Transportation Impact Assessment – Step 4: Analysis

Riverside South Employment Lands and Blocks 13, 14

Prepared for Riverside South Development Corporation
by IBI Group
August 2, 2022

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TIA Plan Reports - Certification

On 14 June 2017, the Council of the City of Ottawa adopted new Transportation Impact Assessment (TIA) Guidelines. In adopting the guidelines, Council established a requirement for those preparing and delivering transportation impact assessments and reports to sign a letter of certification.

Individuals submitting TIA reports will be responsible for all aspects of development-related transportation assessment and reporting, and undertaking such work, in accordance and compliance with the City of Ottawa's Official Plan, the Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines.

By submitting the attached TIA report (and any associate documents) and signing this document, the individual acknowledges that s/he meets the four criteria listed below:

CERTIFICATION

1. I have reviewed and have a sound understanding of the objectives, needs and requirements of the City of Ottawa's Official Plan, Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines;

2. I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;

3. I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering or traffic operations; and

4. I am either a licensed[1] or registered[1] professional in good standing, whose field of expertise [check √ appropriate field(s)] is either transportation engineering □ or transportation planning □.

[1] **License or registration body that oversees the profession is required to have a code of conduct and ethics guidelines that will ensure appropriate conduct and representation for transportation planning and/or transportation engineering works.**

Dated at Ottawa this 2nd day of August, 2022.
(City)

Name: David Hook, P.Eng.

Professional Title: Project Engineer

Signature of Individual certifier that she/he meets the above four criteria

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Executive Summary

IBI Group (IBI) was retained by the Riverside South Development Corporation (RSDC) to undertake a Transportation Impact Assessment (TIA) in support of a Draft Plan of Subdivision application for a proposed development located at 3700 Twin Falls Place in the community of Riverside South. The proposed development will consist of a mix of industrial, institutional (potential fire hall), and residential (townhouse) land uses. Access to the industrial portion (Blocks 1 to 11) of the site will be provided via a new signalized intersection on Limebank Road along the future realigned Leitrim Road. The residential portion (Block 14), which has been renamed to 4020 Spratt Road, will be accessed through a new private approach at the existing Spratt & Urbandale Plaza intersection. The lands designated as institutional/fire hall (Block 13) will be accessed via new private approaches on both Spratt Road and Limebank Road, although the specific configuration of these accesses will be established as part of Site Plan Control.

Based on the trip generation rates from the ITE Trip Generation Manual (11th Edition), it is anticipated that the industrial portion of the proposed development will generate between 936 to 1,008 two-way person-trips during the weekday morning and afternoon peak hours. Similarly, based on 2020 TRANS trip generation rates, the residential portion of the development will generate between 25 and 27 two-way person trips during the weekday morning and afternoon peak hours. Given the future capacity constraints along the Leitrim Screenline, the future transit mode share within the community is expected to be significantly higher than it is currently. Overall, the industrial portion of the site is anticipated to generate approximately 702 to 756 two-way vehicle-trips while the residential portion of the site is anticipated to generate between 11 to 12 two-way vehicle trips during the weekday morning and afternoon peak hours. The institutional lands (Block 13) are expected to generate only nominal amounts of trips during the weekday peak hours.

The segment of the realigned Leitrim Road within the proposed development will be constructed with a rural cross-section and will therefore lack both sidewalks and segregated bicycle facilities. As such, in order to ensure that employees retain access to transit, it is recommended that transit stops be provided at the following three locations on the realigned Leitrim Road: at Limebank Road, at Street #2 and the westmost intersection with Street #1. It is expected that internal pedestrian facilities will be provided to connect the various future industrial/employment buildings to these transit stops.

The results of the intersection capacity analysis indicated that the study area intersections are presently operating at an acceptable Level of Service during the weekday morning and afternoon peak hours under Existing and will continue to do so under Future (2031) Background Traffic conditions. Under Future (2031) Total Traffic conditions, however, the Limebank & Leitrim and Limebank & Realigned Leitrim intersections are expected to begin approaching their theoretical capacity. It is recommended that the three intersections along Limebank Road within the study area be coordinated to ensure a smooth progression of traffic along the corridor. It is also recommended that the design of the future Limebank & Realigned Leitrim intersection be modified to include dual eastbound left-turn lanes, a northbound left-turn lane with at least 105m of storage, an eastbound right-turn lane with at least 50m of storage and a southbound right-turn lane with at least 35m of storage.

Additionally, an eastbound auxiliary left-turn lane with a minimum of 15m of storage is recommended at the Spratt & Urbandale Plaza intersection.

Multi-Modal Level of Service (MMLOS) analysis was completed for all signalized study area intersections and the three roadway segments adjacent to the proposed development. It is important to note that Level of Service for cyclists and pedestrians is largely dictated by the size

of an intersection and therefore mitigation measures are often limited in these circumstances. The proposed measures are recommended in order to address existing deficiencies and not as a direct consequence of the proposed development. The results of the analysis indicate that the City should consider implementing the following measures:

- Consider implementing leading pedestrian intervals (LPIs) and high-visibility crosswalk markings at all signalized intersections in the study area, as warranted by pedestrian volumes; and
- In the future, when the study area intersections and roadways require reconstruction, consider implementing a protected intersection design and providing cycle tracks.

Based on the findings of this study, it is the overall opinion of IBI Group that the proposed development will integrate well with and can be safely accommodated by the adjacent transportation network.

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1 Introduction

IBI Group (IBI) was retained by the Riverside South Development Corporation (RSDC) to undertake a Transportation Impact Assessment (TIA) in support of a Draft Plan of Subdivision application for a proposed subdivision located at 3700 Twin Falls Place in Ottawa, occupying the majority of the undeveloped lands west of Limebank Road between Leitrim Road and Spratt Road. The lands north of Mosquito Creek will be designated as an industrial/employment subdivision, while the lands to the south will be designated a residential subdivision (Block 14, now referred to as 4020 Spratt Road) and a future Institutional land use or Fire Hall (Block 13).

In accordance with the City of Ottawa's Transportation Impact Assessment Guidelines, published in June 2017, the following report is divided into four 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. It also 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.
- **Forecasting** – The Forecasting component of the TIA is intended to review both the development-generated travel demand and the background network travel demand. It also provides an opportunity to rationalize this demand to ensure projections are within the capacity constraints of the transportation network.
- **Analysis** – This component 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 four 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. All technical comments and responses are included in **Appendix A**.

Given that access to the proposed development will be dependent on a new signalized intersection, Functional Design Drawings of recommended roadway improvements to support a Roadway Modification Application (RMA) may be required, however as this intersection has been identified in the recently-approved Environmental Assessment with no implementation timing or funding mechanism, RMA materials will not accompany this TIA and will be subject to future discussions with City staff. The submission may, however, require a post-development Monitoring Plan to track performance of the planned TIA Strategy. The need for the latter element 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 employment subdivision, the minimum development size threshold has been exceeded and therefore the Trip Generation trigger is satisfied.
- **Location**: The employment portion of the proposed development will be accessed from a new signalized access on Limebank Road which is designated as a spine cycling route. 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 Limebank Road and the documented history of traffic operations and safety concerns 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 B**.

3 Project Scoping

3.1 Description of Proposed Development

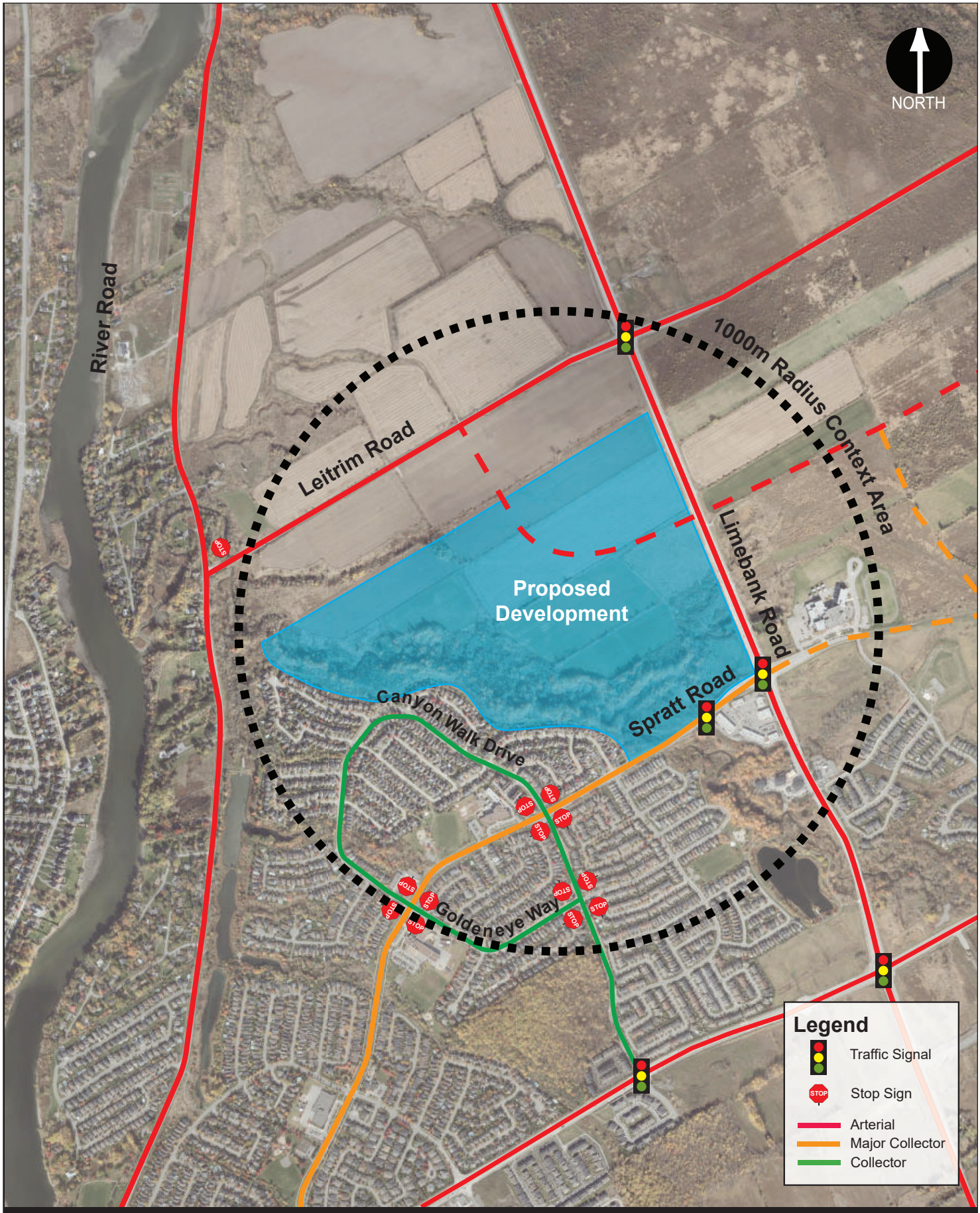
3.1.1 Site Location

The proposed development is located at 3700 Twin Falls Place in the Riverside South community. The site is located within the boundaries of the Riverside South Community Design Plan (CDP) and subject to the policies of the Secondary Plan. The proposed development is located west of Limebank Road and is bound by undeveloped land to the north, Limebank Road to the east, Spratt Road to the south, and an existing low-rise residential subdivision to the west.

The property is physically divided by Mosquito Creek. The lands to the north of this natural feature will have direct access to Limebank Road, while the lands to the south will be accessed from Spratt Road. An Environmental Assessment Study was recently completed by the City of the Ottawa indicating that the preferred alignment for a future arterial road would pass through the northern portion of the property, slated for employment use.

According to the Official Plan (Schedule B3), the full extents of the development, including the residential and institutional blocks, are entirely located within the Ottawa International Airport Economic District. More specifically, the lands north of Mosquito Creek are within the Airport Operating Influence Zone.

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



IBI

Riverside South Employment Lands
& Blocks 13,14
Transportation Impact Assessment

Exhibit 1:
Site Location

PROJECT No. 136974

SCALE: 0m 200m 400m

3.1.2 Land Use Details

Table 1 below summarizes the proposed land uses included in this development. The anticipated number of employees within the industrial park and institutional block are based on the employee density targets from the draft Riverside South Secondary Plan (i.e. 50 employees per hectare and 20 employees per fire hall). It is important to note that this employment density target from the Draft Secondary Plan is preliminary and is still under review.

Table 1 - Land Use Statistics

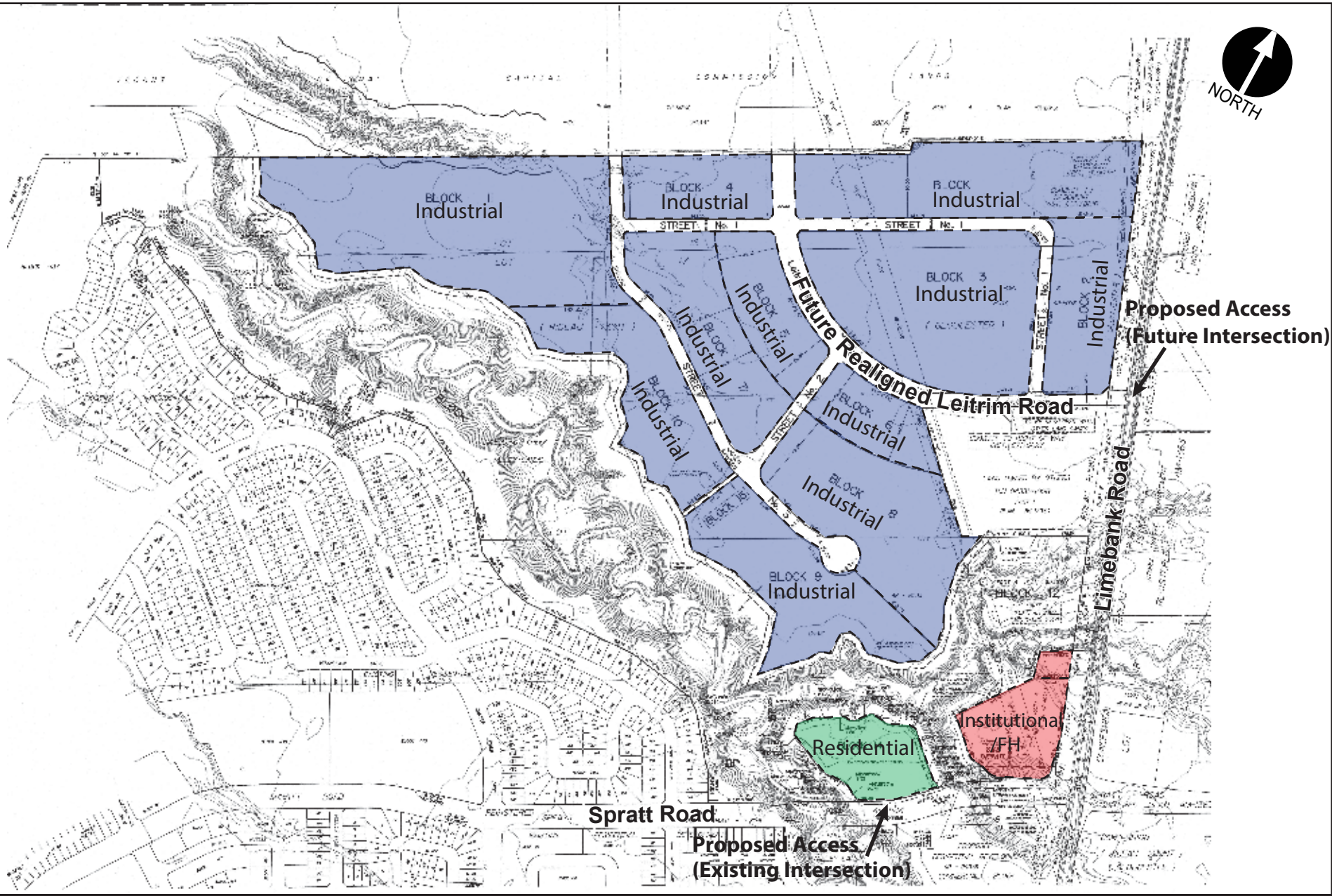
BLOCK	LAND USE	AREA (HECTARES)	EMPLOYEES/ UNITS
1 to 11	Industrial Park	42.257	2,113 employees
12	Mosquito Creek	32.379	N/A
13	Institutional/Fire Hall	1.597	20 employees
14	Townhomes	1.646	38 units
15	Multi-Use Path	0.056	N/A

The Draft Plan of Subdivision for the proposed development is illustrated in **Exhibit 2**. A segment of the future realigned Leitrim Road will pass through the proposed development and intersect with Limebank Road at a new signalized intersection which will provide access to the industrial park portion of the proposed development (Blocks 1 to 11). The residential portion of the proposed development (Block 14) will be physically separated from the employment lands by Mosquito Creek and will be accessed via a new approach to the existing signalized Spratt & Urbandale Plaza intersection. It is anticipated that Block 13 will be accessed via private approaches on both Limebank Road and Spratt Road, although the specific access configuration for the block is expected to be established at the Site Plan Control application stage. The potential access locations for Block 13 will be reviewed in the Analysis section of this report.

The subject site is currently an undeveloped greenfield site and, according to GeoOttawa, is zoned DR – Development Reserve Zone.

3.1.3 Development Phasing & Date of Occupancy

The development of the site will progress over an extended timeframe as blocks are sold to various developers and built. As such, the exact timing for full buildout of the site is unknown, however, for the purposes of this study it is assumed that full buildout will occur in 2031, the planning horizon year of the 2013 Transportation Master Plan. This is a conservative assumption as these types of developments tend to build out over even longer timeframes. The development of each Block will be subject to individual Site Plan Control Applications.



IBI

Riverside South Employment Lands
& Blocks 13,14
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Exhibit 2:
Proposed Development

PROJECT No. 136974

SCALE: 0m 75m 150m

3.2 Existing Conditions

3.2.1 Existing Road Network

3.2.1.1 Roadways

Table 2 below summarizes the details of the boundary roadways as well as other streets within the context area of the proposed development.

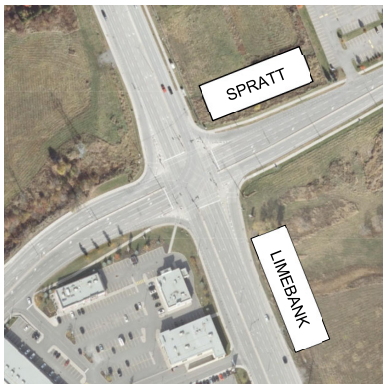
Table 2 - Existing Roadways

NAME	CLASS	JURISDICTION	ORIENTATION & EXTENTS	CROSS-SECTION	ROW (m)	SPEED LIMIT (km/h)
Limebank Road	Arterial	City of Ottawa	North-South, River Road to Mitch Owens Road	4-Lane, Urban, Divided	44.5	80
Spratt Road	Major Collector	City of Ottawa	East of Limebank Road to Mitch Owens Road in the south	4-Lane, Urban, Undivided	26-34	60
Leitrim Road	Arterial	City of Ottawa	East-West, River Road to east of Russel Road	2-Lane, Rural Undivided	37.5	80

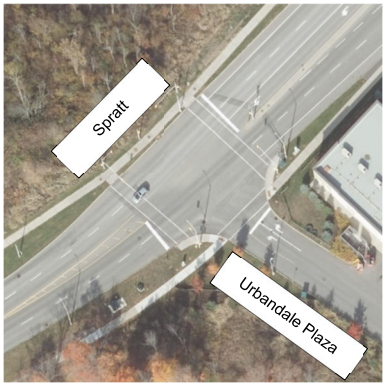
Source: Table 1 – Road Right-of-Way Protection, Official Plan (2021)

3.2.1.2 Intersections

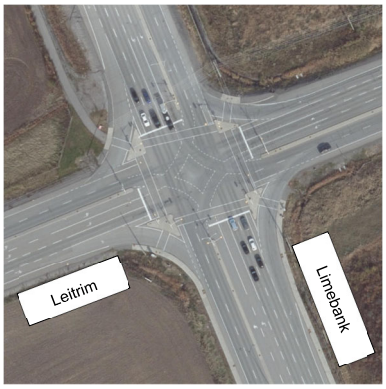
The following existing intersections have the greatest potential to be impacted by the proposed development:



- **Limebank Road & Spratt Road** is a four-legged signalized intersection with dual left-turn lanes, right-turn channels and bike lanes on all approaches. Based on the Draft Riverside South CDP, the intersection is designated as a Sub-Community Gateway.



- **Spratt Road & Urbandale Plaza** is a three-legged signalized intersection with left-turn lanes on the westbound and northbound approaches. Bike lanes have also been provided on both sides of Spratt Road east of the intersection. One of the proposed site access driveways will form the north leg of this intersection.



- **Leitrim Road & Limebank Road** is a four-legged signalized intersection with dual left-turn lanes, right-turn channels and bike lanes on all approaches. Based on the Draft Riverside South CDP, the intersection is designated as a Community Gateway.

3.2.1.3 Driveways Adjacent to Development Access

Within 200m of the proposed site access driveway on Spratt Road is a right-in/right-out access to the Urbandale Plaza (approximately 70m to the east).

3.2.1.4 Traffic Management Measures

There are currently no traffic management measures along any of the roadways within the 1km context area.

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 Limebank Road and Spratt Road
- On-street bike lanes on both sides of Limebank Road and Spratt Road (east of the Spratt Road & Urbandale Plaza signalized intersection).

3.2.3 Existing Transit Facilities and Service

OC Transpo operates the following transit routes 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
#299	Weekday, peak period only	Manotick to Hurdman	Two trips in morning and two return trips in the evening, 60-minute headways
#680	Weekday, peak period only	Merivale HS to Spratt/North Bluff	Two trips in morning and two return trips in the evening

The nearest bus stops to the industrial park portion of the proposed development are presently located approximately 100m south of the Limebank & Leitrim intersection, providing access to Routes #99 and #299. The nearest bus stops to the residential portion of the proposed development are located between 75m and 150m west of the Limebank & Spratt intersection, and also provide access to Routes #99 and #299. Route #680 can be accessed via a bus stop at the Spratt & Owls Cabin / North Bluff intersection, 300m west of the proposed access on Spratt Road. The transit service maps for the above routes are provided in **Appendix C**.

3.2.4 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 4** summarizes all reported collisions between January 1, 2016 and December 31, 2020.

Table 4 – Reported Collisions within Vicinity of Proposed Development

LOCATION	# OF REPORTED COLLISIONS
INTERSECTIONS	
Limebank & Spratt	12
Limebank & Leitrim	0
Spratt & Urbandale Plaza	0
SEGMENTS	
Spratt – Limebank Road to Owls Cabin Avenue	1
Limebank – Leitrim to Spratt	7

Based on the collision history noted above, the Limebank & Spratt intersection and the segment of Limebank Road between Leitrim Road and Spratt Road may require 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.

- Limebank & Spratt: 0.30 collisions per MVE
- Limebank & Leitrim: 0.00 collisions per MVE
- Spratt & Urbandale Plaza: 0.00 collisions per MVE

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

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

3.3 Planned Conditions

3.3.1 Transportation Network

3.3.1.1 Future Road Network Projects

The 2013 Transportation Master Plan (TMP) outlines future road network modifications required in the 2031 'Affordable Network'. The following projects were noted that may have an impact on traffic within the vicinity of the site:

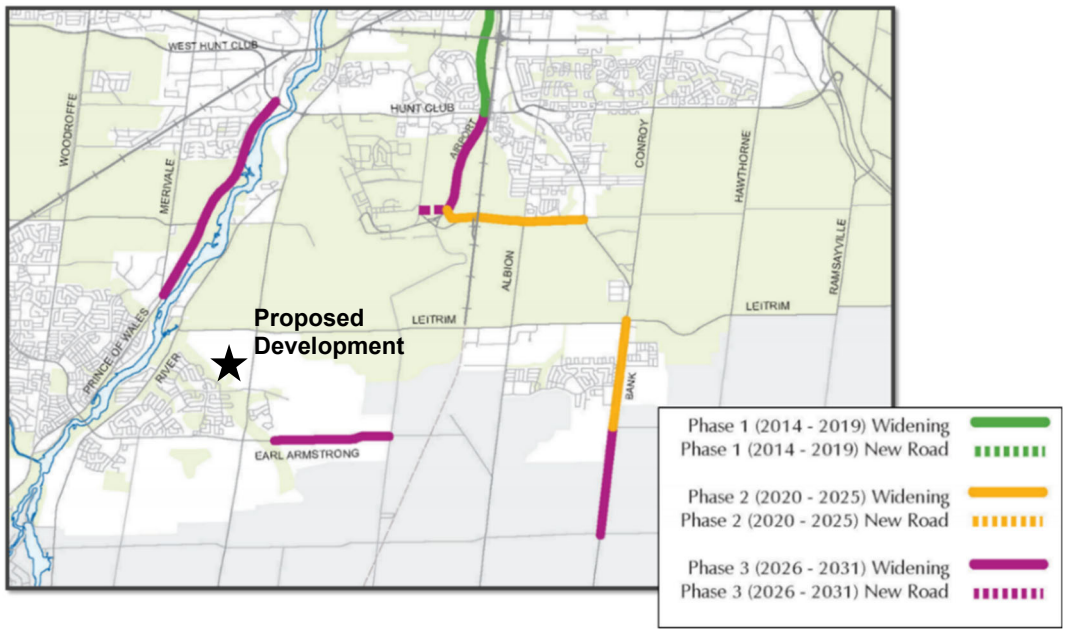
- **Earl Armstrong Road** – Planned widening from two to four lanes between Limebank Road and Bowesville Road (Phase 3: 2026-2031).

