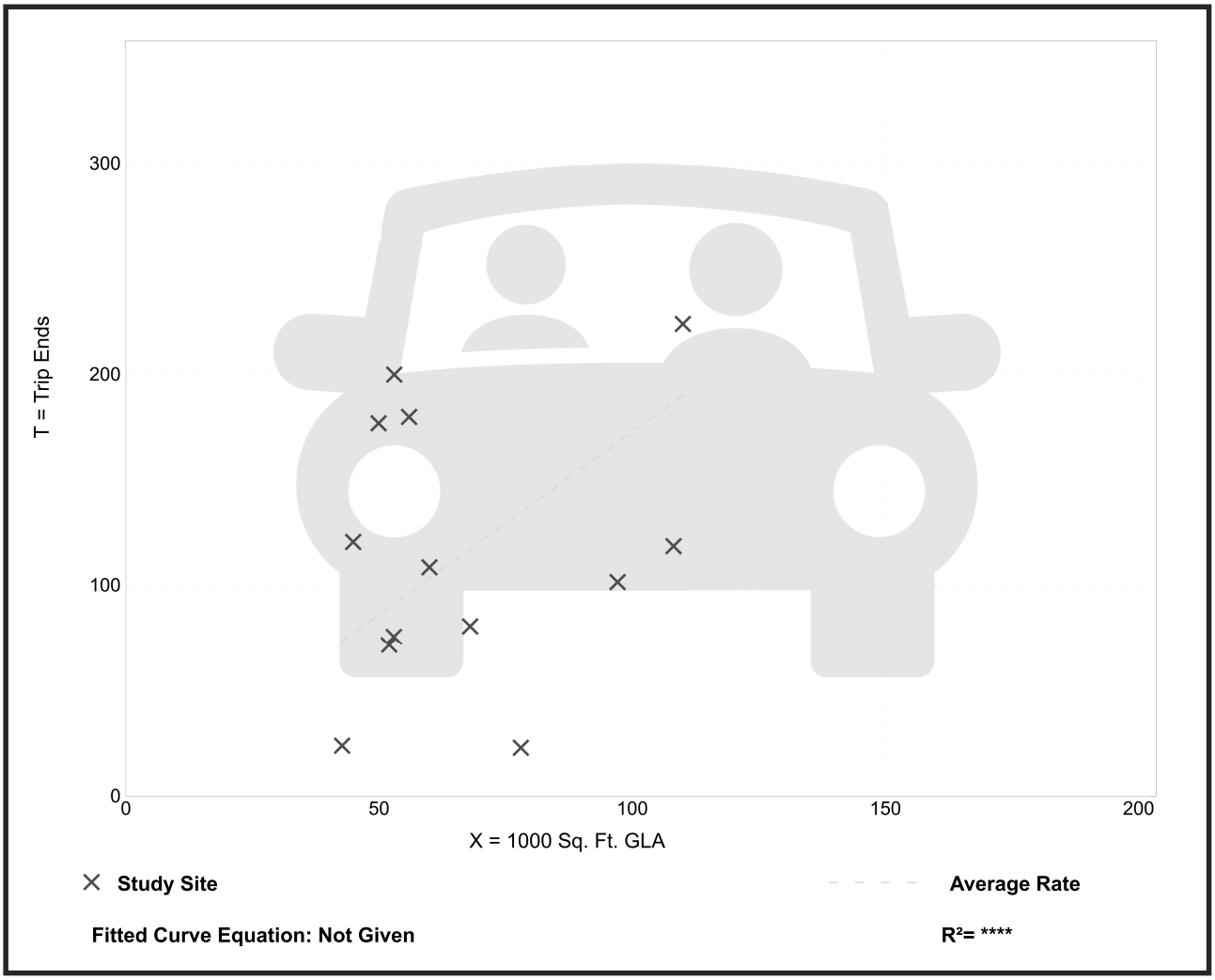
Shopping Plaza (40-150k) - Supermarket - No (821)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GLA**
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:	13
Avg. 1000 Sq. Ft. GLA:	67
Directional Distribution:	62% entering, 38% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
1.73	0.29 - 3.77	1.06