The TMP 2031 'Network Concept' also notes the following projects which are not expected to be implemented within the timeframe of this study but may have an impact on traffic within the vicinity of the site:

- **Leitrim Road Widening and Realignment** – Planned widening from two to four lanes from River Road to east of Limebank Road, and planned realignment and four-lane widening from east of Limebank Road to east of Albion Road.

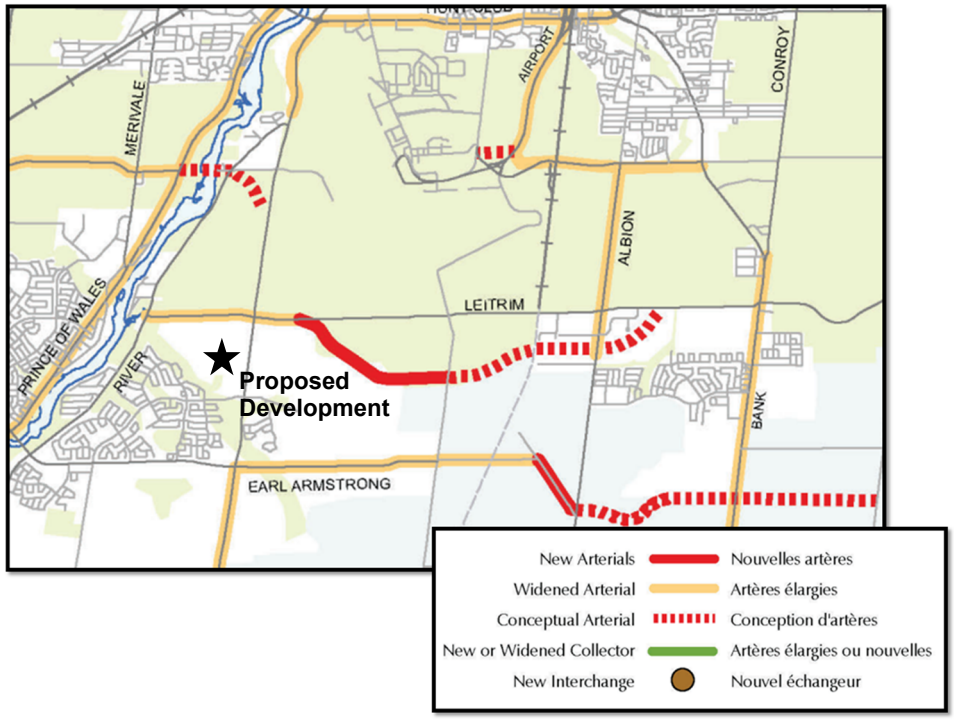
Figure 1 and **Figure 2** below illustrates the planned changes to the arterial road network projects in the broader area, as per the TMP 2031 'Affordable Network' and 2031 'Network Concept', respectively.

Figure 1 - Future Road Network Projects: 2031 'Affordable Network'



Source: 2013 Transportation Master Plan – Map 11 '2031 Affordable Concept'

Figure 2 - Future Road Network Projects: 2031 'Network Concept'



Source: 2013 Transportation Master Plan – Map 10 '2031 Network Concept'

Development Charges Background Study

The Development Charges (DC) Amendment Background Study (March 2019), published well after the 2013 TMP, indicates the following refined timelines or additional transportation network projects expected within the context area:

- **Earl Armstrong Road:** Widening is now planned for implementation between 2030 and 2031, according to the DC study.
- **Limebank Road**: The DC study indicates that this road will be widened between Earl Armstrong Road and Rideau Road in 2032.

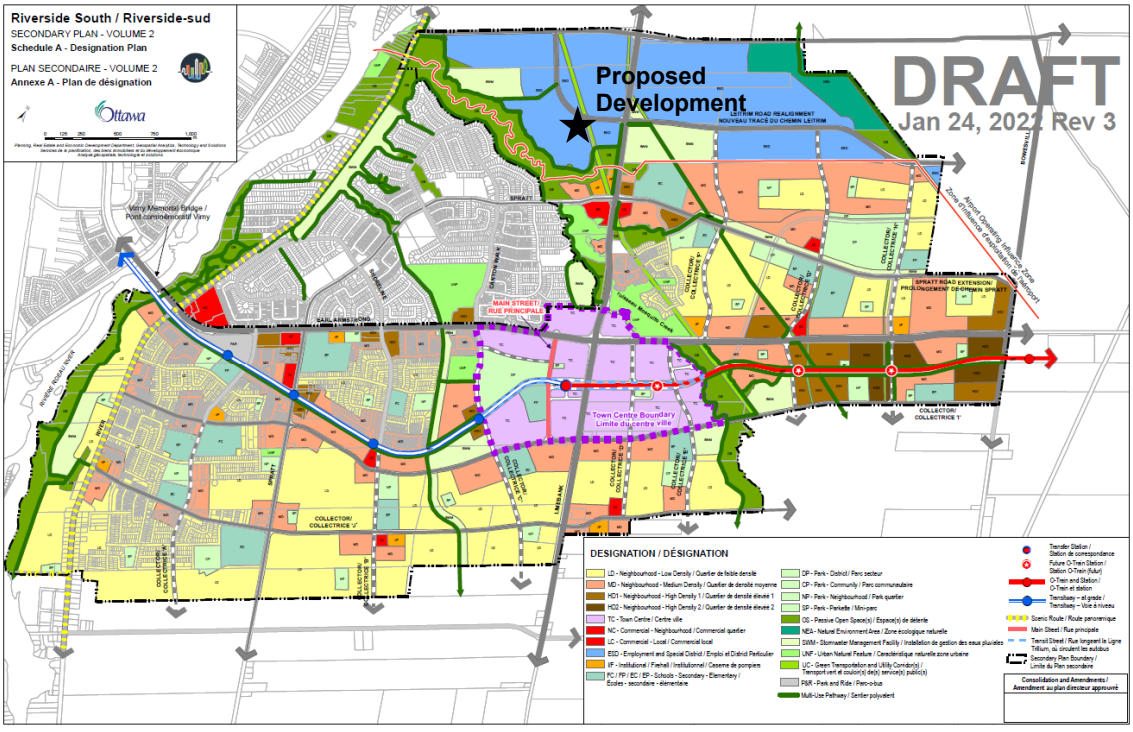
Riverside South CDP

The Riverside South Community Design Plan (CDP) (June 2016) identifies the planned roadway network within the Riverside South community. The CDP is currently undergoing an update which is projected to be finalized in 2022. The latest draft plans indicate that:

- Spratt Road will be extended to Bowesville Road; and
- Leitrim Road will eventually be realigned and extend south from the current alignment of Leitrim Road, through the proposed development and continue east of Limebank Road.

Figure 3 illustrates the latest draft plan from the CDP update. It is important to note that the land use plan illustrated below is still in draft form and undergoing alterations. As it applies to this study, the Stormwater Management (SWM) pond shown within the proposed development site has since been removed per the recommendations of the Master Servicing Study and replaced with additional employment land, as shown on the Draft Plan of Subdivision.

Figure 3 - Riverside South Community Design Plan Update - Draft Plan



Source: Draft Riverside South CDP – Land Use Plan, Revision 3

The construction timing for the above roadways is unknown at the moment, however, it is expected that these roadways will be extended/built as development progresses in the area.

Leitrim Road ESR

The Leitrim Road Realignment and Widening Planning and Environmental Assessment Study – Environmental Study Report (ESR) (Parsons, August 2018) identifies the planned future roadway alignment and cross-section of Leitrim Road from approximately 575m west of Limebank Road to Kelly Farm Drive. This ESR was initiated as it relates to the long-term redevelopment plans of the Ottawa Macdonald-Cartier International Airport to include a new southern runway located along the existing alignment of Leitrim Road.

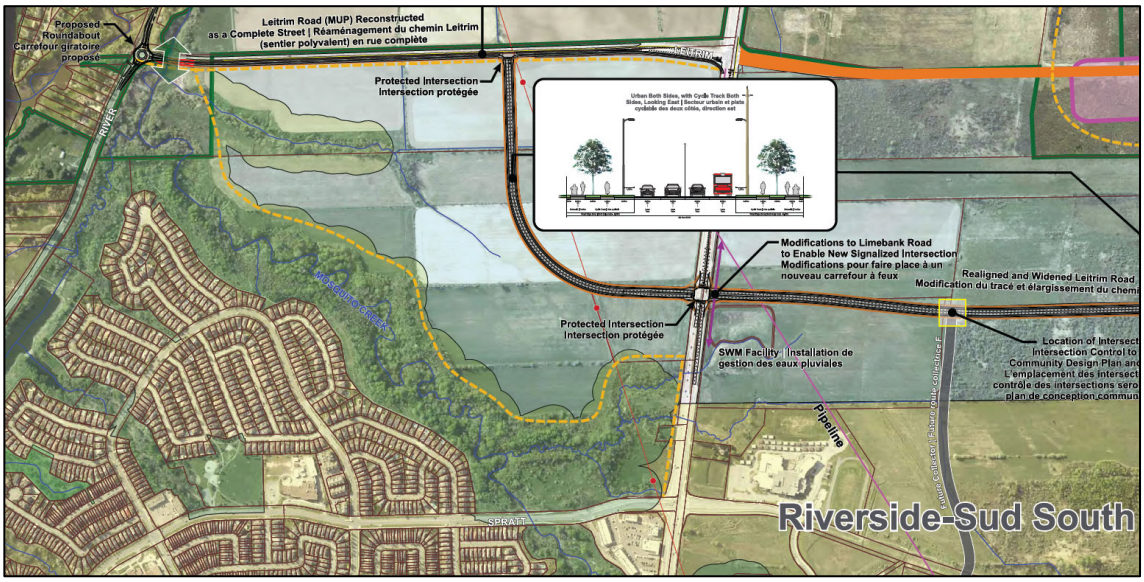
Based on the functional design plan developed as part of the ESR, within the context area the realigned Leitrim Road may ultimately have a four-lane urban undivided cross-section with 3.0m wide boulevards, 1.8m wide cycle tracks and 2.0m wide sidewalks on both sides of the road.

It should be noted, however, that in the interim, the segment of the future realigned Leitrim Road within the proposed development will have a rural cross-section with no sidewalks or cycle tracks. The future urbanization of this roadway is contingent on the availability of Stormwater Management (SWM) pond, in which there is presently none planned within the subject lands.

The ESR indicates that the realignment and widening of Leitrim Road is planned for beyond 2031 while the Airport Master Plan indicates it may be required in the 2040s.

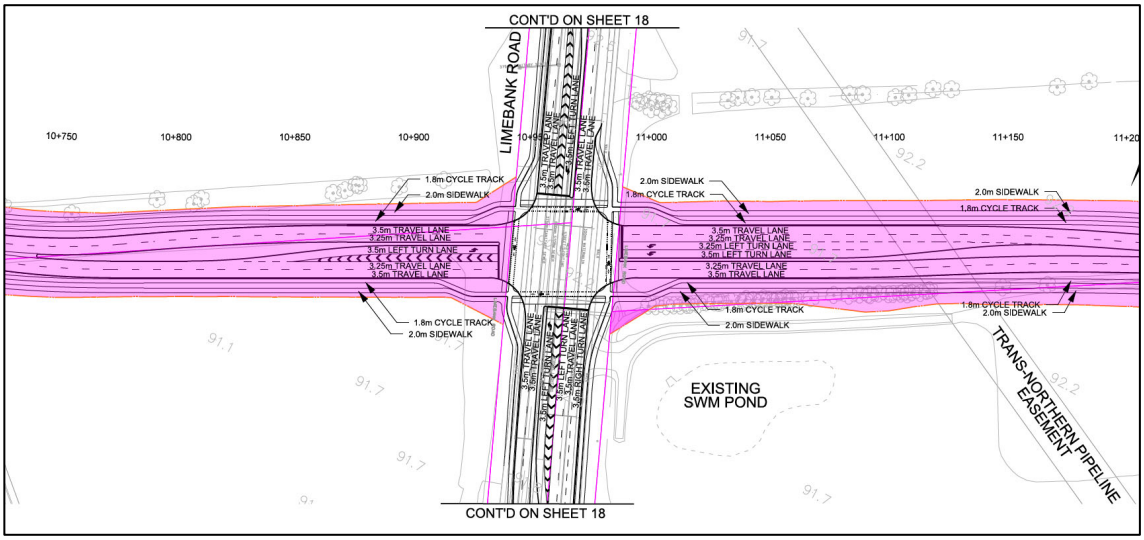
Figure 4 and **Figure 5** show the planned realignment of Leitrim Road as well as the configuration of the new intersection where the realigned Leitrim Road meets Limebank Road.

Figure 4 - Planned Realignment of Leitrim Road



Source: Leitrim Road Realignment and Widening Planning and Environmental Assessment Study – Environmental Study Report (Parsons, August 2018)

Figure 5 - Planned Limebank Road & Realigned Leitrim Road Intersection Configuration



Source: Leitrim Road Realignment and Widening Planning and Environmental Assessment Study – Environmental Study Report (Parsons, August 2018)

3.3.1.2 Future Transit Facilities and Services

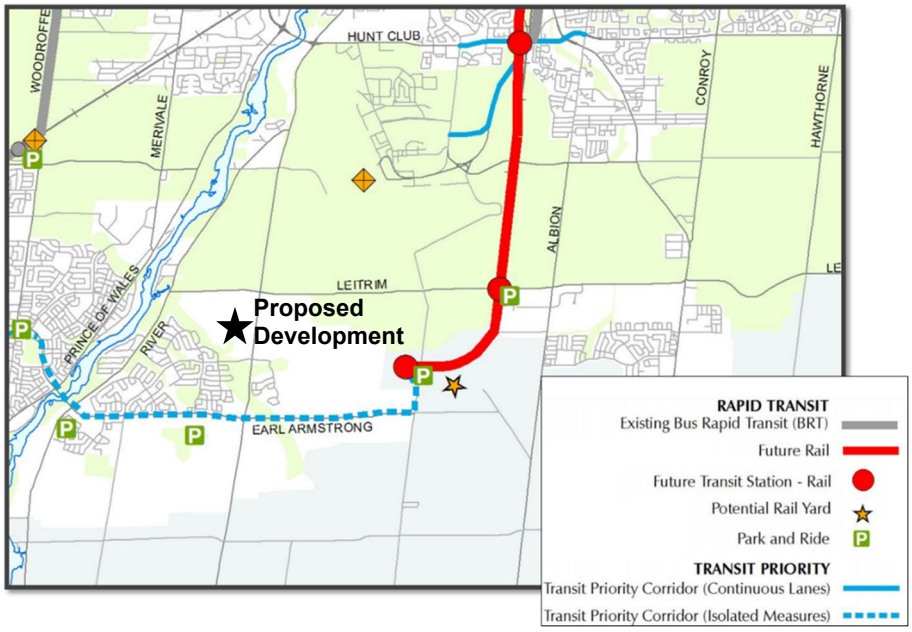
The 2013 TMP outlines the future rapid transit and transit priority (RTTP) network. The following projects were noted in the 'Affordable RTTP Network' that may have a future impact on study area traffic:

- **Trillium Line Extension** – Extension of the Trillium Line from its current terminus at Greenboro Station to Bowesville Station. The *Trillium Line Extension Planning and Environmental Assessment (EA) Study (January 2016)* and the *Trillium Line Light Rail Transit Extension Addendum (September 2018)* both expand upon the TMP. The Trillium Line will now extend to Limebank Road with a spur line to the Ottawa International Airport. Based on the official City of Ottawa Stage 2 LRT website, the Trillium Line South Extension is expected to begin revenue service by the end of 2022.
- **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 below **Figure 7**.

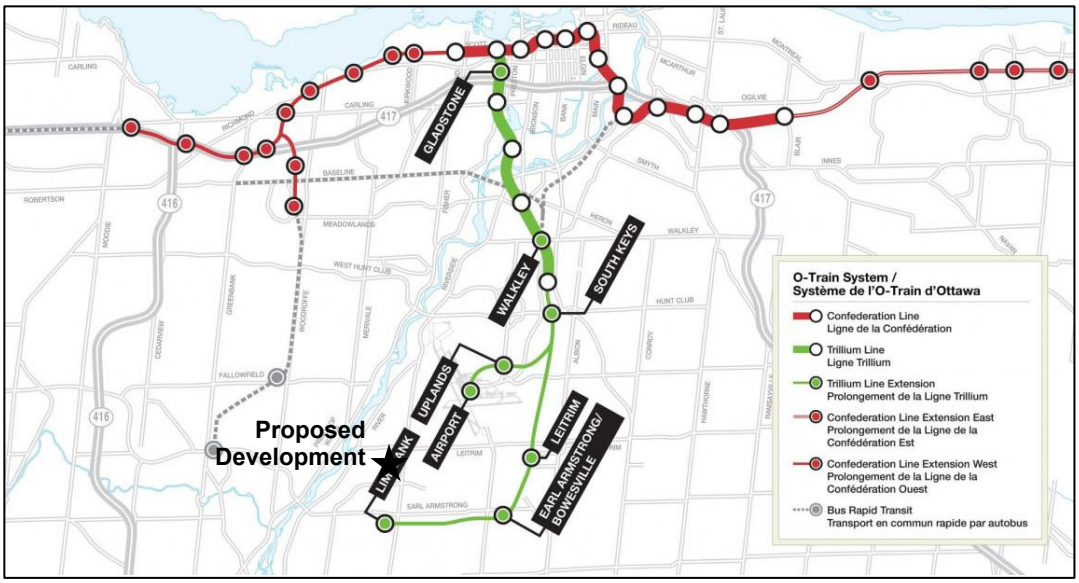
As shown previously in **Figure 3**, the Riverside South CDP identifies the eventual construction of a BRT corridor extending west from the terminus of the Trillium Line Extension, connecting the Riverside Park and Ride with the future O-Train terminus at Limebank Road. The implementation of this corridor, however, is presently not expected to occur within the City's 2031 planning horizon.

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

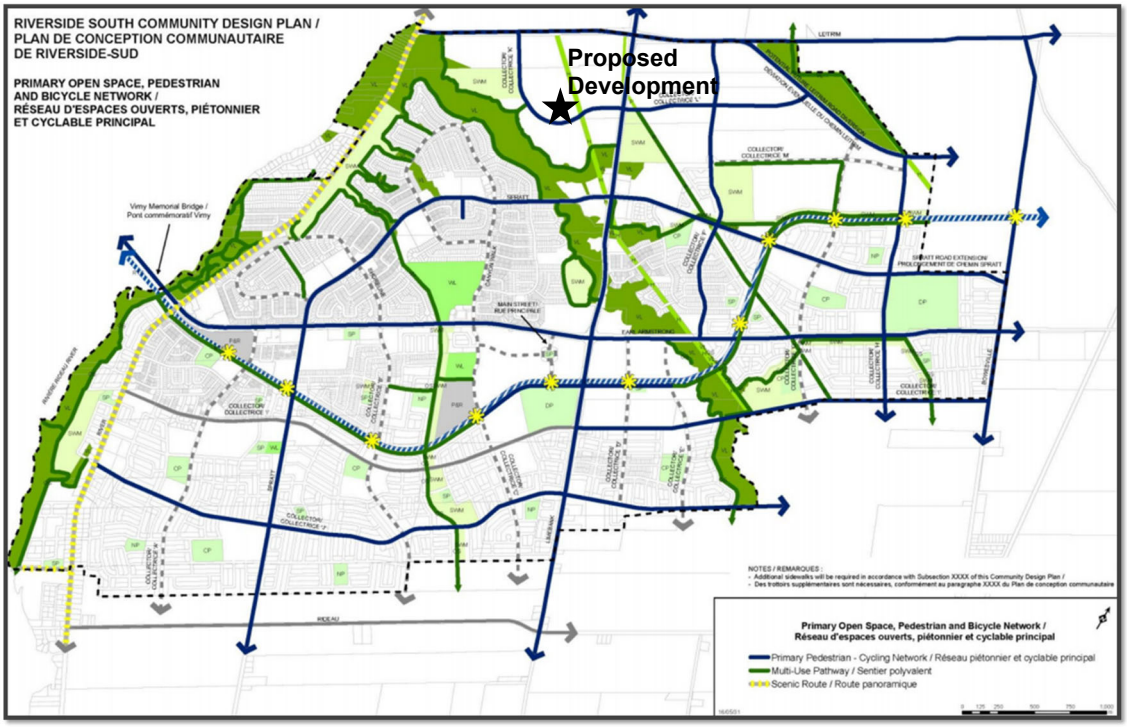
3.3.1.3 Future Cycling and Pedestrian Facilities

The Transportation Master Plan (TMP) designates Limebank Road and Leitrim Road as 'Spine' or City-wide Cycling Routes, which forms part of a system linking the commercial, employment, institutional, residential and educational nodes throughout the City of Ottawa. Spratt Road is identified as a 'Local Route' in the Ultimate Cycling Network.

The Riverside South CDP provides guidance on future active transportation facilities within the area and describes Limebank Road, Leitrim Road, the realigned Leitrim Road, and Spratt Road as being part of the 'Primary Pedestrian – Cycling Network'.

The planned cycling and pedestrian network indicated in the CDP is shown in **Figure 8** below.

Figure 8 - Riverside South Community Design Plan - Cycling and Pedestrian Network

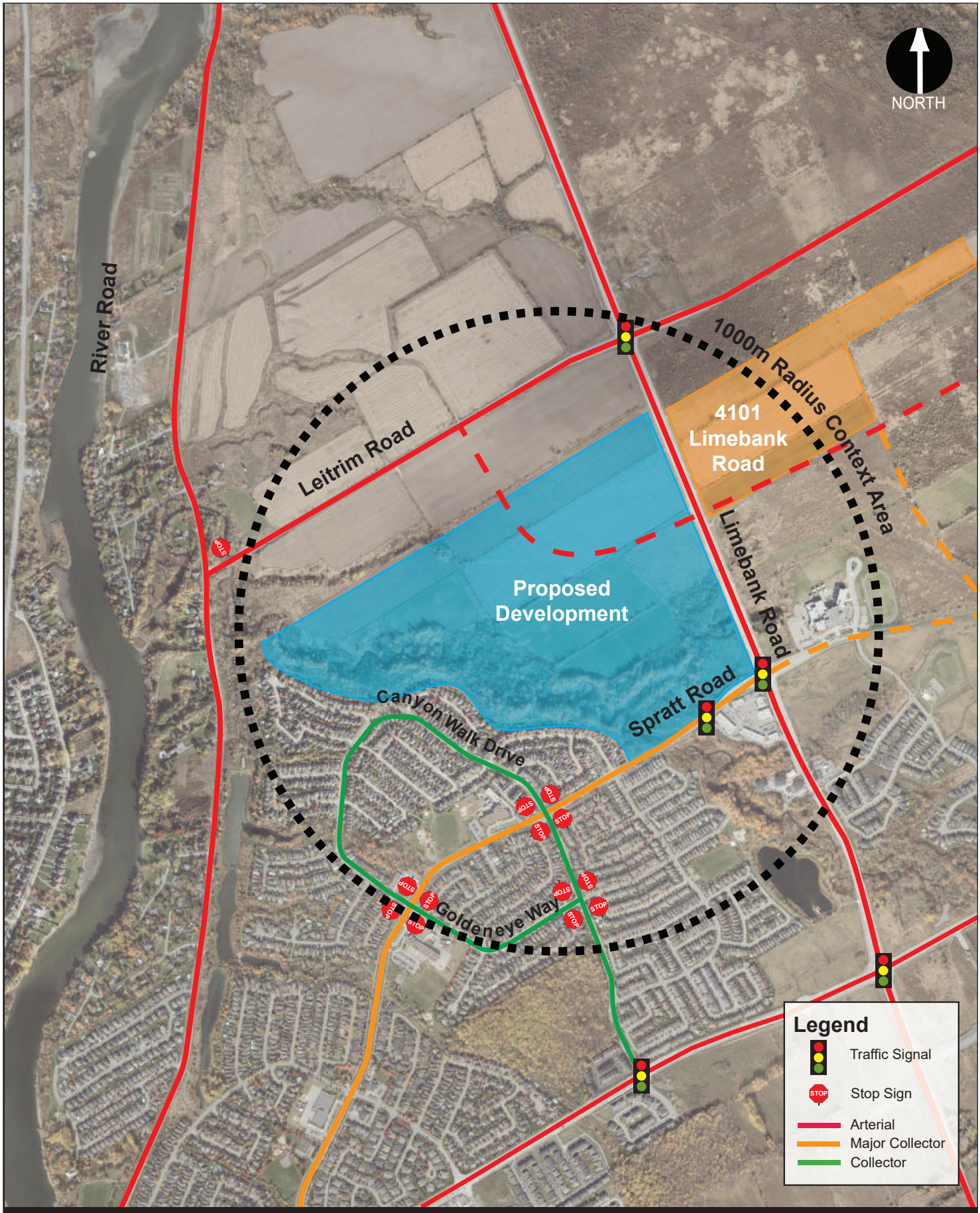


Source: Riverside South Community Design Plan

3.3.2 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 no active development applications of significance within the context area of the proposed development. However, for the purposes of identifying future intersection requirements, an assumption of the potential development magnitude for the adjacent 4101 Limebank Road property has been made and trip generation estimates for the site based on the land uses described in the Riverside South CDP have been developed. The location of this potential future development is illustrated in **Exhibit 3** below.



IBI

Riverside South Employment Lands
& Blocks 13,14
Transportation Impact Assessment

Exhibit 3:
Adjacent Developments

PROJECT No. 136974

SCALE: 0m 200m 400m

3.4 Study Area

With consideration of the information presented thus far, a study area bound by Leitrim Road to the north, Spratt Road to the south, Limebank Road to the east and the western boundary of the site 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:

- Limebank & Spratt
- Limebank & Leitrim
- Limebank & Realigned Leitrim (future)
- Spratt & Urbandale Plaza

Intersection-based Multi-Modal Level of Service (MMLOS) analysis 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 with these configurations. Segment-based MMLOS analysis will be conducted for the segments of Limebank Road and Spratt Road that are adjacent to the proposed development as well as the segment of realigned Leitrim Road that traverses the site.

3.5 Time Periods

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

3.6 Existing Lane Configurations & Traffic Volumes

The following weekday morning and afternoon peak hour turning movement counts were obtained from the City of Ottawa:

- Limebank Road & Leitrim Road (City of Ottawa, February 2022)
- Limebank Road & Spratt Road (City of Ottawa, December 2019)
- Spratt Road & Urbandale Plaza (City of Ottawa, November 2018)

In general, the City requires the use of traffic counts conducted within the last 3 years. The count at the Spratt & Urbandale Plaza intersection was conducted over 3 years ago therefore the eastbound and westbound through volumes were balanced with the adjacent Limebank & Spratt intersection in order to account for changes in traffic patterns that may have occurred since the count was conducted. As there have been no significant changes to the Urbandale Plaza shopping centre since 2018, it is expected that turning volumes at the intersection have not changed significantly.

A growth rate was applied to the northbound and southbound through movements of the Limebank & Spratt intersection to approximate existing traffic volumes. Justification of the background growth rates is discussed further in the Forecasting section of this report.

The 2022 count at the Limebank & Leitrim intersection was conducted during the COVID-19 pandemic and therefore required adjustment to ensure it is representative of typical traffic conditions. The *COVID-19 Traffic Volume Monitoring at Intersections* data provided by the City of Ottawa through Open Ottawa suggests that weekday morning peak hour volumes at the intersection may have been approximately 14% lower than typical traffic conditions. The weekday

morning peak hour traffic volumes were therefore increased in order to account for the impact of the pandemic, and volumes at the intersection during both peak hours were subsequently balanced with the adjacent Limebank & Spratt intersection.

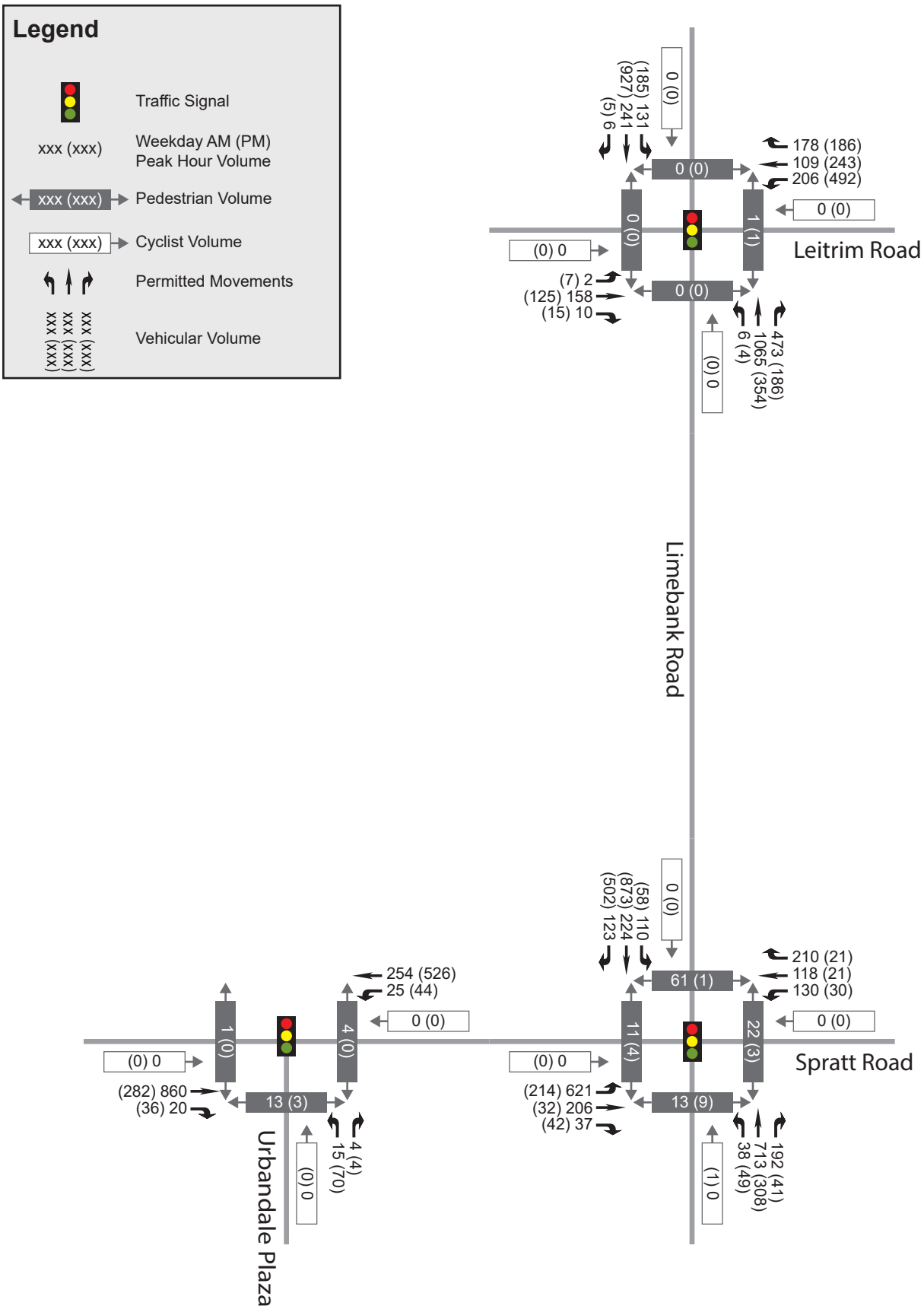
Peak hour traffic volumes representative of typical conditions are shown in **Exhibit 4**. The traffic count data is provided in **Appendix E**. The lane configurations and intersection controls for the study area intersections are illustrated in **Exhibit 5**.

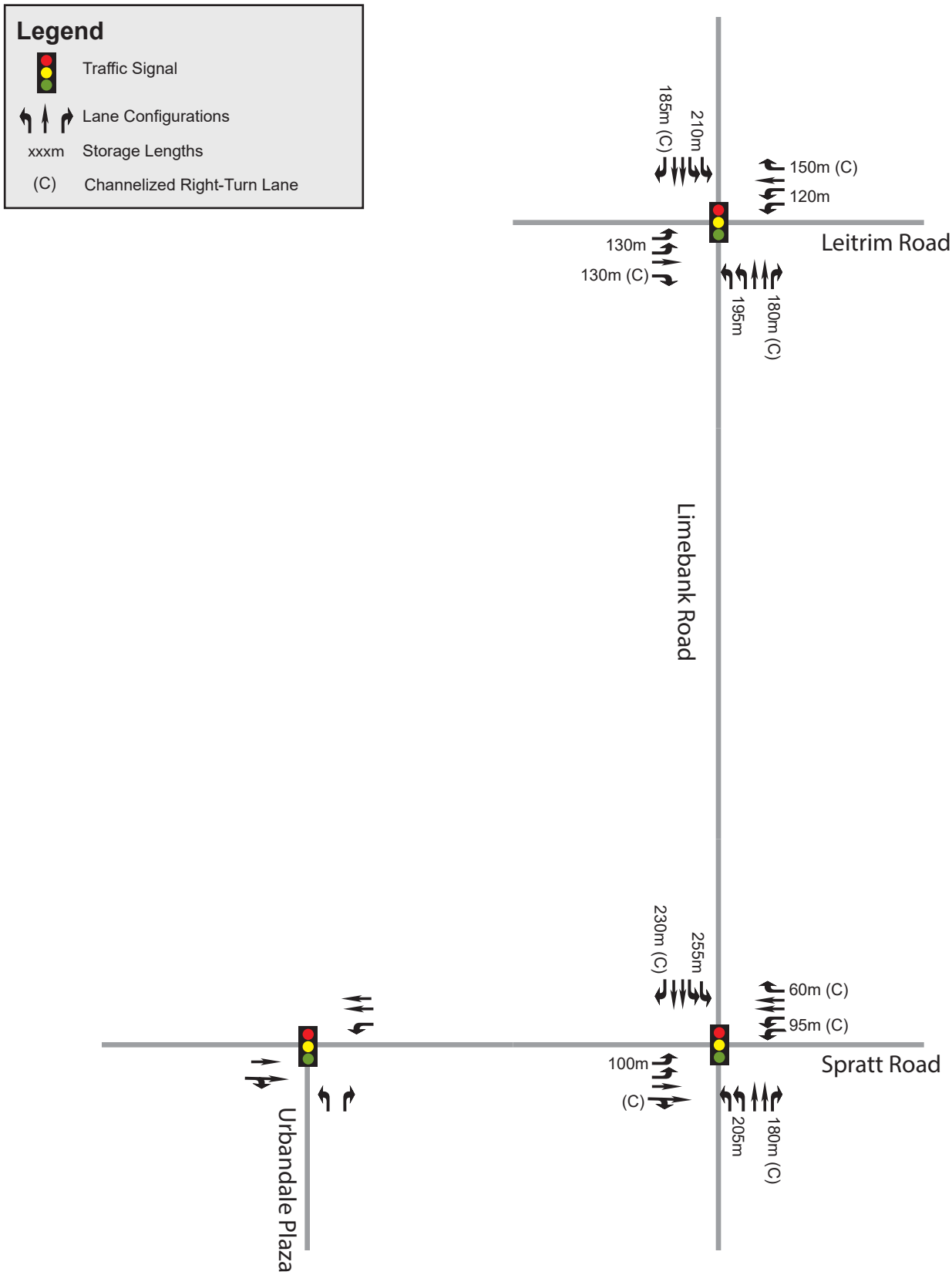
3.7 Analysis Years

The following analysis years will be assessed in this study:

- Existing (2022) Traffic
- Future (2031) Background Traffic
- Future (2031) Total Traffic – Full buildout

Typically, traffic conditions are also evaluated 5 years beyond full buildout of the development, however, as 2031 represents the horizon year of the Transportation Master Plan it is not possible to accurately estimate traffic conditions beyond 2031.


Legend
Traffic Signal
xxx (xxx)
Weekday AM (PM) Peak Hour Volume
xxx (xxx)
Pedestrian Volume
xxx (xxx)
Cyclist Volume
Permitted Movements
xxx (xxx)
Vehicular Volume
Leitrim Road
Limebank Road
Spratt Road
Urbandale Plaza
(185) 131
(927) 241
(5) 6
0 (0)
178 (186)
109 (243)
206 (492)
0 (0)
(0) 0
(7) 2
(125) 158
(15) 10
473 (186)
1065 (354)
6 (4)
(0) 0
(58) 110
(873) 224
(502) 123
210 (21)
118 (21)
130 (30)
61 (1)
11 (4)
22 (3)
(214) 621
(32) 206
(42) 37
13 (9)
192 (41)
713 (308)
38 (49)
(1) 0
254 (526)
25 (44)
4 (0)
1 (0)
(282) 860
(36) 20
13 (3)
4 (4)
15 (70)


Legend
Traffic Signal
Lane Configurations
xxxm Storage Lengths
(C) Channelized Right-Turn Lane
185m (C)
210m
150m (C)
120m
130m
130m (C)
195m
180m (C)
Leitrim Road
Limebank Road
230m (C)
255m
60m (C)
95m (C)
100m
(C)
205m
180m (C)
Spratt Road
Urbandale Plaza

3.8 Exemptions Review

The TIA Guidelines provide exemption considerations for elements of the Design Review and Network Impact components. **Table 5** summarizes the TIA modules that are not applicable to this study.

Table 5 - 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	• Only required for site plans where parking supply is 15% below unconstrained demand	✗
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 Management	4.6.1 Adjacent Neighbourhoods	• Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds	✓
4.8 Network Concept	n/a	• 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	✗

4 Forecasting

4.1 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.

4.1.1 Description of Capacity Issues

Based on the recently completed TIA for the 1515 Earl Armstrong Road development (IBI Group, May 2022), the Limebank & Spratt intersection is expected to operate at an acceptable Level of Service (LOS 'D' or better) within the timeframe of this study.

It should be noted, however, that the Draft Riverside South CDP Transportation Update (IBI Group, March 2020) indicates that by 2031, all roadways to/from the north will be constrained in terms of capacity and approximately 32% of person-trips in and out of the community and crossing the Leitrim Screenline (SL8) will need to be via transit as a result.

There are no other documented records of existing or future capacity issues at any of the other study area intersections.

4.1.2 Adjustment to Development Generated Demands

Given the anticipated capacity constraints noted in the CDP Transportation Update, consideration will be given to an increased use of transit by residents and employees of the proposed development.

4.1.3 Adjustment to Background Network Demands

The planned transit network improvements within the study area and constraints to growth in vehicular traffic are expected to result in a shift in background transit mode share once the O-Train Trillium Line Extension is operational in 2022. It is also expected that there will be some modest growth in the active transportation mode share given broad-based in investment in active transportation infrastructure and Transportation Demand Management (TDM) measures required for all new development.

As indicated above, it is expected that 32% of trips in the broader area will be via transit by 2031. The 2013 Transportation Master Plan (TMP) also indicates that the 2031 active transportation (i.e. walking and cycling) mode share target for local trips within the community is 24%.

Based on the above targets and the community-wide mode share recorded in 2011 O-D Survey, it is expected that by 2031, overall community-wide vehicle usage will decrease by 17% as people shift to transit and active modes of transportation. An adjustment factor has therefore been applied to background traffic volumes to reflect that shift in travel modes.

4.2 Development Generated Traffic

The following subsections describe the trip generation methodology employed to estimate the trip generation of the industrial and residential portions of the proposed development. The trip generation of the Institutional/Fire Hall portion of the site (Block 13) has not been included in the analysis given the low volume of vehicle trips generated by this land use.

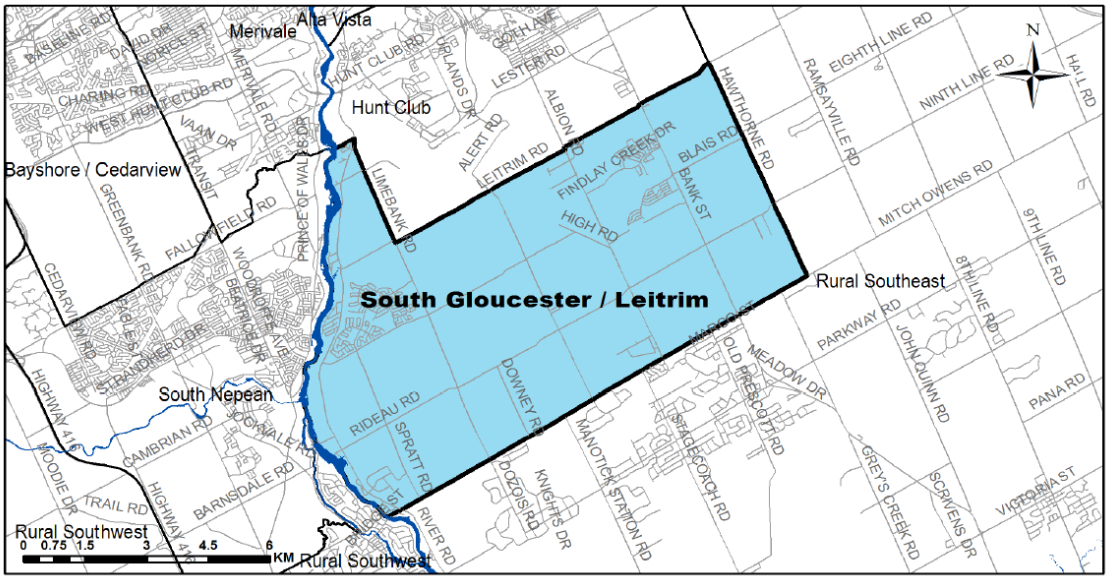
4.2.1 Industrial Trip Generation Methodology (Blocks 1-11)

Peak hour industrial site-generated traffic volumes were developed using the Institute of Transportation Engineers' (ITE) Trip Generation Manual (11th Edition) along with the 2020 TRANS Trip Generation Manual. The TIA Guidelines indicate that vehicle-trip generation rates from the ITE Trip Generation Manual should be converted to person-trips through the application of a 1.28 vehicle-to-person-trip conversion factor.

Mode share targets were developed based on the local mode share distributions from the South Gloucester/Leitrim Traffic Assessment Zone (TAZ) in the 2020 TRANS Trip Generation Manual Summary Report for employment land uses. These mode share targets were adjusted to account for the planned improvements in transit, pedestrian and cycling infrastructure in the vicinity of the proposed development.

The extents of the South Gloucester/Leitrim TAZ are illustrated in **Figure 9** below.

Figure 9 - South Gloucester/Leitrim TAZ



Source: 2011 O-D Survey

4.2.1.1 Baseline Vehicle Trip Generation

Peak hour vehicular traffic volumes associated with the proposed development were determined using appropriate peak hour trip generation rates from the ITE Trip Generation Manual.

The vehicular trip generation results for the proposed development have been summarized in **Table 6** below.

Table 6 - Baseline Vehicular Trip Generation Results: Industrial Park

LAND USE	SIZE (EMPLOYEES)	PERIOD	GENERATED TRIPS (VPH)		
			IN	OUT	TOTAL
Industrial Park	2113	AM	677	110	787
		PM	146	586	732

Notes: vph = vehicles per hour

4.2.1.2 Person Trip Generation

The TIA Guidelines indicate that a 1.28 vehicle-to-person-trip conversion rate should be utilized to convert the baseline vehicular trip generation results into person trips.

The resulting number of site-generated person-trips is summarized in **Table 7** below.

Table 7 - Person-Trip Generation: Industrial Park

LAND USE	PERIOD	PERSON TRIPS (PPH)		
		IN	OUT	TOTAL
Industrial Park	AM	867	141	1008
	PM	187	749	936

Notes: pph = persons per hour

4.2.1.3 Mode Share Proportions

The 2020 TRANS Trip Generation Manual Summary Report provides approximations of the existing modal share within the South Gloucester/Leitrim Traffic Assessment Zone (TAZ) for employment land uses. Relevant extracts from the 2020 TRANS Trip Generation Manual Summary Report are provided in **Appendix F**.

The O-Train Trillium Line Extension will terminate at Limebank Station, 1.8km south of the proposed development, and the site's relative proximity to this station will enhance the attractiveness of transit as a method of getting to/from the proposed development, provided direct transit service is provided between the LRT station and the proposed development.

As discussed previously, 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 target of 32% is now expected for 2031. The community, however, is primarily residential in nature and therefore this target is more representative of the expected mode share for residential land uses. Based on the 2020 TRANS Trip Generation Manual Summary Report, the transit mode share for employment land uses is generally 14% lower than it is for residential land uses therefore a transit mode share target of 18% is expected to be achievable for this development.

Given the site's location and the fact that the realigned Leitrim Road will have a rural cross-section with no sidewalks and only paved shoulders for bicycles initially, it is anticipated that a negligible number of employees will walk to work. As such, a walking mode share target of 0% is proposed for this site. It should be noted that the lack of sidewalks on the realigned Leitrim Road is not expected to impact the transit mode share as it is anticipated that there will be pedestrian facilities connecting the transit stops to the on-site buildings established through the Site Plan Control process for each development parcel.

The existing mode shares for the TAZ and the proposed mode share targets for the proposed development are identified in **Table 8** below.

Table 8 - Existing and Target Mode Share Distributions: Industrial Park

MODE	EXISTING MODE SHARE	MODE SHARE TARGETS
Auto Driver	89%	75%
Auto Passenger	7%	6%
Transit	2%	18%
Bike	1%	1%
Walk	1%	0%
TOTAL	**100%**	**100%**

4.2.1.4 Trip Generation by Mode

The mode share targets from **Table 8** were applied to the number of development generated peak hour person-trips to determine the number of trips per travel mode.

The results after applying the mode share targets and adjustment factors are summarized in **Table 9.**

Table 9 – Development-Generated Peak Hour Person Trips by Mode: Industrial Park

MODE	AM			PM		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Auto Driver	650	106	756	140	562	702
Auto Passenger	52	9	61	11	45	56
Transit	156	25	181	34	135	169
Bike	9	1	10	2	7	9
Walk	0	0	0	0	0	0
Total Person Trips	**867**	**141**	**1,008**	**187**	**749**	**936**

4.2.1 Residential Trip Generation Methodology (Block 14)

Peak hour residential site-generated traffic volumes were developed using the 2020 TRANS Trip Generation Summary Report. The TRANS trip generation rates are based on blended rates derived from the 49 trip generation studies undertaken between 2008 and 2012, the Institute of Transportation Engineers (ITE) Trip Generation Manual (10th Edition) and the 2011 TRANS O-D Travel Survey. Separate peak period person-trip generation rates were developed for single-detached housing, low-rise multifamily housing (i.e. two storeys or less) and high-rise multifamily housing (i.e. three storeys or more). Site-generated peak period person-trips were estimated using these rates and subsequently subdivided based on representative mode share percentages applicable to the study area. Mode-specific adjustment factors were then applied to these peak period person-trips to determine the number of peak hour vehicle, passenger, transit, cycling and pedestrian trips.

Local mode share targets were based on the 2020 TRANS Trip Generation Summary Report which were adjusted to reflect the context of the site.

Appendix F contains relevant 2020 TRANS and 2011 Origin-Destination (O-D) Survey extracts utilized for this study.

4.2.1.1 Peak Period Trip Generation

Peak period person-trips associated with the proposed development were determined using the trip generation rates from the 2020 TRANS Trip Generation Summary Report. The peak period person-trip generation results for the proposed development have been summarized in **Table 10** below.

Table 10 - Peak Period Person-Trip Generation: Residential

Land Use	Size (units)	Period	PEAK PERIOD PERSON-TRIPS		
			In	Out	Total
Multi-Unit (Low-Rise)[1]	38	AM	15	36	51
		PM	34	26	60

Notes: [1] - 2020 TRANS defines 'Multi-Unit Low-Rise' as two storeys or less.