Data Plot and Equation



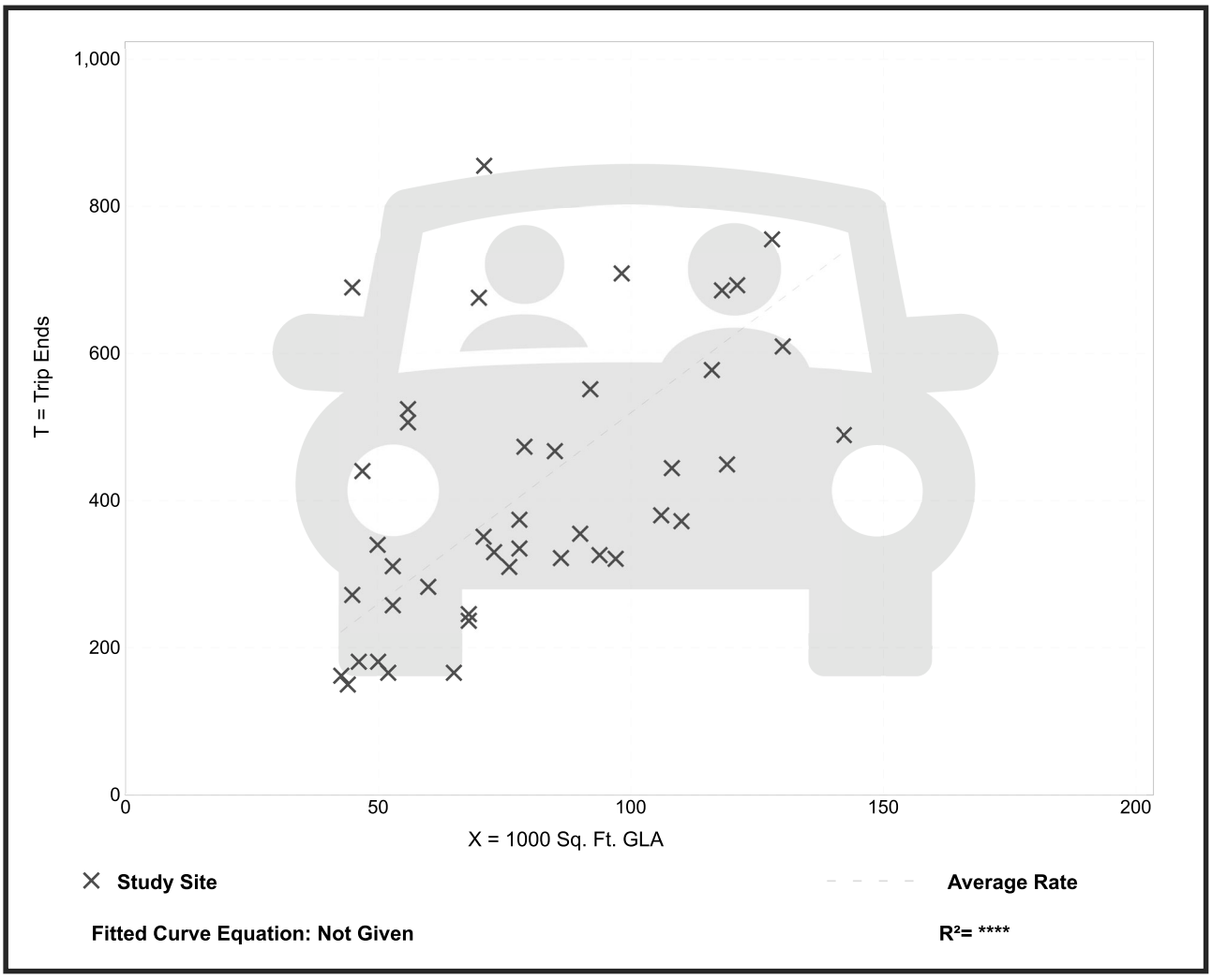
Shopping Plaza (40-150k) - Supermarket - No (821)

Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
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: 42
Avg. 1000 Sq. Ft. GLA: 79
Directional Distribution: 49% entering, 51% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
5.19	2.55 - 15.31	2.28

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ****

Shopping Plaza (40-150k) - Supermarket - No (821)

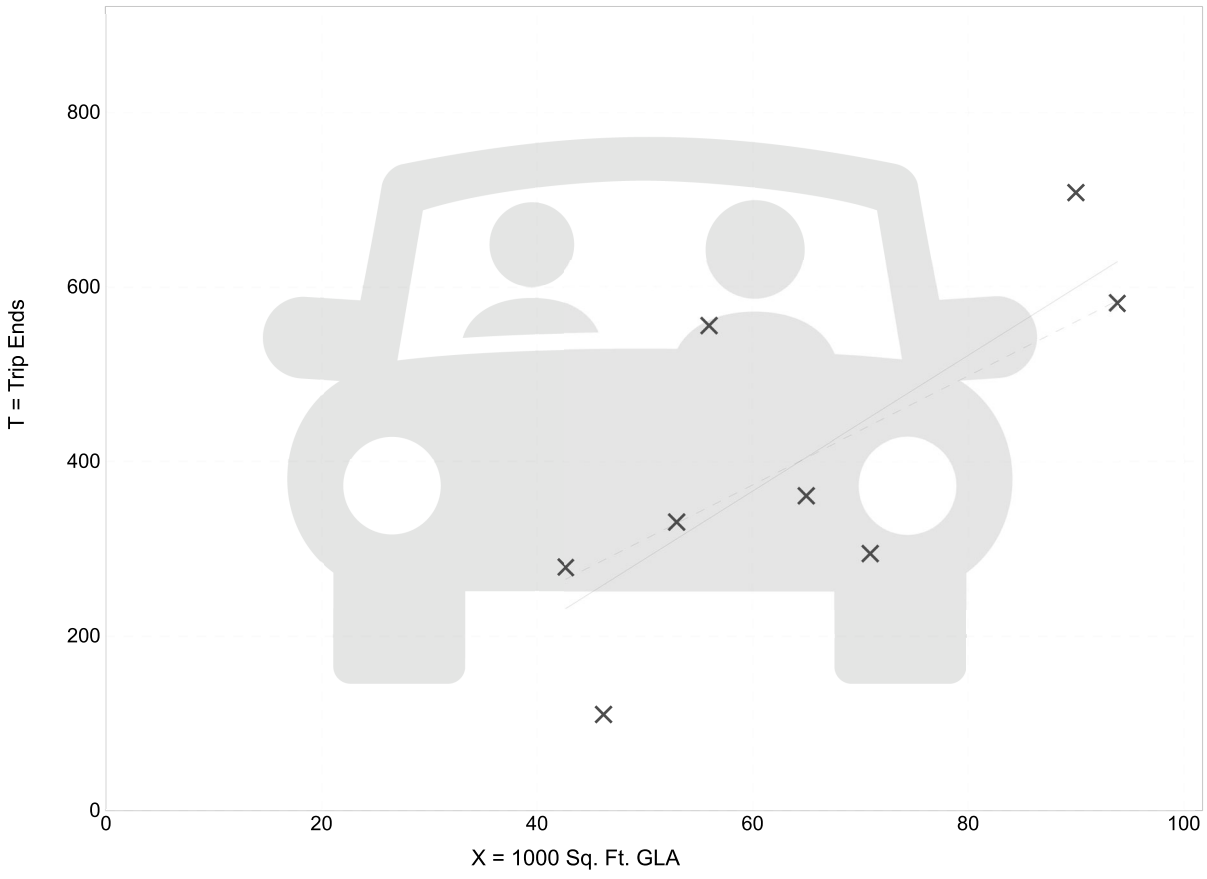
Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Saturday, Peak Hour of Generator**

Setting/Location: **General Urban/Suburban**
Number of Studies: 8
Avg. 1000 Sq. Ft. GLA: 65
Directional Distribution: 52% entering, 48% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
6.22	2.38 - 9.91	2.11