4.2.1.2 Mode Share Proportions

The TRANS Trip Generation Manual (October 2020) provides blended mode shares based on the 2011 TRANS Origin-Destination (O-D) Survey for multi-unit low-rise housing such as townhomes.

The 2013 TMP indicates that the 2031 active transportation (i.e. walking and cycling) mode share for local trips within the community is 24%. Based on the 2011 TRANS O-D Survey, approximately 34% of residential trips are local, therefore, an active transportation mode share target of 8% (24% of 34%) is proposed for the residential portion of this site. Given the proximity to nearby amenities such as the adjacent Urbandale Plaza Shopping Centre to the south, it is expected that this level of active transportation use will be achievable.

The existing mode shares for the TAZ and the proposed mode share targets for the proposed development are identified in **Table 11** below.

Table 11 - Existing and Target Mode Share Distributions: Residential

MODE	EXISTING MODE SHARE	MODE SHARE TARGET
Auto Driver	61%	46%
Auto Passenger	19%	14%
Transit	16%	32%
Bike	1%	2%
Walk	3%	6%
Total	**100%**	**100%**

4.2.1.3 Trip Generation by Mode

The mode share targets from **Table 11** were applied to the number of development generated peak period person-trips to determine the number of trips per travel mode. The peak period to

peak hour adjustment factors from Table 4 of the 2020 TRANS Trip Generation Summary Report were subsequently applied in order to convert to peak hour trips.

The results after applying the mode share targets are summarized in **Table 12**.

Table 12 – Development-Generated Peak Hour Person Trips by Mode: Residential

MODE (MODE SHARE)	AM			PM		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Auto Driver	3	8	11	7	5	12
Auto Passenger	1	2	3	2	2	4
Transit	3	6	9	5	4	9
Cycling	0	0	0	0	0	0
Walking	1	1	2	1	1	2
Total Person Trips	**8**	**17**	**25**	**15**	**12**	**27**

4.2.2 Trip Generation Reduction Factors

Deduction of Existing Development Trips

Not Applicable: The proposed development lands are currently undeveloped, and do not generate any traffic.

Pass-by Traffic

Not Applicable: Both the residential and industrial land uses within the proposed development do not generate pass-by trips, therefore the trip reduction factor is not applicable for this TIA.

Synergy/Internalization

Not Applicable: Given that the residential and industrial portions of the site are physically separated from each other, no internal trip reduction has been applied.

4.2.3 Trip Distribution and Assignment

Given the different travel characteristics of the two land uses contained within the proposed development, separate trip distributions have been calculated for each.

4.2.3.1 Industrial Trip Distribution

It is anticipated that the distribution of **regional** site-generated industrial traffic will align with distribution of trips to the district identified in the 2011 O-D Survey for the industrial section. With consideration of Google Maps travel times during the weekday peak hours, regional site-generated traffic was distributed as follows:

- 50% to/from the North via Limebank Road
- 30% to/from the South via Limebank Road
- 20% to/from the East via Leitrim Road

The distribution of **local** site-generated traffic (18% for industrial land uses) was based primarily on the concentrations of existing and future residential land uses within the Riverside South community:

- 65% to/from the South via Limebank Road
- 15% to/from the East via Spratt Road
- 20% to/from the West via Spratt Road

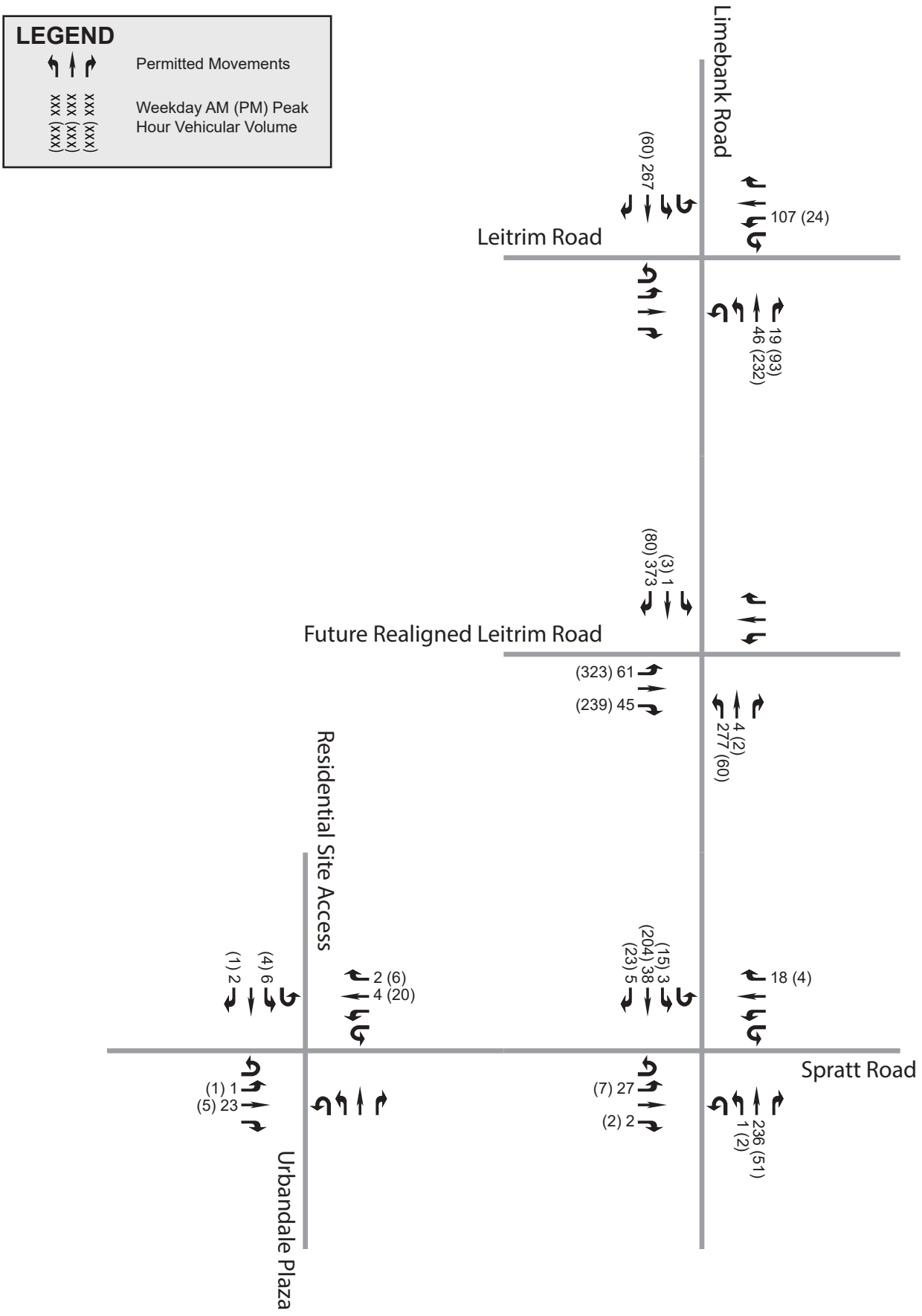
4.2.3.2 Residential Trip Distribution

Based on existing traffic patterns within the study area, it is anticipated that traffic generated by the residential land uses will distribute as follows:

- 30% to/from the North via Limebank Road
- 30% to/from the South via Limebank Road
- 20% to/from the East
    - 5% via Spratt Road
    - 15% via Leitrim Road
- 20% to/from the West via Spratt Road

4.2.3.3 Trip Assignment

Applying the estimated number of new auto trips to the above distributions, future site-generated traffic volumes from **Table 9** and **Table 12** are illustrated at each of the study area intersections in **Exhibit 6**.



Riverside South Employment Lands & Blocks 13, 14
Transportation Impact Assessment

Exhibit 6:
Site-Generated Traffic

PROJECT No. 136974

SCALE: N.T.S.

4.3 Background Network Traffic

4.3.1 Changes to the Background Transportation Network

To properly assess future traffic conditions, planned modifications to the transportation network that may impact travel patterns or demand within the study area have been considered. The Scoping section of this TIA reviewed the anticipated changes to the study area transportation network based on the Transportation Master Plan (TMP) and the Riverside South CDP.

Based on a review of these planning policy documents, the only significant roadway modification within the timeframe of this study is the planned widening of Earl Armstrong Road between 2030 and 2031. Although this may divert traffic from Limebank Road to Bowesville Road, for the purpose of this study it has been conservatively assumed that this will not occur.

4.3.2 General Background Growth Rates

The background growth rate is intended to represent regional growth from outside the study area that will travel along the adjacent road network. Based on the recently completed TIA for 1515 Earl Armstrong Road (IBI Group, May 2022), two-way traffic volumes on Limebank Road are anticipated to increase at a rate of approximately 4.5% per year which reflects the rapid pace of development that is projected to occur within the Riverside South community.

To establish the anticipated growth rate along Leitrim Road, the traffic volume projections from the Leitrim Road Realignment and Widening Planning and Environmental Assessment Study Environment Study Report (ESR) were referenced. Multiple scenarios were developed as part of the ESR, but Scenario 10 is expected to be most representative of future conditions as it includes full buildout of the Riverside South community as well as the LRT extension to Riverside South. Based on Scenario 10 traffic projections, eastbound volumes along Leitrim Road are anticipated to increase at 5.7% per year while westbound volumes are anticipated to increase at 1.5% per year.

These growth rates have only been applied to through movements on arterial roadways, as well as all movements at arterial-to-arterial intersections.

4.3.3 Other Area Development

Future potential developments of significance within the study area were previously identified Section 3.3.2. These developments have been accounted for in the estimation of future background volume projections and represent specific areas of growth within the study area and are therefore considered in addition to the general background growth rate discussed previously.

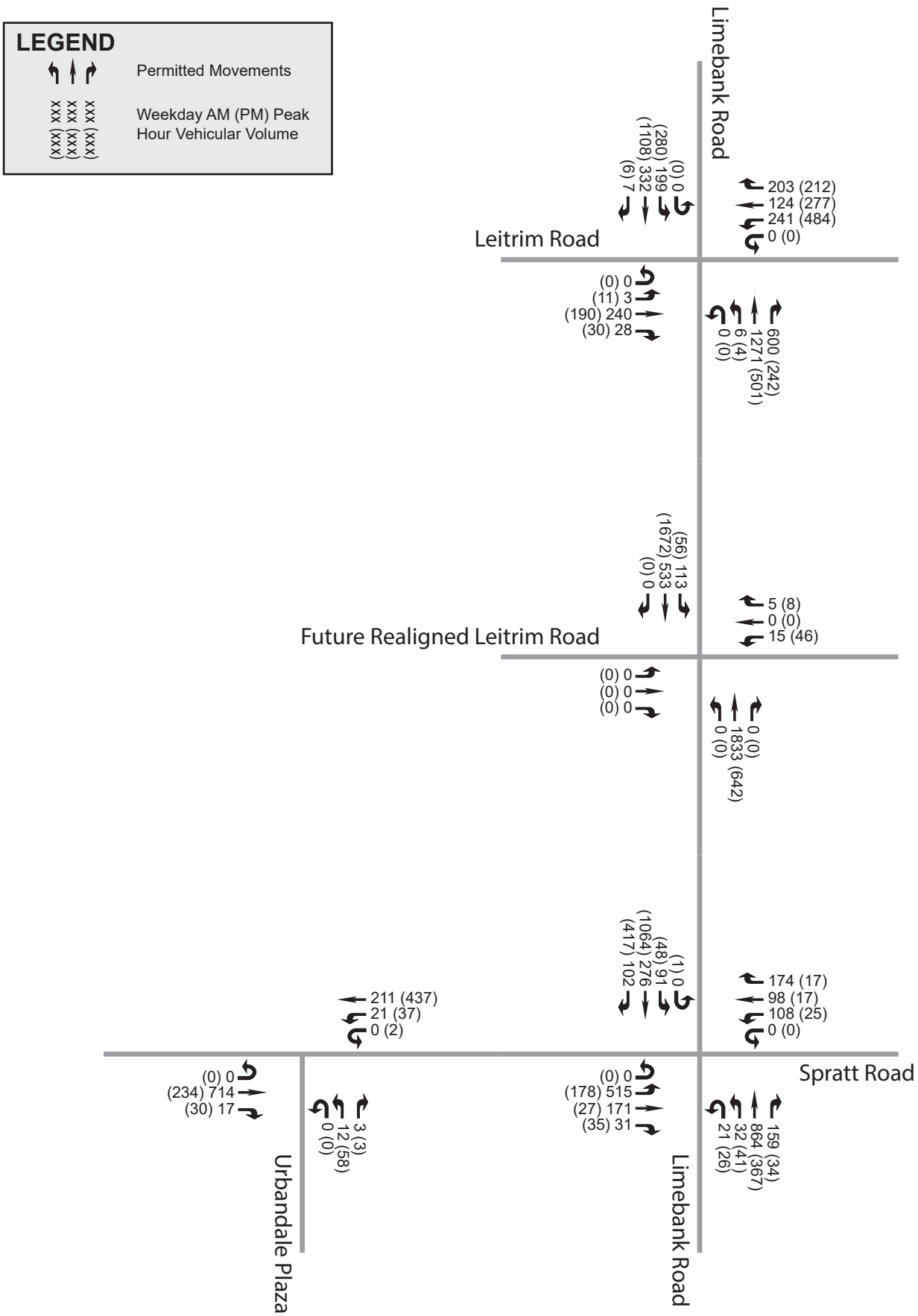
4.4 Traffic Volume Summary

4.4.1 Future Background Traffic Volumes

Future background traffic volumes projections have been established by combining the adjacent development traffic and background traffic derived through the application of a growth rate, as discussed previously. **Exhibit 7** presents the future background traffic volumes anticipated for the 2031 analysis year.

4.4.2 Future Total Traffic Volumes

Future total volumes have been derived by combining the site-generated traffic volumes with future background volumes. **Exhibit 8** presents the future total traffic volumes anticipated for the 2031 analysis year.

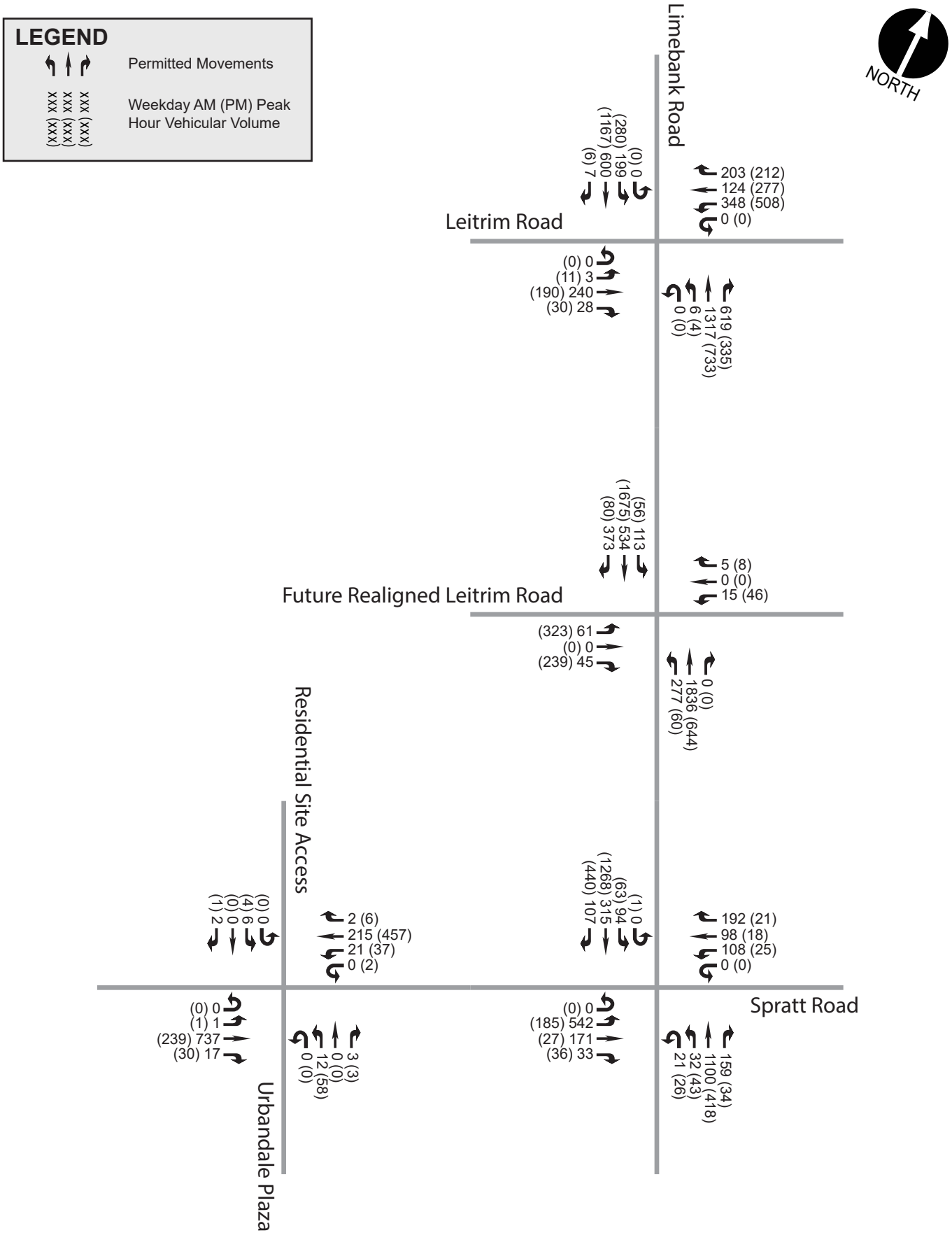


Riverside South Employment Lands & Blocks 13, 14
Transportation Impact Assessment

Exhibit 7:
Future (2031)
Background Traffic

PROJECT No. 136974

SCALE: N.T.S.



Riverside South Employment Lands & Blocks 13, 14
Transportation Impact Assessment

Exhibit 8:
Future (2031)
Total Traffic

PROJECT No. 136974

SCALE: N.T.S.

5 Analysis

5.1 Development Design

5.1.1 Design for Sustainable Modes

Currently there are concrete sidewalks and on-street bike lanes on both Limebank Road and Spratt Road (east of the Urbandale Plaza intersection).

Per the Official Plan, it is expected that concrete sidewalks will be provided on at least one side of the roadway within the residential portion of the site (Block 14). Within the industrial/employment section of the development, the segment of the future realigned Leitrim Road will initially have a rural cross-section with no sidewalks and only paved shoulders for cyclists. In the long-term, it is expected that the realigned Leitrim Road may be upgraded to a four-lane 'complete street' with concrete sidewalks and cycle tracks on both sides, thereby further improving access to sustainable modes of transportation, however, there is currently no drainage solution to provide urbanization of this roadway. For this reason, all proposed local roads within the employment lands (Blocks 1-11) will also have a rural cross-section.

Until such time the realigned Leitrim Road becomes a 'complete street', it is expected that pedestrian facilities will be provided within each development block to provide access to the realigned Letirim Road to ensure that employees will be able to access transit service within a reasonable walking distance of their workplace.

Based on the size and configuration of the planned subdivision, it is recommended that additional bus stops be provided along the realigned Leitrim Road at the Limebank Road intersection, the Street #2 intersection and the westernmost intersection with Street #1 in order to ensure adequate transit coverage within the proposed development.

It is expected that TDM-Supportive Development Design and Infrastructure Checklists will be completed at the Site Plan Control application stage once the development details of each block are known. A blank copy of the TDM-Supportive Development Design and Infrastructure Checklist for non-residential developments has been provided in **Appendix G** for reference, indicating which elements are not applicable to subdivisions.

5.1.2 New Street Networks

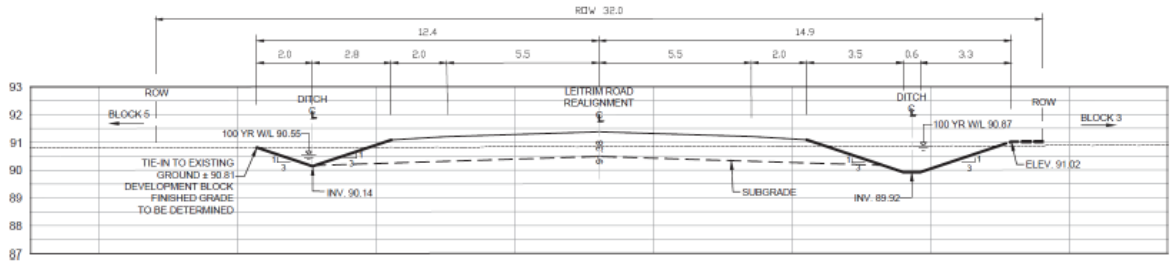
The road network within the proposed development includes the future realigned Leitrim Road as well as Street #1, Street #2, and Street #3. The alignment of the internal roadways has been designed to ensure that the on-site road network follows the form of a modified grid pattern with relatively short block lengths. The overall road network design will promote driver behaviour that is consistent with the roadway classification. **Table 13** summarizes the designation and right-of-way for the proposed roadways.

Table 13 - Proposed Roadways

ROADWAY	DESIGNATION	RIGHT-OF-WAY (m)
Realigned Leitrim Road	Arterial	32.0
Street #1	Local	18.0
Street #2	Local	18.0
Street #3	Local	18.0

The segment of the realigned Leitrim Road that passes through the subject lands will be generally limited to a 32m right-of-way and configured with a rural cross-section with 11m of asphalt (two 5.5m lanes with 2.0m paved shoulders). This roadway will terminate with a cul-de-sac at the northern property limit. The interim cross-section is shown in **Figure 10**.

Figure 10 - Proposed Realigned Leitrim Road Configuration



Source: Assessment of Adequacy of Public Services Report (IBI Group, July 2022)

5.2 Boundary Streets

The proposed development will be accessed via Spratt Road, Limebank Road and the future realigned Leitrim road. Segment-based Multi-Modal Level of Service (MMLOS) analysis has therefore been completed for these roadways.

5.2.1 Mobility

The MMLOS targets for each road vary based on a variety of factors such as the Official Plan designation/ policy area, as well as road classification, cycling network and transit network classification and whether the road is on a truck route.

Segment-based MMLOS results for the segments of Limebank Road, Spratt Road and the realigned Leitrim Road adjacent or within to the proposed development are provided in **Table 14** below.

Details of the MMLOS analysis are provided in **Appendix H**.

Table 14 - Segment MMLOS

LOCATION	LEVEL OF SERVICE BY MODE			
	PEDESTRIAN (PLOS)	BICYCLE (BLOS)	TRANSIT (TLOS)	TRUCK (TkLOS)
Limebank Road (Existing)	B (Target: C)	**E** (Target: C)	D (Target: N/A[1])	A (Target: B)
Spratt Road (Existing)	B (Target: C)	**F** (Target: B)	D (Target: N/A[1])	A (Target: N/A[2])
Realigned Leitrim Road (Future)	**F** (Target: C)	**F** (Target: E)	D (Target: N/A[1])	C (Target: D)

Notes:

[1] – There are no TLOS targets for roadways that are not part of the rapid transit or transit priority network.

[2] – There is no TkLOS target for collector roads that are not truck routes.

The results of the segment-based MMLOS presented above indicate that both existing roadways are not currently meeting their BLOS targets. Providing grade-separated cycle tracks is expected

to improve the BLOS to 'A'. It should be noted that these deficiencies in the segment-based MMLOS along the boundary streets represent existing conditions.

The future realigned Leitrim Road is not expected to meet its PLOS and BLOS targets given its interim rural cross-section. A relatively low volume of cyclists and pedestrians is expected within the subdivision in the foreseeable future until such time the roadway is extended north to Leitrim Road or east of Limebank Road, providing network connectivity within the community. Paved shoulders serve as a sufficient bicycle facility in the interim. Should the realigned Leitrim Road be urbanized and widened to its ultimate configuration, complete with sidewalks and cycles tracks, this will greatly improve the PLOS and BLOS of this roadway segment. As indicated in the future (2031) volume projections, the segment of realigned Leitrim Road is not expected to experience traffic volumes that would warrant four travel lanes. A two-lane roadway will therefore be sufficient for the foreseeable future.

5.2.2 Road Safety

A summary of all reported collisions within the study period over the past five years was presented in Section 3.2.4. The City requires a safety review if at least six collisions for any one movement or of a discernible pattern have occurred over the study period. Based on these criteria, the Limebank & Spratt intersection and the segment of Limebank between Leitrim Road and Spratt Road may require further review.