Data Plot and Equation



Fitted Curve Equation: T = 7.75(X) - 98.93

R^2= 0.58

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	980 Earl Armstrong & 4700 Limebank	**Organization:**	Arcadis IBI Group
Project Location:		**Performed By:**	EM
Scenario Description:	Phase 1	**Date:**	2023-09-19
Analysis Year:	2028	**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0	0	0
Retail				355	220	135
Restaurant				0		
Cinema/Entertainment				0		
Residential				139	43	96
Hotel				0		
All Other Land Uses[2]				0		
				494	263	231

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.00			1.00		
Retail	1.00			1.00		
Restaurant						
Cinema/Entertainment						
Residential	1.00			1.00		
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	1	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	1	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	494	263	231
Internal Capture Percentage	1%	1%	1%
External Vehicle-Trips[5]	490	261	229
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	0%	1%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	1%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	980 Earl Armstrong & 4700 Limebank
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	220	220	1.00	135	135
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	43	43	1.00	96	96
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	39		18	0	19	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	1	19	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		70	0	0	0	0
Retail	0		0	0	1	0
Restaurant	0	18		0	2	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	37	0	0		0
Hotel	0	9	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	1	219	220	219	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	1	42	43	42	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	1	134	135	134	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	1	95	96	95	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	980 Earl Armstrong & 4700 Limebank	**Organization:**	Arcadis IBI Group
Project Location:		**Performed By:**	EM
Scenario Description:	Phase 1	**Date:**	2023-09-19
Analysis Year:	2028	**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0	0	0
Retail				1,064	521	543
Restaurant				0		
Cinema/Entertainment				0		
Residential				139	80	59
Hotel				0		
All Other Land Uses[2]				0		
				1,203	601	602

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.00			1.00		
Retail	1.00			1.00		
Restaurant						
Cinema/Entertainment						
Residential	1.00			1.00		
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office					#DIV/0!	
Retail					921	
Restaurant						
Cinema/Entertainment						
Residential		921				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	37	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	19	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	1,203	601	602
Internal Capture Percentage	9%	9%	9%
External Vehicle-Trips[5]	1,091	545	546
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	4%	7%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	46%	32%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	980 Earl Armstrong & 4700 Limebank
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	521	521	1.00	543	543
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	80	80	1.00	59	59
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	11		157	22	135	27
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	19	12	0		2
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		42	0	0	3	0
Retail	0		0	0	37	0
Restaurant	0	261		0	13	0
Cinema/Entertainment	0	21	0		3	0
Residential	0	41	0	0		0
Hotel	0	10	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	19	502	521	502	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	37	43	80	43	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	37	506	543	506	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	19	40	59	40	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	980 Earl Armstrong & 4700 Limebank	**Organization:**	Arcadis IBI Group
Project Location:		**Performed By:**	EM
Scenario Description:	Phase 1	**Date:**	2023-09-19
Analysis Year:	2028	**Checked By:**	
Analysis Period:	**SAT Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0	0	0
Retail				1,334	693	641
Restaurant				0		
Cinema/Entertainment				0		
Residential				177	88	89
Hotel				0		
All Other Land Uses[2]				0		
				1,511	781	730

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail	1.00			1.00		
Restaurant						
Cinema/Entertainment						
Residential	1.00			1.00		
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office					#DIV/0!	
Retail					921	
Restaurant						
Cinema/Entertainment						
Residential		921				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	40	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	29	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	1,511	781	730
Internal Capture Percentage	9%	9%	9%
External Vehicle-Trips[5]	1,373	712	661
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	4%	6%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	45%	33%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Project Name:	980 Earl Armstrong & 4700 Limebank
Analysis Period:	**SAT Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	693	693	1.00	641	641
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	88	88	1.00	89	89
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	13		186	26	159	32
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	4	29	19	0		3
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		55	0	0	4	0
Retail	0		0	0	40	0
Restaurant	0	347		0	14	0
Cinema/Entertainment	0	28	0		4	0
Residential	0	54	0	0		0
Hotel	0	14	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	29	664	693	664	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	40	48	88	48	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	40	601	641	601	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	29	60	89	60	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	980 Earl Armstrong & 4700 Limebank	**Organization:**	Arcadis IBI Group
Project Location:		**Performed By:**	EM
Scenario Description:	Phase 1-2	**Date:**	2023-09-19
Analysis Year:	2033	**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0	0	0
Retail				592	367	225
Restaurant				0		
Cinema/Entertainment				0		
Residential				139	43	96
Hotel				0		
All Other Land Uses[2]				0		
				731	410	321