Limebank & Spratt Intersection

Over a five-year period, a total of three angle, six rear-end and three single motor vehicle (SMV) collisions were recorded at the Limebank & Spratt intersection. Four of the six rear-end collisions occurred under dark or dusk lighting conditions which may be a reflection of driver behaviour during nighttime conditions, particularly as the collisions that occurred under these conditions involved drivers travelling too fast for the conditions, failing to yield the right of way and following too closely. Half of the rear-end collisions involved right-turning traffic and the remainder involved through traffic.

Limebank Road between Leitrim Road and Spratt Road

Between 2016 and 2020, a total of two rear-end, four SMV, and one 'other' collision occurred on Limebank Road between Leitrim Road and Spratt Road and there were no significant reoccurring collision patterns observed.

5.3 Access Intersections

5.3.1 Location and Design of Access

The proposed development will provide direct access to the arterial road and major collectors network at the following locations:

- **Limebank Road & Realigned Leitrim Road** – This intersection will provide access to the industrial/employment portion of the proposed development. Based on the Leitrim Road Widening and Realignment ESR, this future signalized intersection will include dual westbound left-turn lanes, single left-turn lanes on all other approaches and a northbound right-turn lane. The design of the intersection, however, provisions for the eventual implementation of dual left-turn lanes on all approaches. The planned intersection configuration identified in the ESR is illustrated in **Figure 5**.
- **Spratt Road & Urbandale Plaza/Residential Site Access**– This intersection is located approximately 225m west of the Spratt & Limebank intersection. It is currently a three-legged signalized intersection which provides access to Urbandale Plaza. A new private approach with a single shared through-right-left lane will be provided on the north side of

the intersection to provide access to the residential portion of the site. A new eastbound left-turn lane will be required to facilitate left-turns into the site and reduce potential conflicts with eastbound through traffic.

The design of these intersections will be submitted to the City at a later date.

Access to the lands designated as Institutional/Fire Hall (Block 13) may be provided via new private approaches on Spratt Road and Limebank Road. To ensure that emergency vehicles can safety exit the site, the following measures should be considered:

- The new private approaches should be placed as far as possible from the Limebank & Spratt intersection to minimize conflicts with left-turn queues.
- Median opening should be provided to allow emergency vehicles to cross the median and turn left out onto Limebank Road and Spratt Road.
- Pavement markings and signage should be provided on Limebank Road and Spratt Road to indicate to drivers that they should not block the accesses to the fire hall.
- Signal pre-emption should be implemented at the Limebank & Spratt intersection to help clear vehicular queues at the intersection for egress of emergency vehicles.

5.3.2 Intersection Control

5.3.2.1 Traffic Signal Warrants

Based on the projected total traffic volumes presented in this study, the proposed Limebank & Realigned Leitrim intersection warrants traffic signals under Future (2031) Total Traffic conditions as a 4-legged intersection.

The results of the traffic signal warrants are provided in **Appendix I**.

5.3.2.2 Roundabout Analysis

As per the City's Roundabout Implementation Policy, intersections that satisfy any of the following criteria should be screened utilizing the Roundabout Initial Feasibility Screening Tool:

- At any new City intersection
- Where traffic signals are warranted
- At intersections where capacity or safety problems are being experienced

The results of the Roundabout Initial Feasibility Screening Tool indicate that a roundabout is not recommended at the Limebank & Realigned Leitrim intersection.

The results of the Roundabout Initial Feasibility Screening Tool are provided in **Appendix I**.

5.3.3 Intersection Design (MMLOS)

The results of the MMLOS analysis for the access intersections have been provided in Section 5.7.3.

5.4 Transportation Demand Management (TDM)

The City of Ottawa is committed to requiring all new developments to include Transportation Demand Management (TDM) measures in an effort to reduce automobile dependence, particularly during the weekday peak travel periods.

5.4.1 Context for TDM

As described in the Forecasting section of this report, the industrial and residential trip generation mode share targets used to estimate future development traffic were based on the local mode share distributions from the South Gloucester/Leitrim Traffic Assessment Zone (TAZ) in the 2020 TRANS Trip Generation Manual Summary Report and were adjusted based on the transit and active transportation mode share targets identified in the Draft Riverside South CDP Transportation Update and 2013 TMP.

The proposed development is not located in a Design Priority Area (DPA) or Transit-Oriented Development (TDO) zone.

5.4.2 Need and Opportunity

To promote the use of transit by employees of the industrial park, bus stops along the segment of the realigned Leitrim Road within the proposed development are recommended. Given the relative proximity to the future Limebank LRT Station 1.8km to the south providing access to the City-wide rapid transit network, this will encourage employees to use transit. Lack of transit or pedestrian access to the employment portion of the site could result in increased personal vehicle use. It is important to note, however, that both existing boundary streets (Limebank Road and Spratt Road) include facilities for cyclists and pedestrians and signalized access intersections will provide controlled pedestrian crossing opportunities for safe access to bus stops.

5.4.3 TDM Program

It is expected that the TDM Measures Checklists for non-residential and residential developments will be completed at the Site Plan Control application stage once more details are known about the developments that will be occupying each block. Blank copies of the City of Ottawa's TDM Measures Checklists for non-residential and residential developments have provided in **Appendix G** for reference.

5.5 Neighbourhood Traffic Management

5.5.1 Adjacent Neighbourhoods

The residential portion of the proposed development (Block 14) is dependent on Spratt Road, a major collector, for access to the residential portion of the site. The TIA Guidelines indicate that the livability threshold for a major collector is 600 vehicles per hour per lane. Volumes in excess of this threshold may impact resident comfort but do not necessarily indicate that the roadway cannot accommodate this level of traffic.

Traffic volumes along Spratt Road are expected to be as high as 750 vehicle per hour in one direction during the weekday morning and afternoon peak hours. Given the four-lane cross-section of Spratt Road, the livability threshold is 1,200 vehicles per hour per direction and therefore the livability threshold is not expected to be exceeded by this relatively minor increase in traffic.

5.6 Transit

5.6.1 Route Capacity

The estimated future total transit passenger demand within the study area was provided in Section 4.2.1.4 and 4.2.1.3. The results have been summarized in **Table 15**.

Table 15 - Future Development Generated Transit Demand

PERIOD	TRANSIT TRIPS	
	In	Out
AM	159	31
PM	39	139

Based on the number of transit trips generated by the proposed development during the weekday morning and afternoon peak hours, additional transit capacity may be required to accommodate the transit demand. The projected volume of transit users is likely to warrant the extension of transit service into the employment lands upon full build-out.

5.6.2 Transit Priority Measures

Limebank Road is not presently identified as a transit priority corridor in the Official Plan (Schedule C2). It is not expected that transit priority measures will be required at any of the study area intersections in order to support development-generated transit demand.

5.7 Intersection Operational Review

The following sections summarize the methodology and results of the Multi-Modal Level of Service (MMLOS) analysis conducted within the study area.

5.7.1 Intersection Analysis Criteria (Automobile)

The following section outlines the City of Ottawa's methodology for determining motor vehicle Level of Service (LOS) at signalized and unsignalized intersections.

5.7.1.1 Signalized Intersections

In qualitative terms, the Level of Service (LOS) defines operational conditions within a traffic stream and their perception by motorists. A LOS definition generally describes these conditions in terms of such factors as delay, speed and travel time, freedom to manoeuvre, traffic interruptions, safety, comfort and convenience. LOS can also be related to the ratio of the volume to capacity (v/c) which is simply the relationship of the traffic volume (either measured or forecast) to the capability of the intersection or road section to accommodate a given traffic volume. This capability varies depending on the factors described above. LOS are given letter designations from 'A' to 'F'. LOS 'A' represents the best operating conditions and LOS 'E' represents the level at which the intersection or an approach to the intersection is carrying the maximum traffic volume that can, practicably, be accommodated. LOS 'F' indicates that the intersection is operating beyond its theoretical capacity.

The City of Ottawa has developed criteria as part of the Transportation Impact Assessment Guidelines, which directly relate the volume to capacity (v/c) ratio of a signalized intersection to a LOS designation. These criteria are presented in **Table 16** below:

Table 16 - LOS Criteria for Signalized Intersections

LOS	VOLUME TO CAPACITY RATIO (v/c)
A	0 to 0.60
B	0.61 to 0.70
C	0.71 to 0.80
D	0.81 to 0.90
E	0.91 to 1.00
F	> 1.00

The intersection capacity analysis technique provides an indication of the LOS for each movement at the intersection under consideration and for the intersection as a whole. The overall v/c ratio for an intersection is defined as the sum of equivalent volumes for all critical movements at the intersection divided by the sum of capacities for all critical movements.

5.7.1.2 Unsignalized Intersections

The capacity of an unsignalized intersection can also be expressed in terms of the LOS it provides. For an unsignalized intersection, the Level of Service is defined in terms of the average movement delays at the intersection. This is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this includes the time required for a vehicle to travel from the last-in-queue position to the first-in-queue position. The average delay for any particular minor movement at the un-signalized intersection is a function of the capacity of the approach and the degree of saturation.

The Highway Capacity Manual 2010 (HCM), prepared by the Transportation Research Board, includes the following Levels of Service criteria for un-signalized intersections, related to average movement delays at the intersection, as indicated in **Table 17** below.

Table 17 - LOS Criteria for Unsignalized Intersections

LOS	DELAY (seconds)
A	<10
B	>10 and <15
C	>15 and <25
D	>25 and <35
E	>35 and <50
F	>50

The unsignalized intersection capacity analysis technique included in the HCM and used in the current study provides an indication of the Level of Service for each movement of the intersection under consideration. By this technique, the performance of the unsignalized intersection can be compared under varying traffic scenarios, using the Level of Service concept in a qualitative sense. One unsignalized intersection can be compared with another unsignalized intersection using this concept. Level of Service 'E' represents the capacity of the movement under consideration and generally, in large urban areas, Level of Service 'D' is considered to represent an acceptable operating condition. Level of Service 'E' is considered an acceptable operating

condition for planning purposes for intersections located within Ottawa's Urban Core the downtown and its vicinity). Level of Service 'F' indicates that the movement is operating beyond its design capacity.

Roundabout capacity analysis has been carried out using the HCM 2010 methodology.

5.7.2 Intersection Capacity Analysis

Following the established intersection capacity analysis criteria described above, existing and future traffic conditions are analysed using the weekday morning and afternoon peak hour traffic volumes derived in this study.

The Level of Service calculation is based on locally-specific parameters as described in the TIA Guidelines and incorporates existing signal timing plans obtained from the City of Ottawa. The analysis existing conditions utilized a Peak Hour Factor (PHF) of 0.90, while future conditions considers optimized signal timing plans and use of a Peak Hour Factor (PHF) of 1.0 to recognize peak spreading beyond a 15-minute period in congested conditions.

The intersection capacity analysis reports have been provided in **Appendix J**.

5.7.2.1 Existing Traffic

Table 18 below summarizes the existing traffic operational performance at the study area intersections based on Existing Traffic volumes.

Table 18 - Intersection Capacity Analysis: Existing Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Limebank & Leitrim	Signalized	C (0.76)	NBT (0.86)	B (0.69)	WBL (0.77)
Limebank & Spratt	Signalized	C (0.73)	EBL (0.78)	A (0.57)	SBT (0.72)
Spratt & Urbandale Plaza	Signalized	A (0.32)	EBTR (0.32)	A (0.23)	NBL (0.41)

As indicated above, the study area intersections are generally operating at an acceptable Level of Service (i.e. LOS ‘E’ or better).

5.7.2.2 Future (2031) Background Traffic

An intersection capacity analysis has been undertaken using the Future (2031) Background Traffic volumes presented previously in **Exhibit 7**.

The results of the intersection capacity analysis are summarized below.

Table 19 - Intersection Capacity Analysis: Future (2031) Background Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Limebank & Leitrim	Signalized	D (0.85)	NBT (0.90)	B (0.69)	SBT (0.76)
Limebank & Spratt	Signalized	B (0.70)	NBT (0.78)	A (0.57)	SBT (0.72)
Spratt & Urbandale Plaza	Signalized	A (0.23)	EBTR (0.23)	A (0.33)	NBL (0.33)
Limebank & Realigned Leitrim	Signalized	D (0.88)	NBT (0.88)	A (0.59)	SBTR (0.59)

The results of the intersection capacity analysis indicate that all study area intersections are expected to operate at an acceptable Level of Service (i.e. LOS ‘E’ or better) under Future (2031) Background Traffic conditions. It should be noted, however, that the Limebank & Leitrim intersection and the Limebank & Realigned Leitrim intersection have movements that are close to exceeding a v/c ratio of 0.90 and therefore any additional traffic could result in LOS ‘E’.

5.7.2.3 Future (2031) Total Traffic

An intersection capacity analysis has been undertaken using the Future (2031) Total Traffic volumes presented previously in **Exhibit 8**.

The results of the intersection capacity analysis are summarized below.

Table 20 - Intersection Capacity Analysis: Future (2031) Total Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Limebank & Leitrim	Signalized	E (0.92)	NBT (0.93)	C (0.77)	WBL (0.86)
	Signalized[1]	D (0.90)	WBL (0.91)	C (0.71)	WBL (0.86)
Limebank & Spratt	Signalized	C (0.75)	EBL (0.79)	B (0.64)	SBT (0.77)
	Signalized[1]	C (0.77)	EBL (0.89)	A (0.58)	EBL (0.67)
Spratt & Urbandale Plaza	Signalized	A (0.23)	EBTR (0.23)	A (0.17)	NBL (0.39)
Limebank & Realigned Leitrim	Signalized	E (0.94)	NBT (0.94)	E (0.99)	EBL (1.16)
	Signalized[2]	E (0.94)	NBT (0.94)	E (0.96)	SBTR (0.96)
	Signalized[3]	D (0.84)	NBT (0.84)	D (0.84)	EBTR (0.90)

Notes:

[1] – Change from uncoordinated to coordinated traffic signals.

[2] – Dual eastbound left-turn auxiliary lanes.

[3] – Change from uncoordinated to coordinated traffic signals with dual eastbound left-turn auxiliary lanes.

Based on the intersection capacity analysis results shown above, both the Limebank & Leitrim intersection and the Limebank & Realigned Leitrim intersection are expected to approach their theoretical capacity under their existing/planned configuration.

The planned configuration for the Limebank & Realigned Leitrim intersection includes only a single eastbound left-turn lane initially, however, the design provisions for the eventual addition of a second eastbound left-turn lane. Given the volume of left-turn traffic projected, dual eastbound left-turn lanes will be required to accommodate site-generated traffic.

The intersections along Limebank Road are also currently uncoordinated and operate independently from each other. It is recommended that the three intersection be coordinated to ensure a smooth progression of traffic from intersection to intersection. The result of the intersection capacity analysis suggests that if the intersections are coordinated then all study area intersection will be able to operate at an acceptable Level of Service (i.e. LOS 'D' or better) under Future (2031) Total Traffic conditions.

5.7.3 Intersection Design (MMLOS)

Analysis of conditions for each mode has been conducted based on the methodology prescribed in the 2017 Multi-Modal Level of Service Guidelines and subsequent Addendum. The Level of Service for each mode has been calculated for each intersection where signals exist.

The Future (2031) Total Traffic intersection MMLOS results have been summarized in **Table 21** below. Detailed analysis results are provided in **Appendix H**.

Table 21 - Intersection-based MMLOS Results

LOCATION	LEVEL OF SERVICE BY MODE			
	PEDESTRIAN (PLOS)	BICYCLE (BLOS)	TRANSIT (TLOS)	TRUCK (TkLOS)
Leitrim & Limebank (Existing)	**F** (Target: C)	**F** (Target: C)	F (Target: N/A[1])	A (Target: D)
Realigned Leitrim & Limebank (Future)	**F** (Target: C)	A (Target: C)	F (Target: N/A[1])	B (Target: D)
Limebank & Spratt (Existing)	**F** (Target: C)	**F** (Target: B)	E (Target: N/A[1])	N/A[2]
Spratt & Urbandale Plaza (Existing)	**F** (Target: C)	**F** (Target: B)	B (Target: N/A[1])	N/A[2]
Spratt & Urbandale Plaza (Future)	**F** (Target: C)	**F** (Target: B)	B (Target: N/A[1])	N/A[2]

Notes:

[1] – There are no TLOS targets for roadways that are not part of the rapid transit or transit priority network.

[2] – Leitrim Road and Limebank Road are identified as truck routes but none of the local/collector roads are truck routes. As TkLOS is only evaluated for right-turn movements that will be used by trucks, the TkLOS target does not apply for these locations.

5.7.3.1 Summary of Potential Improvements

Based on the MMLOS results outlined in **Table 21** above, the following measures have been identified which could improve conditions for each travel mode:

Pedestrians

The PLOS at intersections is based on several factors including the crossing distance, corner radii, and whether the crossing allows for permissive or protective right or left turns, among others. The City of Ottawa target for PLOS in Employment Areas and the General Urban Area is 'C'.

The results of the analysis indicate that all intersections are currently at PLOS 'F'. Given the distances that pedestrians must cross, it is not expected that the PLOS can be improved, however, consideration should be given to implementing leading pedestrian intervals (LPIs) and high-visibility crosswalk markings where warranted by pedestrian volumes. Although these measures won't be sufficient to improve the PLOS, they will represent improvements to pedestrian safety and comfort.

Cyclists

The BLOS at intersections is dependent on several factors: the number of lanes that the cyclist is required to cross to make a left-turn; the presence of a dedicated right-turn lane on the approach; and the operating speed of each approach. The City target for BLOS on Spine Routes is 'C' and for Local Routes it is 'B'.

The results of the analysis indicate that the current and planned cycling facilities result in a BLOS of 'F' at all study area intersections except for the future Limebank & Realigned Leitrim intersection. This is primarily due to the number of lanes that must be crossed to make left-turns as well as the introduction of right-turn lanes to the right of the bike lanes. Achieving the BLOS target at the study area intersections would require reconstruction of the intersections to a protected intersection configuration. It is assumed the Limebank & Realigned Leitrim intersection will be designed as a protected intersection, ultimately, based on the functional design presented in the EA.

Transit

None of the study area intersections are within the Rapid Transit or Transit Priority networks.

Trucks

Both Leitrim Road and Limebank Road are designed truck routes, however, none of the other roadways within the study area are truck routes. TkLOS is only applicable to right-turn movements used by trucks therefore the only intersections for which TkLOS analysis is required is the existing Limebank & Leitrim intersection and the future realigned Limebank & Leitrim intersection. Based on the turning radii and number of receiving lanes available, the TkLOS target is met at both of these intersections.

The recommended measures listed above are intended only as suggestions to the City on how the MMLOS within the study area could be improved and do not identify measures to be implemented as a direct consequence of this development. The remediation measures described above would improve mobility and comfort for all travel modes but are not required to accommodate the proposed development.

5.8 Geometric Review

The following section provides a review of all geometric requirements for the study area intersections.

5.8.1 Sight Distance

Limebank Road has an assumed design speed of 90km/h (posted speed limit plus 10km/h), therefore based on the TAC Geometric Design Guide for Canadian Roads, the minimum intersection sight distance required to permit right-turns-on-red for tractor-trailers (WB 19s and WB 20s) at the Limebank & Realigned Leitrim intersection is 265m. For Spratt Road, the assumed design speed is 70 km/h and therefore the minimum intersection sight distance required to permit right-turns on red for passenger vehicles is 130m. Given that the site access on Spratt Road will provide access to residential land uses only, there is no need to ensure that tractor-trailers can be accommodated.

Based on a desktop review of sightlines, sufficient sight distance is available at both intersections to permit right-turns-on-red.

5.8.2 Auxiliary Lane Analysis

Auxiliary turning lane requirements for all intersections within the study area are described below. The minimum storage requirements do not include deceleration or taper length requirements.

5.8.2.1 Auxiliary Left-Turn Lane Requirements (Signalized Intersections)

A review of auxiliary left-turn lane storage requirements was completed under Future (2031) Total Traffic conditions, comparing the highest queue lengths on each intersection approach under weekday morning and afternoon peak hours. The review compared the projected 95th percentile

queue lengths from Synchro operational results, and the standard queue length calculation based on the following equation:

$$Storage\ Length = \frac{NL}{C} \times 1.5$$

Where:
N = number of vehicles per hour
L = Length occupied by a vehicle in the queue = 7 m
C = number of traffic signal cycles per hour

The results of the auxiliary left-turn lane analysis are summarized below in **Table 22** below.

Table 22 - Auxiliary Left-Turn Storage Analysis at Signalized Intersections

INTERSECTION	APPROACH	MAXIMUM 95TH %ILE QUEUE LENGTH (m)	MAXIMUM CALCULATED QUEUE LENGTH (m)	EXISTING/ PLANNED PARALLEL LENGTH (m)	STORAGE DEFICIENCY (m)
Limebank & Leitrim	NB	m5	5	195	-
	SB	#60	60	210	-
	EB	5	5	130	-
	WB	#95	110	120	-
Limebank & Spratt	NB	20	15	205	-
	SB	25	20	255	-
	EB	#100	115	100	-[1]
	WB	25	25	95	-
Spratt & Urbandale Plaza	NB	20	15	-	-
	EB	5	5	-	15
	WB	5	10	-	-
Limebank & Realigned Leitrim	NB	m25	105	90	15
	SB	m25	45	90	-
	EB	#80	70	90	-
	WB	15	10	125	-

Notes:
[1] – There is no space to extend the auxiliary left-turn lane due to the nearby adjacent Spratt & Urbandale Plaza intersection.

Based on the results above, an eastbound auxiliary left-turn lane with at least 15m of storage is recommended at the Spratt & Urbandale Plaza intersection. Although only 5m of storage is required, 15m is typically the recommended minimum length.

The results also indicate that at the Limebank & Realigned Leitrim intersection, the northbound left-turn auxiliary lane should be constructed with at least 105m of storage rather than the 90m of storage indicated in the EA Functional Design.

Note: The above storage lengths shall be considered at the design stage for these intersections. The values presented do not give consideration to deceleration or taper requirements.

5.8.2.2 Auxiliary Right-Turn Lane Requirements (Signalized Intersections)

Section 9.14 of TAC suggests that auxiliary right-turn lanes shall be considered when more than 10% of vehicles on an approach are turning right and when the peak hour demand exceeds 60 vehicles. The purpose of this guideline is to mitigate operational impacts to through-traffic, particularly on high-speed arterial roadways, and may not be applicable in all circumstances. The highest of the weekday morning and afternoon peak hour volumes under Future (2031) Total Traffic conditions were considered in this evaluation. Auxiliary right-turn lane warrants were not evaluated for movements with existing right-turn lanes.

The results of the auxiliary right-turn lane analysis are summarized in **Table 23** below.

Table 23 – Auxiliary Right-Turn Lane Storage Analysis at Signalized Intersections

INTERSECTION	APPROACH	MAXIMUM RIGHT TURN VOLUME	MAXIMUM PERCENTAGE OF VEHICLES TURNING RIGHT (%)	CONSIDERATION
Spratt & Urbandale Plaza	NB	3	21%	No
	SB	2	20%	No
	EB	30	11%	No
	WB	6	1%	No
Limebank & Realigned Leitrim	NB	0	0%	No
	SB	373	37%	Yes
	EB	239	43%	Yes
	WB	8	25%	No

Note: The above storage lengths shall be considered at the design stage for these intersections. The values presented do not give consideration to deceleration or taper requirements.

The results of the auxiliary right-turn lane analysis indicate that an eastbound and southbound right-turn lane is warranted at the future Limebank & Realigned Leitrim intersection. Sensitivity analysis indicates that if auxiliary right-turn lanes were provided, the maximum 95th percentile queue would be 45.5m and 31.4m, respectively. It is therefore recommended that an eastbound and southbound right-turn lane with at least 50m and 35m of storage, respectively, be provided when the intersection is constructed.

Note: The above storage lengths shall be considered at the design stage for these intersections. The values presented do not give consideration to deceleration or taper requirements.

5.9 Summary of Recommended Improvements

Based on the results of the intersection capacity analysis, the following modifications are recommended:

- **Limebank Road & Leitrim Road:** Coordinate signal timing along Limebank Road.
- **Limebank Road & Realigned Leitrim Road:** Incorporate dual eastbound left-turn lanes, 105m of storage for the northbound left-turn lane, 50m of storage for the eastbound right-

turn lane and 35m of storage for the southbound right-turn lane into the design indicated in the ESR, and coordinate signal timing along Limebank Road.

- **Limebank Road & Spratt Road:** Coordinate signal timing along Limebank Road.
- **Spratt Road & Urbandale Plaza:** Include 15m of storage for the eastbound left-turn lane.

The MMLOS analysis also suggested that leading pedestrian intervals (LPIs) and high-visibility crosswalks be implemented at all signalized intersections but should be further evaluated by the City based on future pedestrian volumes. In the long-term, it is recommended that the City consider reconstruction of the study area intersections as protected intersections in order to improve safety and comfort for cyclists, and that cycle tracks be provided on both sides of Limebank Road. These future modifications are recommended to address the existing MMLOS deficiencies that are primarily a result of intersection size and are not triggered by or required to accommodate the proposed development.

6 Conclusion

The industrial/employment portion of the proposed Riverside South Employment Lands are expected to generate up to 1,008 and 936 two-way person trips during the weekday morning and afternoon peak hours, respectively, while the residential portion is expected to generated up to 25 and 27 two-way person trips. These person-trips were assigned mode share targets consistent with the South Gloucester/Leitrim Traffic Assessment Zone (TAZ) in the 2020 TRANS Trip Generation Manual Summary Report and adjusted to reflect the transit and active transportation mode share targets outlined in the Draft Riverside South CDP Transportation Update and 2013 TMP. These person-trips were subsequently distributed and assigned to the adjacent roadway network based on the 2011 O-D Survey.

The resulting two-way vehicle trip generation is, therefore 756 and 702 two-way vehicle-trips during the weekday morning and afternoon peak hours, respectively, for the industrial/employment portion of the site, and 11 and 12 two-way vehicle-trips, respectively, for the residential portion of the site.

Site-generated traffic will access the public roadway network via a new signalized intersection along the future re-alignment of Leitrim Road and via a new private approach at the signalized Spratt & Urbandale Plaza intersection.

As indicated by the analysis conducted for this study, some capacity issues are anticipated under Future (2031) Total Traffic conditions. To mitigate these capacity issues, it is recommended that the intersections along Limebank Road be coordinated to ensure a smooth progression of traffic along the corridor.

The following modifications to the design of the Limebank & Realigned Leitrim intersection are also recommended based on the results of the intersection capacity analysis and auxiliary lane analysis:

- Implement dual eastbound left-turn lanes. These have already been provisioned for in the intersection design from the ESR, however, the design assumed that only a single left-turn lane would be required initially.
- Provide 105m of storage (minimum) for the northbound left-turn lane rather than the 90m currently planned.
- Provide an eastbound and southbound right-turn lane with at least 50m and 35m of storage, respectively.

An eastbound left-turn lane with 15m of storage (minimum) is also recommended at the Spratt & Urbandale Plaza intersection.

It should be noted that the above storage lane recommendations do not include deceleration and taper requirements.

Multi-Modal Level of Service analysis was conducted for the roadway segments and signalized intersections within the study area. Based on the results of the analysis, it is recommended that the City consider implementing the following measures:

- **Short-Term:** Consider implementing leading pedestrian intervals (LPIs) and high-visibility crosswalk markings at all signalized intersections in the study area, based on pedestrian volumes; and
- **Long-Term:** Consider implementing a protected intersection design at all signalized intersections, providing cycle tracks on both sides of the study area roadways and providing sidewalks and cycle tracks along the realigned Leitrim Road if widened and urbanized in the future.

It should be noted that the above recommendations would improve mobility and comfort for all travel modes but are not required to accommodate the proposed development. Level of Service for cyclists and pedestrians is largely dictated by the size of an intersection and therefore mitigation measures are often limited in these circumstances. The proposed measures are recommended in order to address existing deficiencies and not as a direct consequence of the proposed development.

It is also recommended that new transit stops be provided along the realigned Leitrim Road at the Limebank Road intersection, at the Street #2 intersection and the westernmost intersection with Street #1 in order to ensure adequate transit coverage for the site upon full build-out.

All intersections were shown to operate well under their theoretical capacities within the timeframe of this study with the recommended mitigation measures. A post-development monitoring plan is therefore not a requirement of this study. The functional design of the access intersections on Spratt Road and on Limebank Road will require further discussion with the City and therefore are not included in this TIA.

Based on the findings of this study, it is the overall opinion of IBI Group that the proposed development will integrate well with and can be safely accommodated by the adjacent transportation network.

Appendix A – City Circulation Comments

M E M O / N O T E D E S E R V I C E

To / Destinataire	File **Final** Meeting Notes – April 7, 2015	File/N° de fichier: PC 2014-0201 Part of 3700 Twin Falls Place Now 4020 Spratt Road
From / Expéditeur	Cathlyn Kaufman Development Review – Suburban - Southeast Planning and Growth Management	Date: April 29, 2015

Subject: Pre-consultation Meeting –
For Subdivision and Zoning Application
Where: City Hall, 110 Laurier Avenue, Meeting Room 4102
Date: April 7, 2015
Time: 10:30 am to 12:00 pm

Those in attendance:
City: Cathlyn Kaufman, File Lead Planner
Jacek Taracha, Senior Engineer,
Asad Yousfani, Project Manager, Transportation
Don Morse, Planner III, Urban Design
Matthew Hayley, Planner II, Environment

Applicant: Mary Jarvis, RSDC
Lucie Dalrymple, J.L. Richards and Associates (Engineering)
Curtiss Scarlett, J.L. Richards and Associates (Engineering)
Lee Jablonski, J.L. Richards and Associates (Transportation)
Katie Morphet, J.L. Richards and Associates (Planning)
Tim Chadder, J.L. Richards and Associates (Planning)
Alex Zeller, Dillon Consulting
Erin Wilson, Golder Associates
David Gilbert, Parterson Group

Regards: Gord Elliott, Project Manager, Infrastructure, Jennifer Hemmings, Parks Planner,
Jocelyn Chandler, RVCA: Martha Copestake, Forestry Planner;

Further Comments received from :
1. Municipal Addressing, April 20, 2015 (provided on Page 4)
2. Jocelyn Chandler, April 10, 2015 (Attached on Page 4)
3. Gord Elliott, April 29, 2015 (provided on Page 5)

The detailed 'Applicant's Study and Plan Identification List' will be provided as a separate document.

Purpose:

A pre-application consultation meeting for Subdivision and Zoning applications for under 50 unit plan of subdivision know as Riverside South – Phase 16. The number of units is to be confirmed.

Location Summary Details:

The parcel, referenced as part of 3700 Twin Falls Place, will be re-addressed to have a Spratt Road address. This parcel is part of a large landholding which is bisected by Mosquito Creek and a small ravine. The area being proposed to be developed is 2.72 hectares on the north side of Spratt Road, south side of Mosquito Creek and approximately 200 metres west of Limebank Road.

Note: At the meeting it was determined that the parcel to the east of this site located in the north west quadrant of the intersection of Limebank Road and Spratt Road will be developed in the future through the following possible planning applications : severance, site plan and zoning.

Items discussed in an Open Forum

1. Proposed Development is based on Pre-application consultation dated September 2014 and draft subdivision concept plan received by the City in March 2015.
   Number of Townhouses: under 50 units? To be confirmed
   Ravine Setback Block – 15 metre top of bank/slope ore limit of hazard lands whichever is the greater.
   Valley Lands of Mosquito Creek and the small ravine to the east are outside of the subdivision.
2. Engineering points raised:
   - it is recognized that the stormwater (SW) from this subdivision will drain to Mosquito Creek via a storm sceptor at a location that will be determined.
   - the outfall of the municipally owned storm scepter which is outside of the subdivision will be shown as a block on the Draft 4M-plan and set out in a Draft Condition.
   - there much discussion around if watermain looping would be required and this is to be determined once the number of units is confirmed. If the total number of units is 50 or more that watermain will have to be looped.
   - since the Master Servicing Study contemplated that this parcel and the parcel to the east would be developed together there was further consideration given to how the service the parcels separately.
   - it was noted that the water main in the north section of Limebank Road is not live.
   - Jacek to confirm the watermain connection to the existing 350 mm dia HDPE pipe in Spratt Road.
   - Spratt Road will have to be ripped up to allow connection to sanitary sewer and the watermain.
   - The issue of stormwater management storage requirements and what to design to is to be.
   It is confirmed, after, the meeting, that the original 50m3/ha sag storage is OK providing that the 0.30 allowed ponding depth and the inlet capacity of 94 l/s/ha is maintained.
   After conversation with RVCA on April 16, 2015, there will be a requirement that the existing Spratt Road storm sewer to be redirected via the subdivision to the proposed oil and grit separator (sceptor unit).
3. Geotechnical discussion
   - the limit of development will be determined and best location for the storm sceptor have to be further examined as to the possible 'best' recommended location given slope issues and possible environmental constraints such as significant trees
4. RVCA – both the limit of development, storm sceptor location and outfall design will be subject to RVCA review and possible permits as determined.

5. Transportation Discussion

- due to the size of this subdivision and the fact that there is an existing intersection with traffic signals that will be used to access this subdivision, a Traffic Memo was requested.
- it was noted that the proposed public street within the subdivision is to align with the existing intersection.
- after Draft Plan approval and before subdivision registration, there will be a requirement for Road Modification Design at 80% complete to be submitted and approved.
- Cul-de-sac design was reviewed. 18 m radius with 16.50 m Right-of-way. Pavement width would be 8.5 metres of asphalt with 4 metres of boulevard on each side. This would allow a 14 metre radius of asphalt in the cul-de-sac which is what the Fire Department and City Operations requires for turning the large vehicles.

6. Park Dedication Requirement

- will be based on the units proposed and will be tracked through a condition of subdivision registration of the accumulation of parkland for a District Park.
- An approved Riverside South modified Area Park Plan (mAPP) will required to be in place prior to the registration of the subdivision.

7. Urban Design Comments:

- the proposed layout is similar to the existing Riverside South (RS) CDP and this area of Riverside South will probably be minimally impacted by the updated that is being done for the RS CDP.
- design of units will be to the internal public street but noise walls should be avoided.
- consider the unique location of the site as it is surrounded by ravine lands and the Mosquito Creek valley land. Design should be keep open with minimal fencing requirements where possible.
- the area is shown as low density but medium density could be considered for this parcel.
- the site layout will be refined as the lotting layout was not totally being accessed via the internal public road.

8. Environmental Matters:

- An Environment Impact Statement is required to look at the following items and this is not an all inclusive list as there may be other item found once the seasonal studies are completed:
    - should consider significant valley lands and woodlands.
    - species at risk (Endangered and Threatened Species)
    - woods – distinctive trees
- there was some questions about the proposed subdivision design and it was recognized that the subdivision layout will be refined.
- the EIS will need to include a discussion of where the stormwater outlet can/will be located from an environmental prespective.
- Tree Conservation Report required.

9. Archaeological Resource Assessment

- Mosquito Creek considered an important waterway.

Therefore for property within 300 metres of waterway and 100 metres of important overland route (Limebank Road) – an archaeological assessment is required.

- there has been some field work done.
- 3 copies required with Draft Plan application together with proof the Assessment has been submitted to Province.
- Study will probably include both Parcels as the properties are being assessed together.

10. Planning Process: Subdivision and Zoning can move forward at same time. It was noted that until the Limit of Development is clearly defined there may be a need to put the Zoning Application ‘On Hold’ until the development limit is accepted and approved.

Other Items:

Note: As a follow-up to the meeting, the Riverside South CDP dated January 15, 2015 does show the subject parcel as medium density. If the planning application are submitted in advance of the Riverside South CDP update, this proposed medium density land use should be recognized.

Additional Information and Comments:

1. Municipal Addressing: (April 20, 2015)
    - Parcel 1 west of small green corridor on RS CDP – 4020 Spratt Road.
    - Parcel 2 east of small green corridor on RS CDP – 4010 Spratt Road

2. RVCA: Jocelyn Chandler (April 10, 2015)

I have had a preliminary look at the proposed subdivision lands and draft meeting minutes and have the following comments on behalf of the RVCA:

1. The main stem of Mosquito Creek R-3 which is at the south-west boundary of the site will require site specific delineation of constraint lines as follows:

    - 30 m from NHWM
    - 15 from Top of slope
    - Geotechnical as per MNR & city of Ottawa Guidelines
    - Meanderbelt

2. Tributary 3 at the north-west boundary of the site will require site specific delineation of constraint lines as above. At one time there were proposed works related to erosion thresholds proposed along this reach. What is the status of these works (or proposed works). Might this change through completion of the MSS Update?
3. Tributary 3C/D as shown in red on the attached map appears to have been considered during the fisheries assessment and DFO work. It was expected to be filled and was accounted for in the compensation calculations (to be confirmed). It is our understanding that because this work was already reviewed and approved under the Fisheries Act, no other fisheries assessment under DFO will be required.
4. If Trib 3C/D is to be filled, a permit to alter (fill/close) this watercourse will be required under O.Reg 174/06, and any upstream drainage accounted for.
5. Based on above the north-east boundary will require rational (will Trib C/D be retained?... therefore setbacks required or will it be closed and the lot line with the adjacent future development to be established.
6. It is our understanding that stormwater will be collected and outletted to Mosquito Creek directly. Quality controls must be 80% TSS removal. Quantity as per thresholds identified in RSS MSS.
7. Location of these stormwater outlets must be discussed directly with RVCA watercourse regulations staff (Hal Stimson).
8. A permit under O.Reg 174/06 will be required prior to any works on the bed or banks of any watercourses.
9. We strongly advise that sediment curtains and orange construction fencing must be set up along the constraint boundaries adjacent the watercourses prior to undertaking any works on the site.

3. Infrastructure Comments: Gord Elliott (April 29, 2015)

Per our conversation yesterday I have the following additional comments that need further discussion with RSDC, I left a message with Mary Jarvis but as of today have not rec'd a return call.

1. RSDC should have further discussion with the City & RVCA on land development benefits of filling Tributary# 3D. Some of the benefits may include eliminating most of the set back requirements to the ravine, providing more developable land, provides opportunity for a "servicing corridor" and watermain looping to both blocks of land (currently isolated by the ravine), potential for one SWM treatment location + one outlet pipe to Mosquito creek and it may provide better access for both site (ie existing traffic lights @ plaza vs restricted rt in rt out).

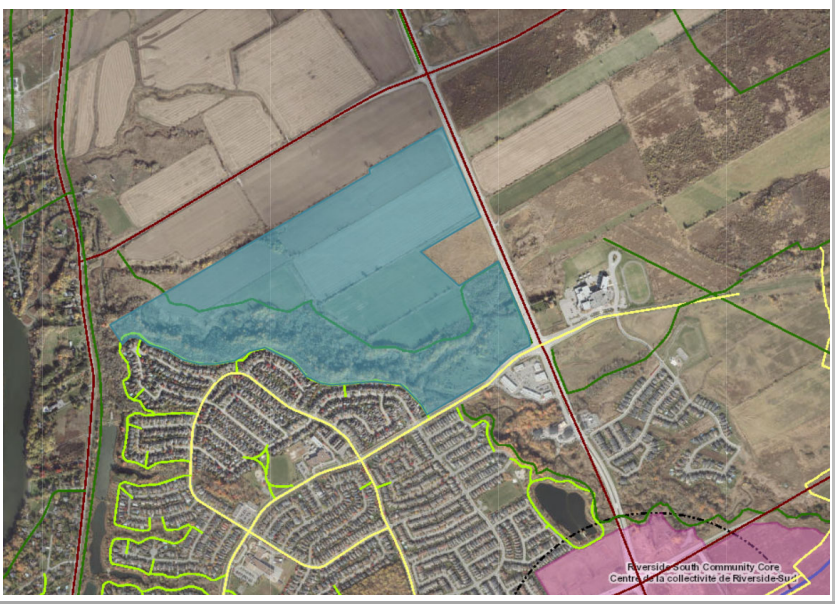
2. I have rec'd confirmation from Chris Hamilton in Drinking Water Services Division (see separate e-mail) that the existing 350 HDPE pipe in Spratt Rd will remain in service and this project must connect to the 350 pipe in Spratt Rd.

Further discussion on this matter with Mary and the consultants is suggested.

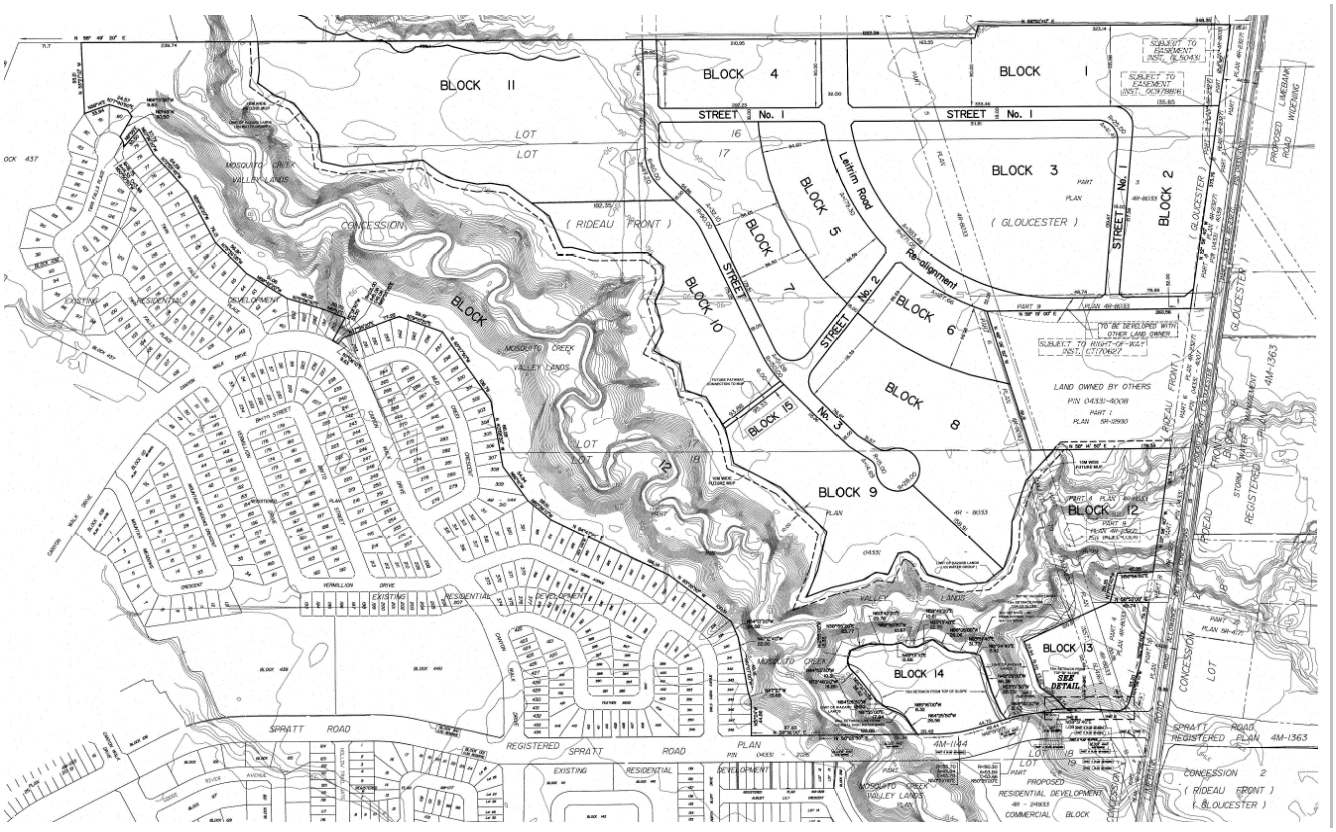
Appendix B – Screening Form

City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	3700 Twin Falls Place
Description of Location	West of Limebank Road, between Leitrim Road and Spratt Road. 
Land Use Classification	Employment, institutional and residential
Development Size (units)	38 townhouse units
Development Size (m^2)	42.3 hectares of employment lands and 1.6 hectares of land for a firehall
Number of Accesses and Locations	One (1) new signalized access on Limebank Road and a new approach at the signalized Spratt Road & Urbandale Plaza intersection.
Phase of Development	One Phase
Buildout Year	TBD

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	
Single-family homes	40 units	
Townhomes or apartments	90 units	
Office	3,500 m^2	
Industrial	5,000 m^2	✓
Fast-food restaurant or coffee shop	100 m^2	
Destination Retail	1,000 m^2	
Gas Station or convenience market	75 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.*

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 Spine Bicycle Networks?	✓	
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?*		✓

**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.*

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 dewvelopment 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.