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.00			1.00		
Retail	1.00			1.00		
Restaurant						
Cinema/Entertainment						
Residential	1.00			1.00		
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	1	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	1	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	731	410	321
Internal Capture Percentage	1%	0%	1%
External Vehicle-Trips[5]	727	408	319
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	0%	0%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	1%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	980 Earl Armstrong & 4700 Limebank
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	367	367	1.00	225	225
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	43	43	1.00	96	96
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	65		29	0	32	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	1	19	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		117	0	0	0	0
Retail	0		0	0	1	0
Restaurant	0	29		0	2	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	62	0	0		0
Hotel	0	15	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	1	366	367	366	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	1	42	43	42	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	1	224	225	224	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	1	95	96	95	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	980 Earl Armstrong & 4700 Limebank	**Organization:**	Arcadis IBI Group
Project Location:		**Performed By:**	EM
Scenario Description:	Phase 1-2	**Date:**	2023-09-19
Analysis Year:	2033	**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0	0	0
Retail				1,776	870	906
Restaurant				0		
Cinema/Entertainment				0		
Residential				139	80	59
Hotel				0		
All Other Land Uses[2]				0		
				1,915	950	965

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.00			1.00		
Retail	1.00			1.00		
Restaurant						
Cinema/Entertainment						
Residential	1.00			1.00		
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office					0	
Retail					1061	
Restaurant						
Cinema/Entertainment						
Residential		1061				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	37	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	18	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	1,915	950	965
Internal Capture Percentage	6%	6%	6%
External Vehicle-Trips[5]	1,805	895	910
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	2%	4%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	46%	31%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

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Project Name:	980 Earl Armstrong & 4700 Limebank
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	870	870	1.00	906	906
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	80	80	1.00	59	59
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	18		263	36	215	45
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	18	12	0		2
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		70	0	0	3	0
Retail	0		0	0	37	0
Restaurant	0	435		0	13	0
Cinema/Entertainment	0	35	0		3	0
Residential	0	65	0	0		0
Hotel	0	17	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	18	852	870	852	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	37	43	80	43	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	37	869	906	869	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	18	41	59	41	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	980 Earl Armstrong & 4700 Limebank	**Organization:**	Arcadis IBI Group
Project Location:		**Performed By:**	EM
Scenario Description:	Phase 1-2	**Date:**	2023-09-19
Analysis Year:	2033	**Checked By:**	
Analysis Period:	**SAT Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0	0	0
Retail				2,271	1,181	1,090
Restaurant				0		
Cinema/Entertainment				0		
Residential				177	88	89
Hotel				0		
All Other Land Uses[2]				0		
				2,448	1,269	1,179

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail	1.00			1.00		
Restaurant						
Cinema/Entertainment						
Residential	1.00			1.00		
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office					0	
Retail					1061	
Restaurant						
Cinema/Entertainment						
Residential		1061				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	40	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	28	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	2,448	1,269	1,179
Internal Capture Percentage	6%	5%	6%
External Vehicle-Trips[5]	2,312	1,201	1,111
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	2%	4%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	45%	31%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	980 Earl Armstrong & 4700 Limebank
Analysis Period:	**SAT Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	1181	1181	1.00	1090	1090
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	88	88	1.00	89	89
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	22		316	44	258	55
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	4	28	19	0		3
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		94	0	0	4	0
Retail	0		0	0	40	0
Restaurant	0	591		0	14	0
Cinema/Entertainment	0	47	0		4	0
Residential	0	88	0	0		0
Hotel	0	24	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	28	1153	1181	1153	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	40	48	88	48	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	40	1050	1090	1050	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	28	61	89	61	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	980 Earl Armstrong & 4700 Limebank	**Organization:**	Arcadis IBI Group
Project Location:		**Performed By:**	EM
Scenario Description:	Phase 1-3	**Date:**	2023-09-19
Analysis Year:	2038	**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0	0	0
Retail				592	367	225
Restaurant				0		
Cinema/Entertainment				0		
Residential				507	158	349
Hotel				0		
All Other Land Uses[2]				0		
				1,099	525	574