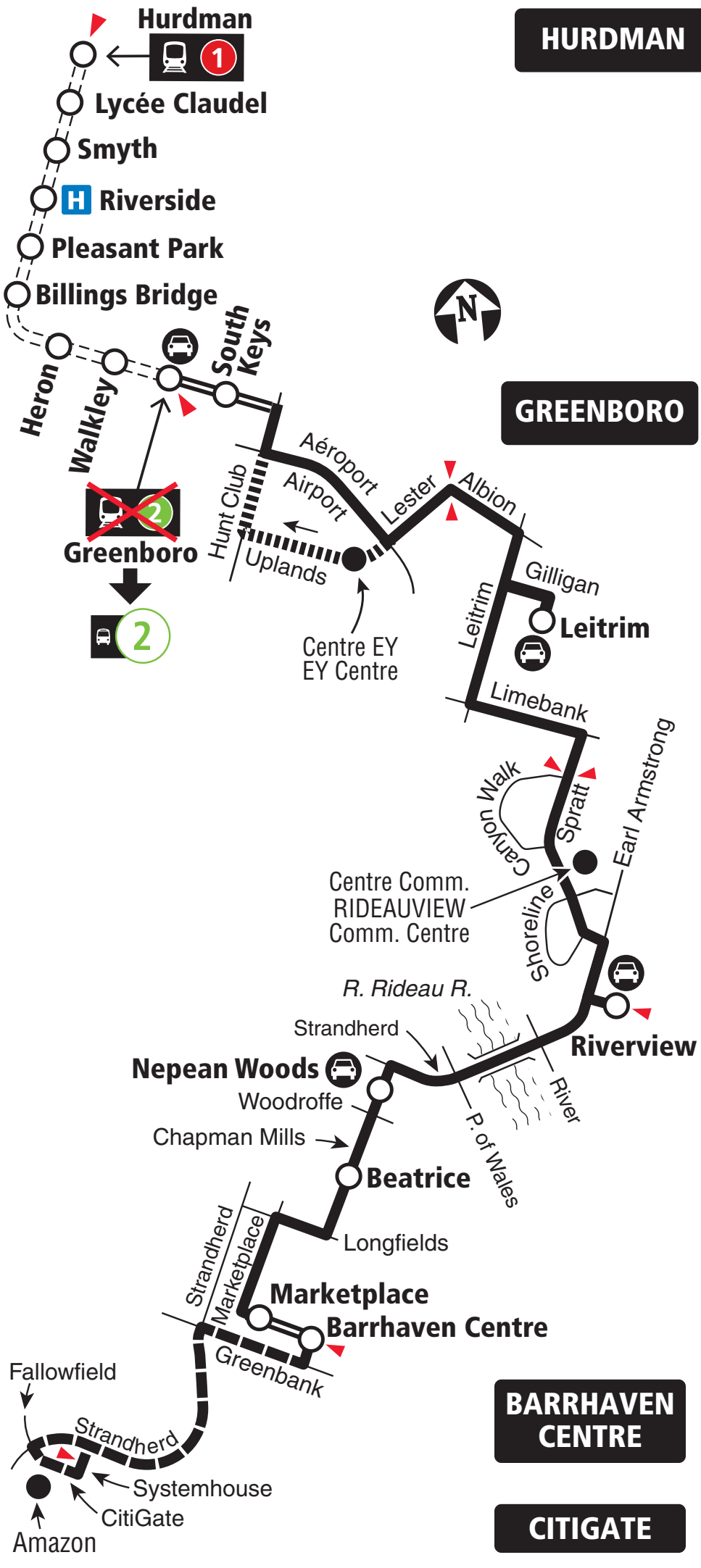
Appendix C – OC Transpo Routes

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

299

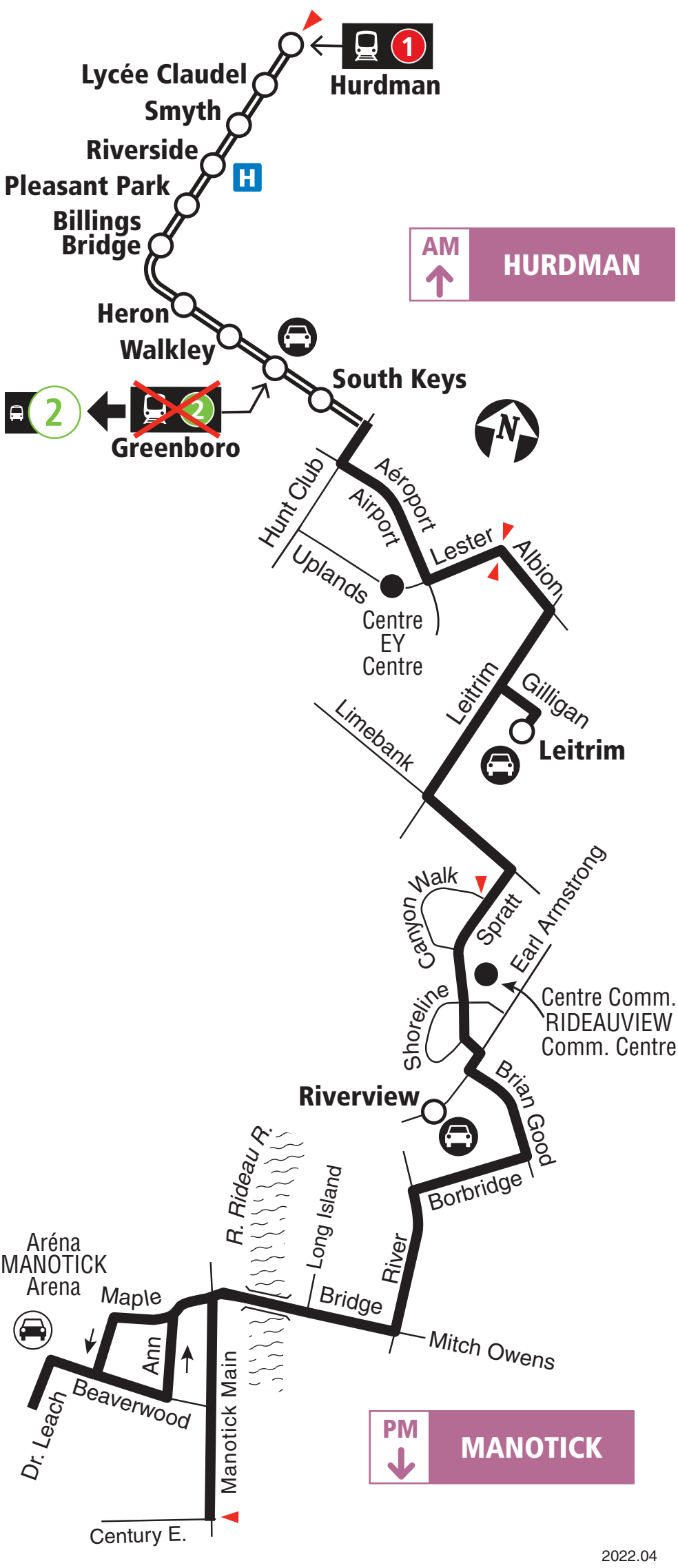
MANOTICK
HURDMAN

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**

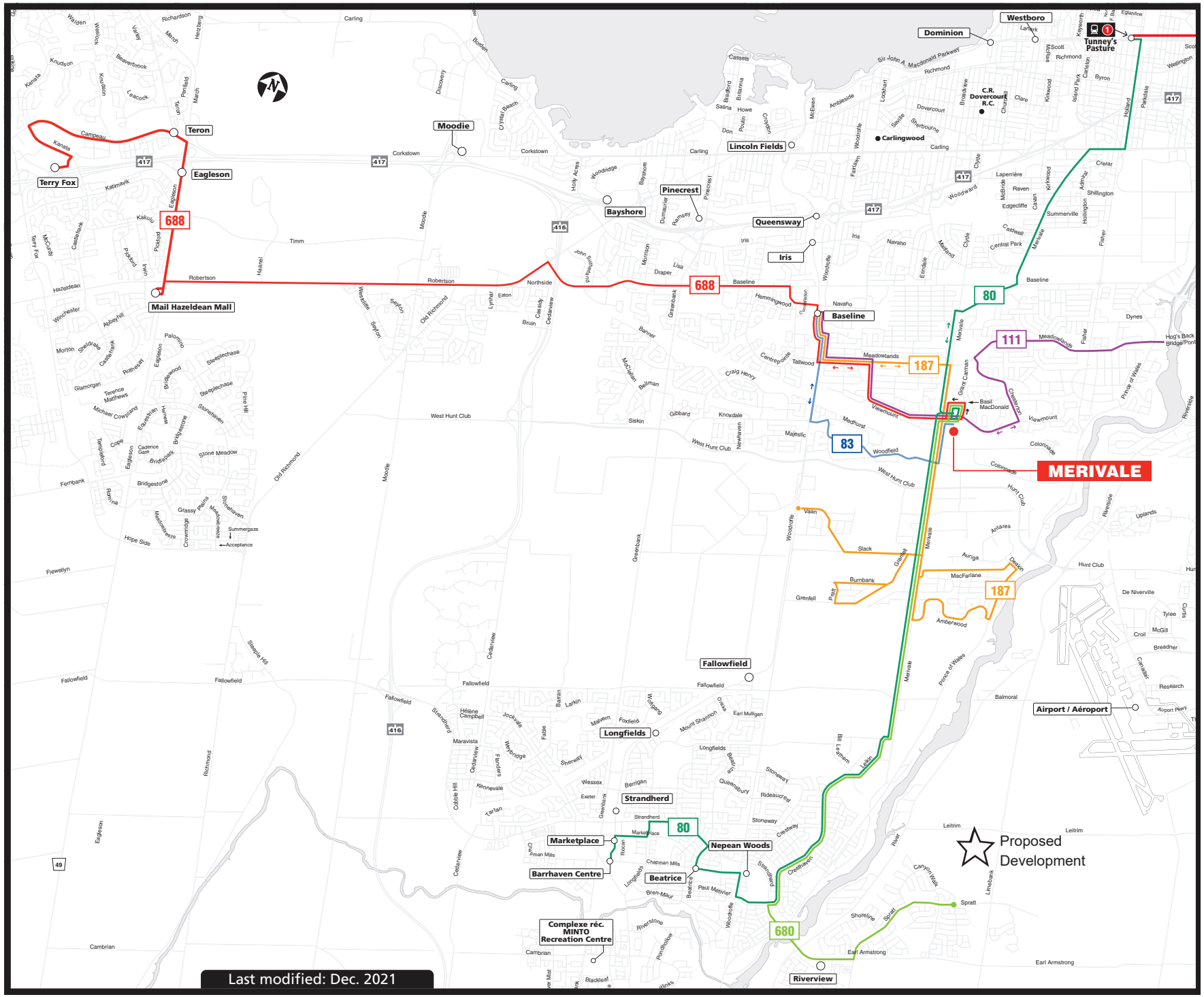
Security / Sécurité **613-741-2478**

Effective April 24, 2022

En vigueur 24 avril 2022

OC Transpo

INFO 613-560-5000
octranspo.com


Westboro
Dominion
Tunney's Pasture
Teron
Eagleson
Terry Fox
Moodie
Bayshore
Pinecrest
Lincoln Fields
Carlingwood
Queensway
Iris
Baseline
Mail Hazeldean Mall
688
80
111
187
83
MERIVALE
Fallowfield
Longfields
Strandherd
Marketplace
Barrhaven Centre
Nepean Woods
Beatrice
Complexe réc. MINTO Recreation Centre
Riverview
680
Airport / Aéroport
Proposed Development
Last modified: Dec. 2021

Appendix D – Collision Data

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
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
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	

Transportation Services - Traffic Services

Collision Details Report - Public Version

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

Location: LIMEBANK RD btwn LEITRIM RD & SPRATT RD

Traffic Control: No control **Total Collisions:** 7

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2018-Jan-07, Sun,12:09	Clear	SMV other	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Pole (utility, power)	0
2018-Feb-04, Sun,03:37	Snow	SMV other	P.D. only	Loose snow	North	Going ahead	Automobile, station wagon	Skidding/sliding	0
2018-Dec-16, Sun,02:30	Clear	Rear end	P.D. only	Dry	North	Going ahead	Unknown	Other motor vehicle	0
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2019-Feb-08, Fri,08:59	Clear	Other	P.D. only	Wet	North	Going ahead	Automobile, station wagon	Debris falling off vehicle	0
					South	Going ahead	Unknown	Other	
2019-Nov-22, Fri,18:36	Clear	SMV other	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Animal - wild	0
2020-Feb-06, Thu,23:08	Snow	SMV other	Non-fatal injury	Loose snow	South	Going ahead	Pick-up truck	Curb	0
2020-Feb-12, Wed,07:40	Clear	Rear end	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Stopped	Automobile, station wagon	Other motor vehicle	

Transportation Services - Traffic Services

Collision Details Report - Public Version

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

Location: SPRATT RD btwn LIMEBANK RD & OWLS CABIN AVE

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
2020-Dec-01, Tue,15:59	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	

Appendix E – Traffic Data

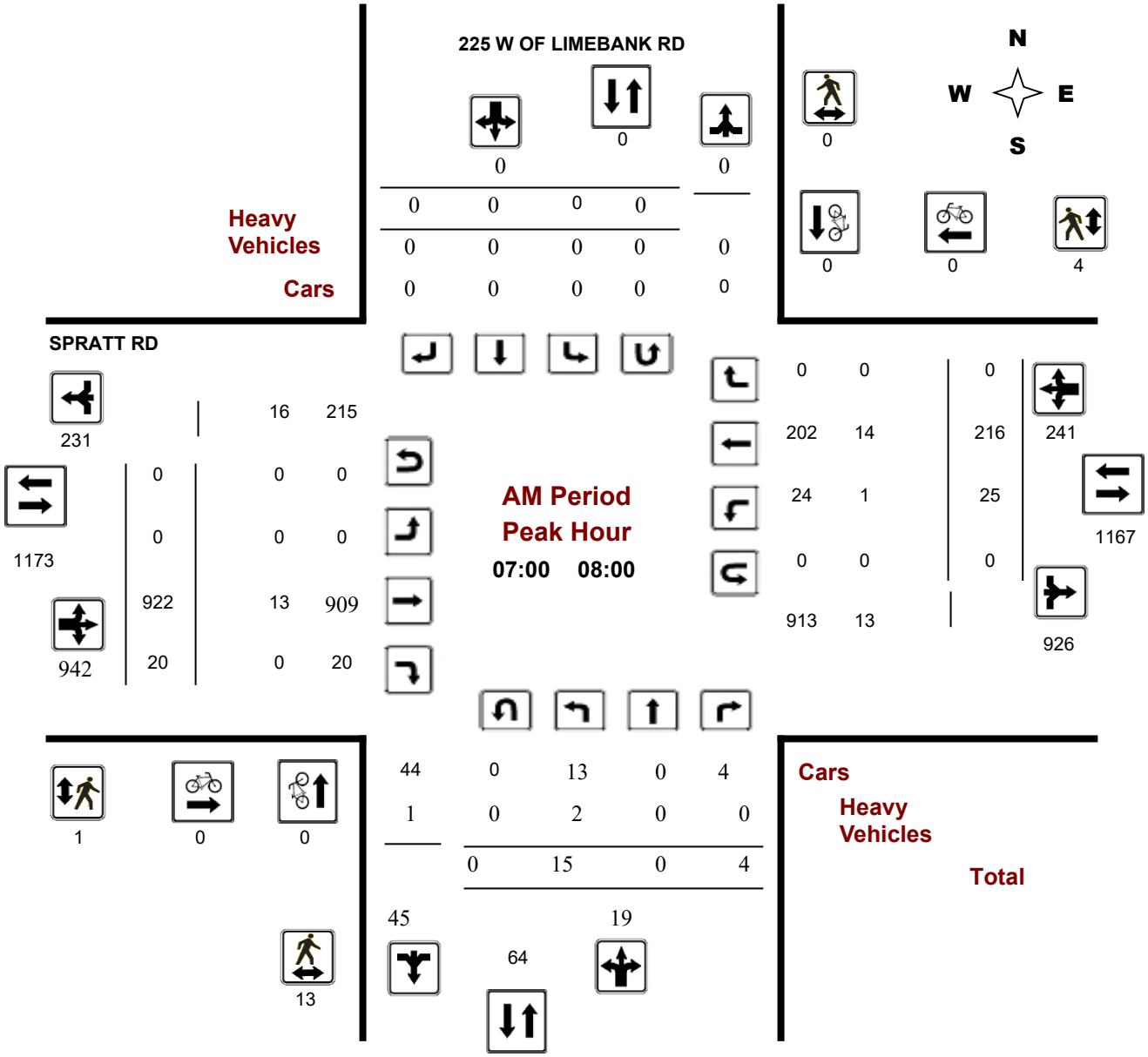
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

225 W OF LIMEBANK RD @ SPRATT RD

Survey Date: Wednesday, November 21, 2018 **WO No:** 38151

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



Comments

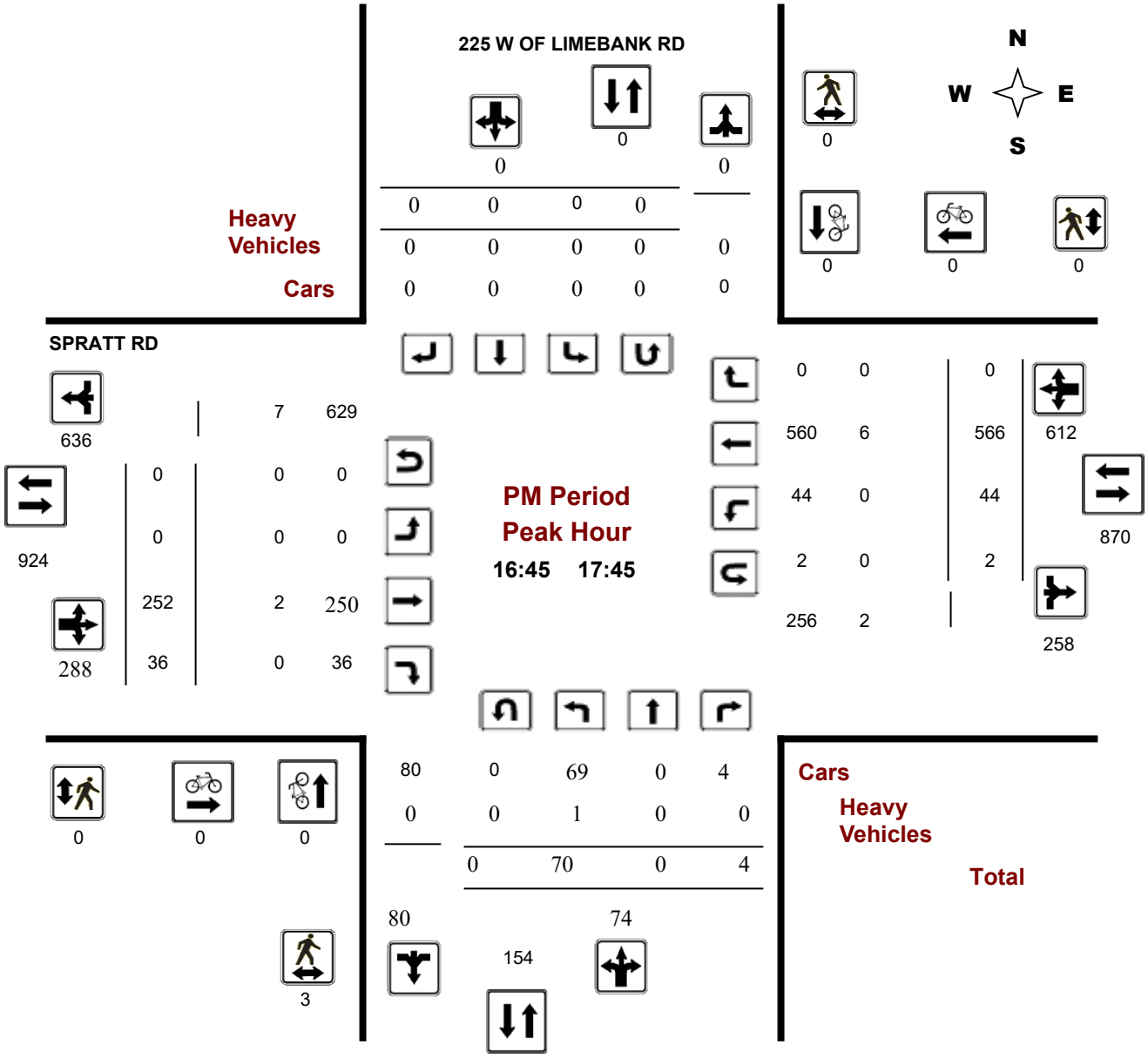
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

225 W OF LIMEBANK RD @ SPRATT RD

Survey Date: Wednesday, November 21, 2018 **WO No:** 38151

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



Comments

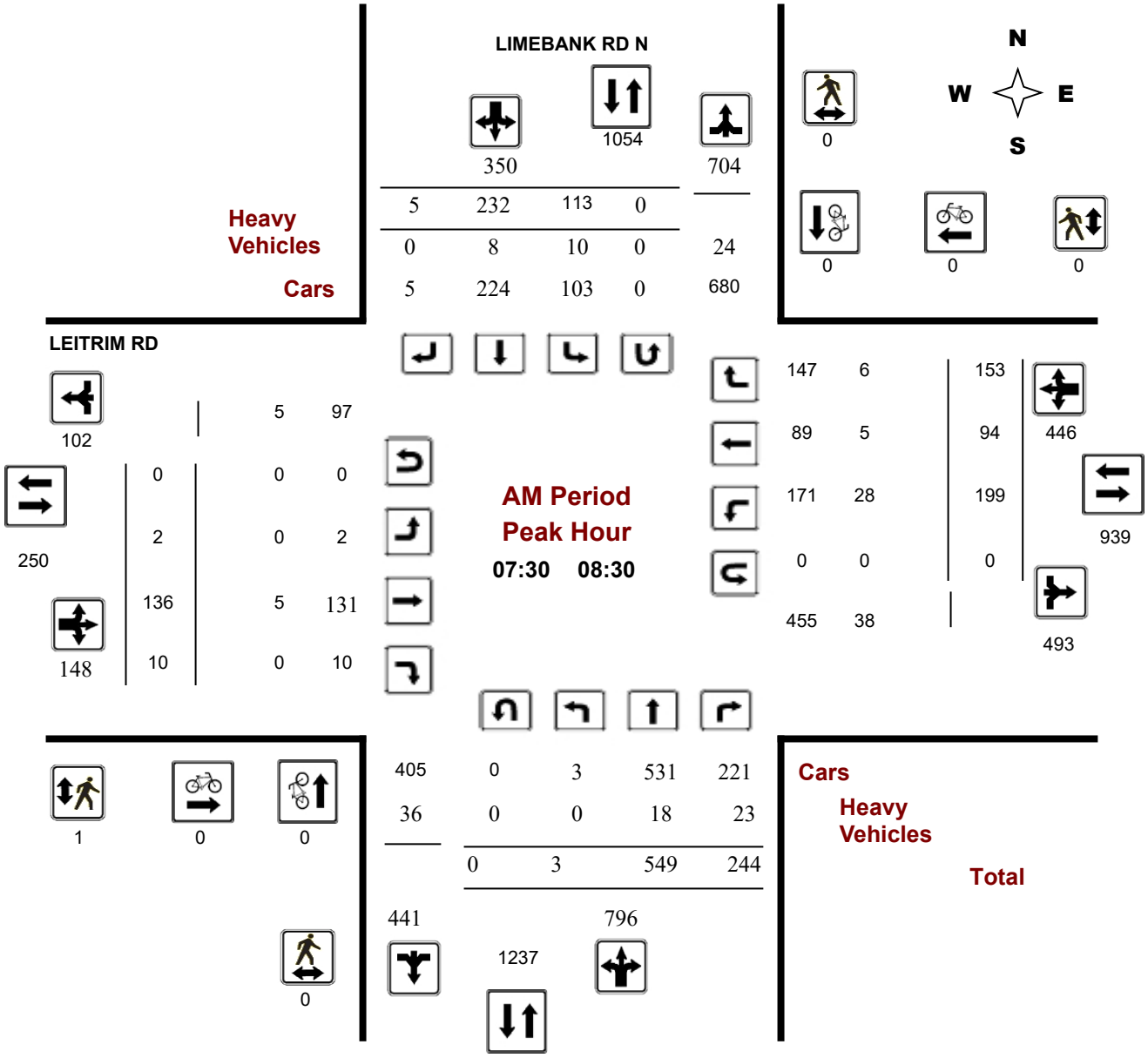
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

LEITRIM RD @ LIMEBANK RD N

Survey Date: Wednesday, February 02, 2022 **WO No:** 40094

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



Comments

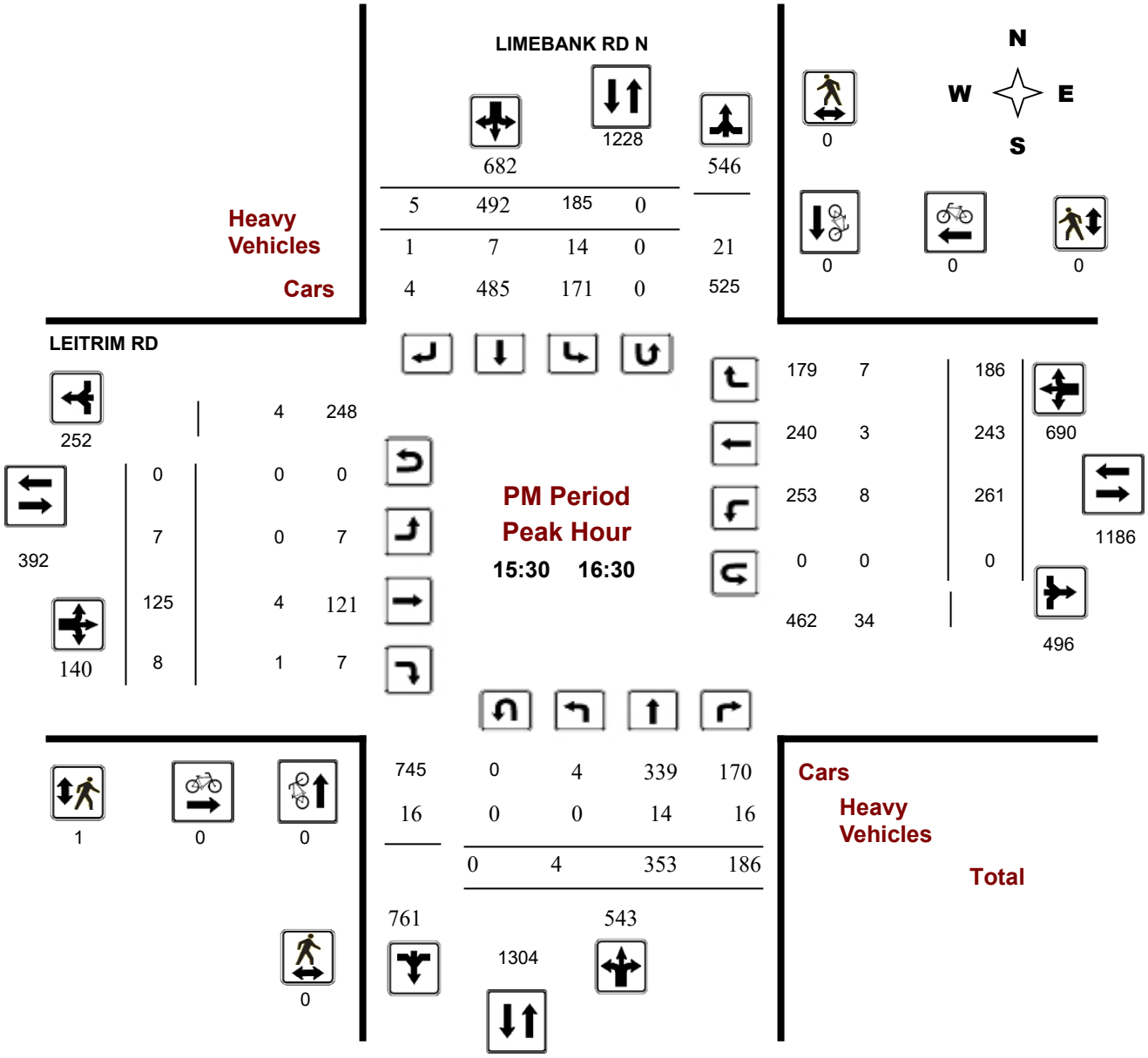
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