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.00			1.00		
Retail	1.00			1.00		
Restaurant						
Cinema/Entertainment						
Residential	1.00			1.00		
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	3	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	3	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	1,099	525	574
Internal Capture Percentage	1%	1%	1%
External Vehicle-Trips[5]	1,087	519	568
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	1%	1%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	1%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	980 Earl Armstrong & 4700 Limebank
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	367	367	1.00	225	225
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	158	158	1.00	349	349
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	65		29	0	32	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	7	3	70	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		117	0	0	0	0
Retail	0		0	0	3	0
Restaurant	0	29		0	8	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	62	0	0		0
Hotel	0	15	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	3	364	367	364	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	3	155	158	155	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	3	222	225	222	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	3	346	349	346	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	980 Earl Armstrong & 4700 Limebank	**Organization:**	Arcadis IBI Group
Project Location:		**Performed By:**	EM
Scenario Description:	Phase 1-3	**Date:**	2023-09-19
Analysis Year:	2038	**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0	0	0
Retail				1,776	870	906
Restaurant				0		
Cinema/Entertainment				0		
Residential				501	290	211
Hotel				0		
All Other Land Uses[2]				0		
				2,277	1,160	1,117

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.00			1.00		
Retail	1.00			1.00		
Restaurant						
Cinema/Entertainment						
Residential	1.00			1.00		
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office					#DIV/0!	
Retail					1501	
Restaurant						
Cinema/Entertainment						
Residential		1501				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	133	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	53	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	2,277	1,160	1,117
Internal Capture Percentage	16%	16%	17%
External Vehicle-Trips[5]	1,905	974	931
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	6%	15%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	46%	25%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	980 Earl Armstrong & 4700 Limebank
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	870	870	1.00	906	906
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	290	290	1.00	211	211
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	18		263	36	184	45
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	8	54	44	0		6
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		70	0	0	12	0
Retail	0		0	0	133	0
Restaurant	0	435		0	46	0
Cinema/Entertainment	0	35	0		12	0
Residential	0	53	0	0		0
Hotel	0	17	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	53	817	870	817	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	133	157	290	157	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	133	773	906	773	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	53	158	211	158	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	980 Earl Armstrong & 4700 Limebank	**Organization:**	Arcadis IBI Group
Project Location:		**Performed By:**	EM
Scenario Description:	Phase 1-3	**Date:**	2023-09-19
Analysis Year:	2038	**Checked By:**	
Analysis Period:	**SAT Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0	0	0
Retail				2,271	1,181	1,090
Restaurant				0		
Cinema/Entertainment				0		
Residential				649	329	320
Hotel				0		
All Other Land Uses[2]				0		
				2,920	1,510	1,410

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail	1.00			1.00		
Restaurant						
Cinema/Entertainment						
Residential	1.00			1.00		
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office					#DIV/0!	
Retail					1501	
Restaurant						
Cinema/Entertainment						
Residential		1501				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	151	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	72	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	2,920	1,510	1,410
Internal Capture Percentage	15%	15%	16%
External Vehicle-Trips[5]	2,474	1,287	1,187
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	6%	14%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	46%	23%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	980 Earl Armstrong & 4700 Limebank
Analysis Period:	**SAT Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	1181	1181	1.00	1090	1090
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	329	329	1.00	320	320
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	22		316	44	221	55
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	13	82	67	0		10
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		94	0	0	13	0
Retail	0		0	0	151	0
Restaurant	0	591		0	53	0
Cinema/Entertainment	0	47	0		13	0
Residential	0	72	0	0		0
Hotel	0	24	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	72	1109	1181	1109	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	151	178	329	178	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	151	939	1090	939	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	72	248	320	248	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.