LEITRIM RD @ LIMEBANK RD N

Survey Date: Wednesday, February 02, 2022 **WO No:** 40094

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



Comments

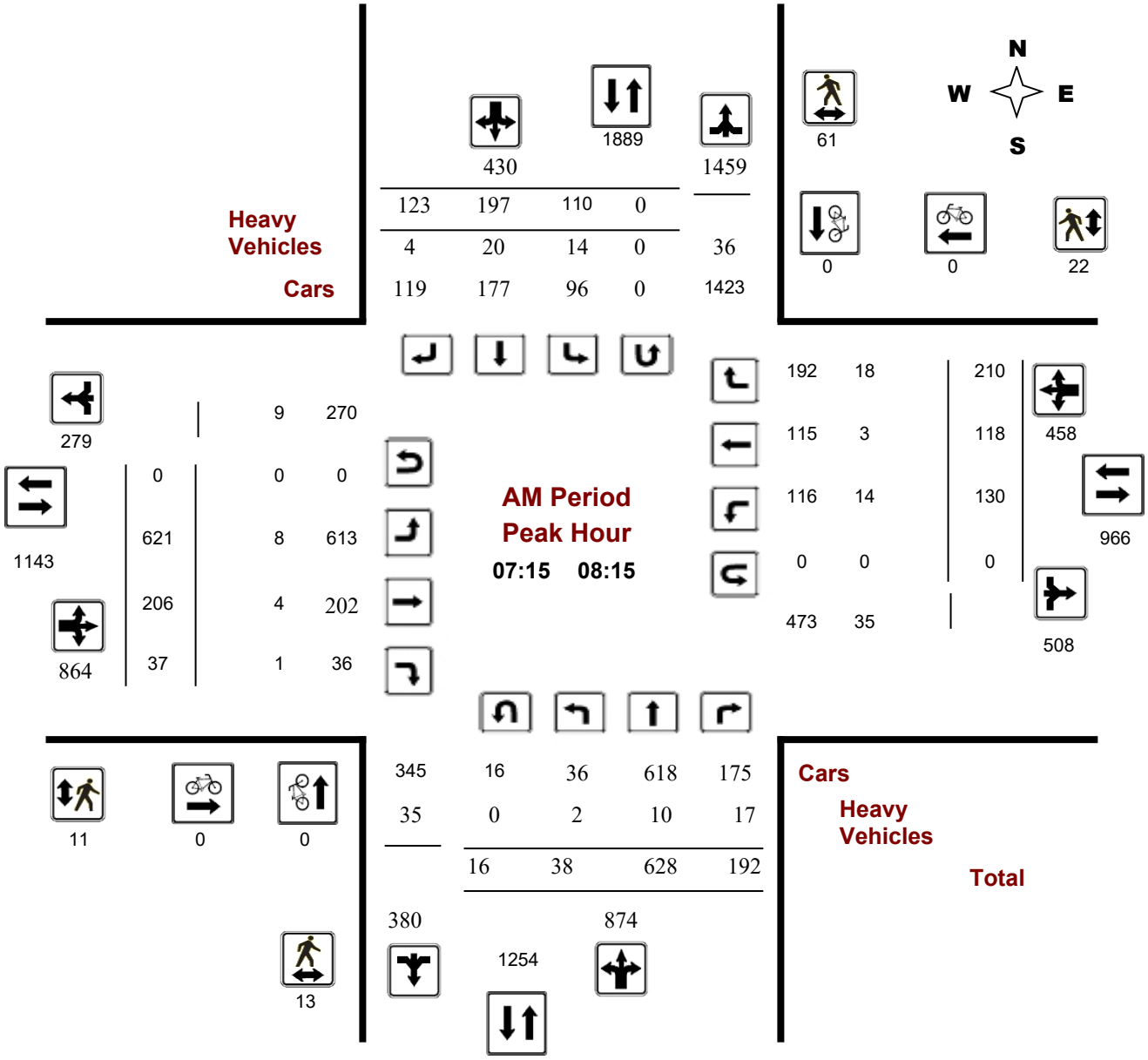
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

LIMEBANK RD @ SPRATT RD

Survey Date: Wednesday, December 18, 2019 **WO No:** 39637

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



Comments 5467460 - LIMEBANK RD & SPRATT RD - WED DEC 18TH - 8 HRS - LORETTA

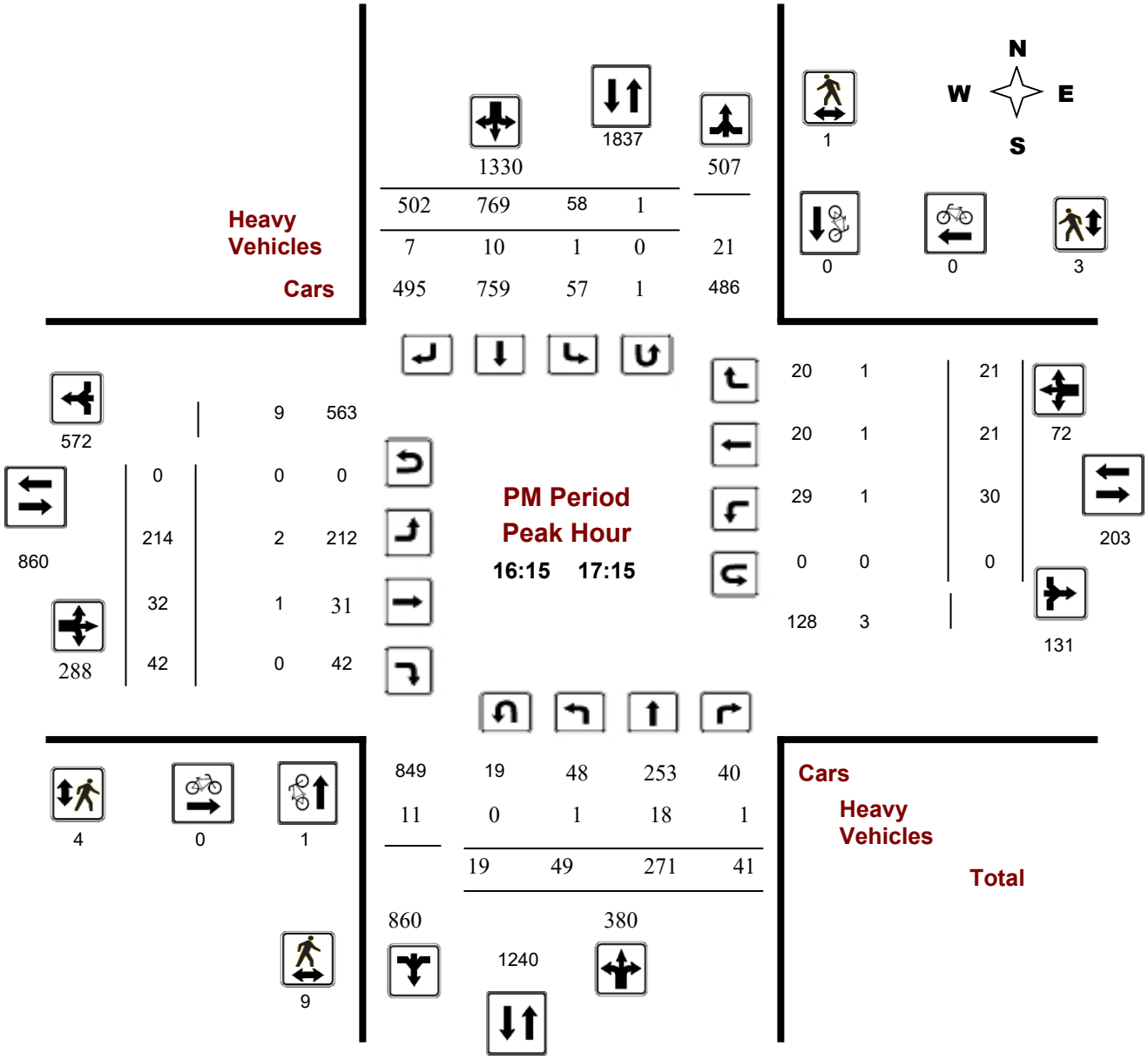
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

LIMEBANK RD @ SPRATT RD

Survey Date: Wednesday, December 18, 2019 **WO No:** 39637

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



Comments 5467460 - LIMEBANK RD & SPRATT RD - WED DEC 18TH - 8 HRS - LORETTA

Appendix F – Trip Generation Data

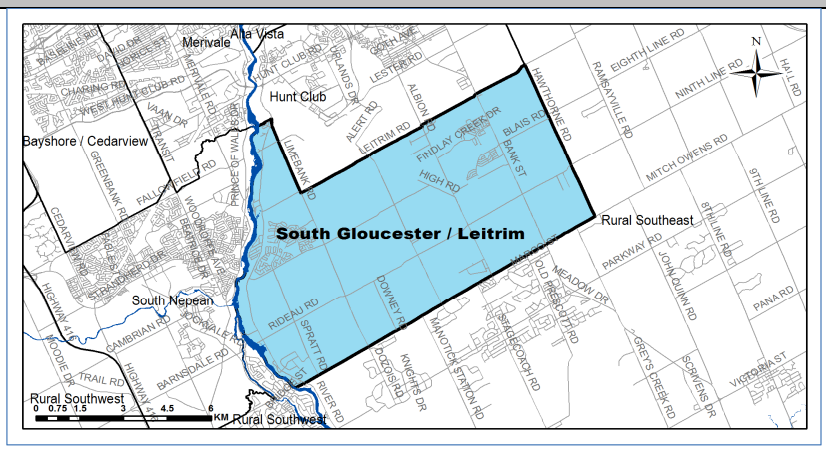
South Gloucester / Leitrim

Demographic Characteristics

Population	17,600	Actively Travelled	14,190
Employed Population	8,910	Number of Vehicles	11,080
Households	6,240	Area (km^2)	78.9

Occupation Status (age 5+)	Male	Female	Total
Full Time Employed	4,550	3,630	8,180
Part Time Employed	130	590	730
Student	2,160	2,130	4,290
Retiree	720	770	1,490
Unemployed	90	220	320
Homemaker	20	540	560
Other	80	120	200
Total:	7,750	8,010	15,760

Traveller Characteristics	Male	Female	Total
Transit Pass Holders	790	1,070	1,850
Licensed Drivers	5,790	5,940	11,730
Telecommuters	60	10	70
Trips made by residents	20,810	24,430	45,240



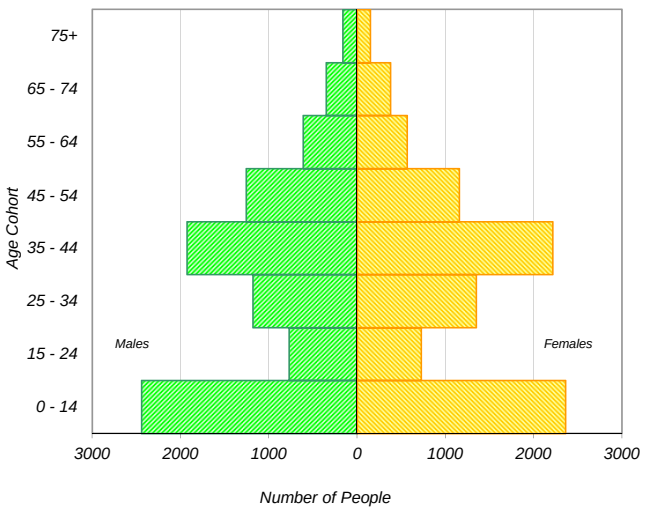
Household Size		
1 person	880	14%
2 persons	1,870	30%
3 persons	1,170	19%
4 persons	1,630	26%
5+ persons	690	11%
Total:	6,240	100%

Households by Vehicle Availability		
0 vehicles	40	1%
1 vehicle	2,080	33%
2 vehicles	3,510	56%
3 vehicles	510	8%
4+ vehicles	100	2%
Total:	6,240	100%

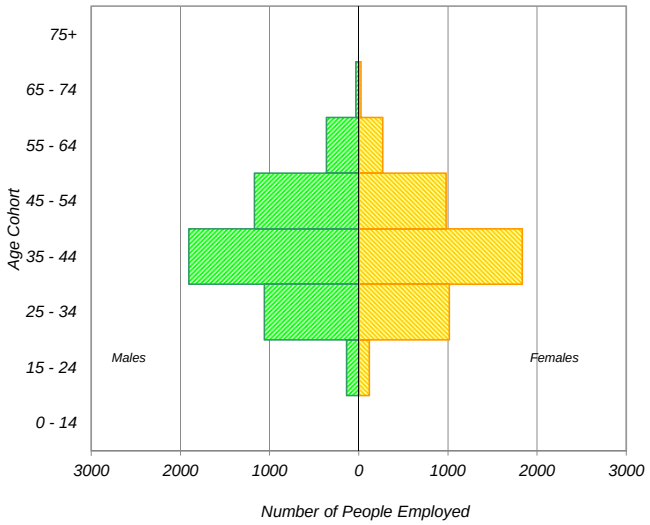
Selected Indicators	
Daily Trips per Person (age 5+)	2.87
Vehicles per Person	0.63
Number of Persons per Household	2.82
Daily Trips per Household	7.25
Vehicles per Household	1.78
Workers per Household	1.43
Population Density (Pop/km2)	220

Households by Dwelling Type		
Single-detached	3,300	53%
Semi-detached	770	12%
Townhouse	2,010	32%
Apartment/Condo	150	2%
Total:	6,240	100%

Population



Employed Population

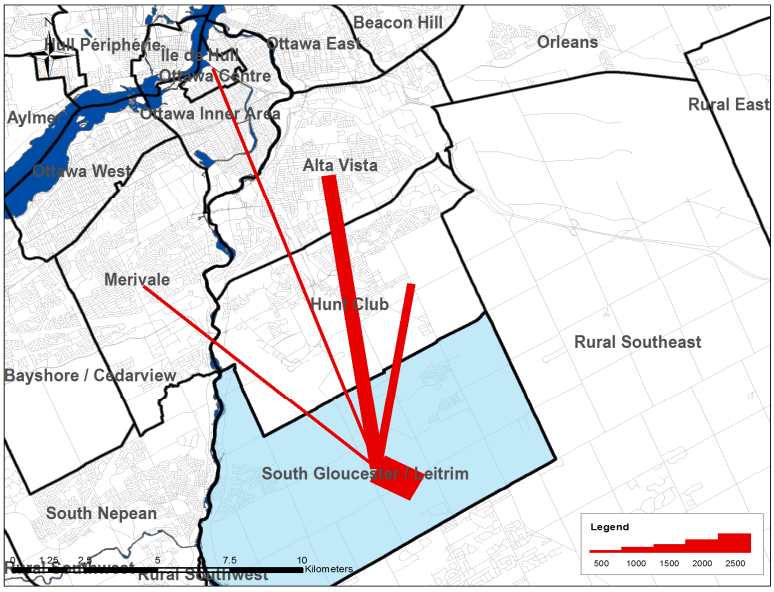


* In 2005 data was only collected for household members aged 11+ therefore these results cannot be compared to the 2011 data.

Travel Patterns

Top Five Destinations of Trips from South Gloucester / Leitrim

AM Peak Period



Summary of Trips to and from South Gloucester / Leitrim

AM Peak Period (6:30 - 8:59) Districts	Destinations of Trips From District	% Total	Origins of Trips To District	% Total
Ottawa Centre	930	9%	0	0%
Ottawa Inner Area	530	5%	250	4%
Ottawa East	240	2%	40	1%
Beacon Hill	240	2%	30	0%
Alta Vista	1,970	18%	160	2%
Hunt Club	1,100	10%	870	13%
Merivale	770	7%	340	5%
Ottawa West	290	3%	0	0%
Bayshore / Cedarview	170	2%	70	1%
Orléans	50	0%	170	3%
Rural East	0	0%	10	0%
Rural Southeast	210	2%	570	8%
South Gloucester / Leitrim	3,680	34%	3,680	55%
South Nepean	310	3%	100	1%
Rural Southwest	120	1%	220	3%
Kanata / Stittsvile	140	1%	60	1%
Rural West	40	0%	60	1%
Île de Hull	90	1%	0	0%
Hull Périphérie	10	0%	20	0%
Plateau	0	0%	20	0%
Aylmer	0	0%	0	0%
Rural Northwest	20	0%	10	0%
Pointe Gatineau	10	0%	30	0%
Gatineau Est	0	0%	0	0%
Rural Northeast	20	0%	0	0%
Buckingham / Masson-Angers	0	0%	20	0%
Ontario Sub-Total:	10,790	99%	6,630	99%
Québec Sub-Total:	150	1%	100	1%
Total:	10,940	100%	6,730	100%

Trips by Trip Purpose

24 Hours	From District		To District		Within District	
Work or related	6,300	29%	3,270	15%	700	6%
School	1,640	8%	840	4%	1,930	16%
Shopping	1,830	8%	720	3%	700	6%
Leisure	2,730	13%	1,990	9%	660	6%
Medical	440	2%	120	1%	120	1%
Pick-up / drive passenger	1,610	7%	970	4%	1,720	14%
Return Home	6,020	28%	13,110	60%	5,320	44%
Other	1,160	5%	680	3%	850	7%
Total:	21,730	100%	21,700	100%	12,000	100%

AM Peak (06:30 - 08:59)	From District		To District		Within District	
Work or related	4,650	64%	1,740	57%	420	11%
School	1,310	18%	810	27%	1,580	43%
Shopping	60	1%	40	1%	10	0%
Leisure	140	2%	50	2%	0	0%
Medical	80	1%	0	0%	0	0%
Pick-up / drive passenger	780	11%	180	6%	900	25%
Return Home	100	1%	120	4%	330	9%
Other	150	2%	110	4%	430	12%
Total:	7,270	100%	3,050	100%	3,670	100%

PM Peak (15:30 - 17:59)	From District		To District		Within District	
Work or related	140	3%	150	2%	40	1%
School	30	1%	0	0%	80	2%
Shopping	270	6%	170	2%	210	6%
Leisure	840	19%	420	6%	140	4%
Medical	50	1%	0	0%	30	1%
Pick-up / drive passenger	310	7%	360	5%	400	12%
Return Home	2,400	54%	5,990	82%	2,350	69%
Other	400	9%	200	3%	150	4%
Total:	4,440	100%	7,290	100%	3,400	100%

Peak Period (%)	Total:	% of 24 Hours	Within District (%)
24 Hours	55,430		22%
AM Peak Period	13,990	25%	26%
PM Peak Period	15,130	27%	22%

Trips by Primary Travel Mode

24 Hours	From District		To District		Within District	
Auto Driver	14,990	69%	14,970	69%	5,210	43%
Auto Passenger	3,870	18%	3,650	17%	3,120	26%
Transit	1,630	8%	1,740	8%	200	2%
Bicycle	90	0%	100	0%	20	0%
Walk	40	0%	40	0%	2,680	22%
Other	1,110	5%	1,200	6%	770	6%
Total:	21,730	100%	21,700	100%	12,000	100%

AM Peak (06:30 - 08:59)	From District		To District		Within District	
Auto Driver	4,640	64%	2,070	68%	1,540	42%
Auto Passenger	1,260	17%	210	7%	1,140	31%
Transit	860	12%	100	3%	60	2%
Bicycle	70	1%	20	1%	10	0%
Walk	20	0%	0	0%	620	17%
Other	420	6%	640	21%	300	8%
Total:	7,270	100%	3,040	100%	3,670	100%

PM Peak (15:30 - 17:59)	From District		To District		Within District	
Auto Driver	3,100	70%	4,920	67%	1,510	44%
Auto Passenger	1,020	23%	1,120	15%	860	25%
Transit	150	3%	790	11%	50	1%
Bicycle	20	0%	80	1%	0	0%
Walk	10	0%	0	0%	850	25%
Other	130	3%	390	5%	130	4%
Total:	4,430	100%	7,300	100%	3,400	100%

Avg Vehicle Occupancy	From District	To District	Within District
24 Hours	1.26	1.24	1.60
AM Peak Period	1.27	1.10	1.74
PM Peak Period	1.33	1.23	1.57

Transit Modal Split	From District	To District	Within District
24 Hours	8%	9%	2%
AM Peak Period	13%	4%	2%
PM Peak Period	4%	12%	2%

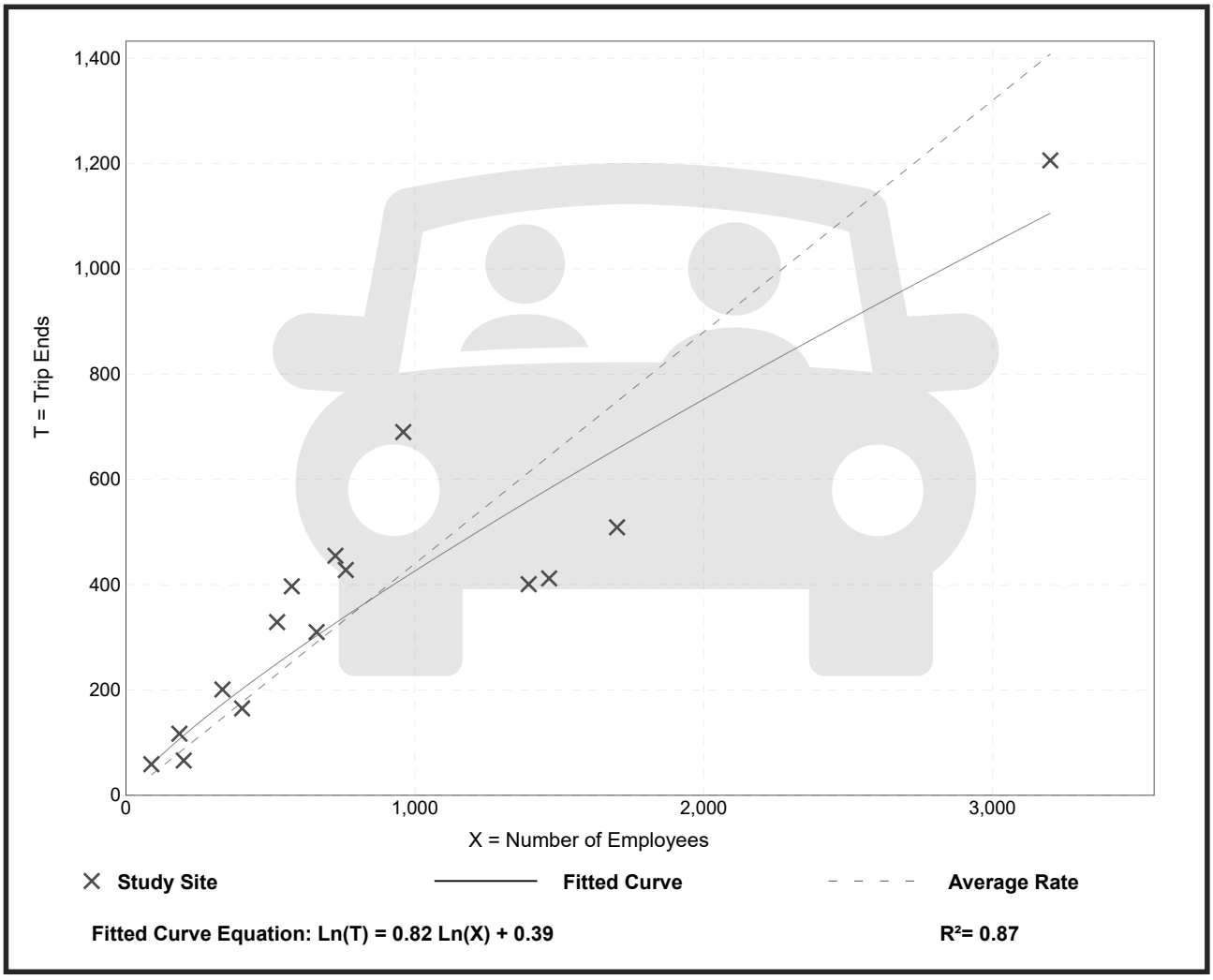
Industrial Park
(130)

Vehicle Trip Ends vs: **Employees**
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: 15
Avg. Num. of Employees: 878
Directional Distribution: 86% entering, 14% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.44	0.28 - 0.72	0.16

Data Plot and Equation



Trip Gen Manual, 11th Edition ● Institute of Transportation Engineers

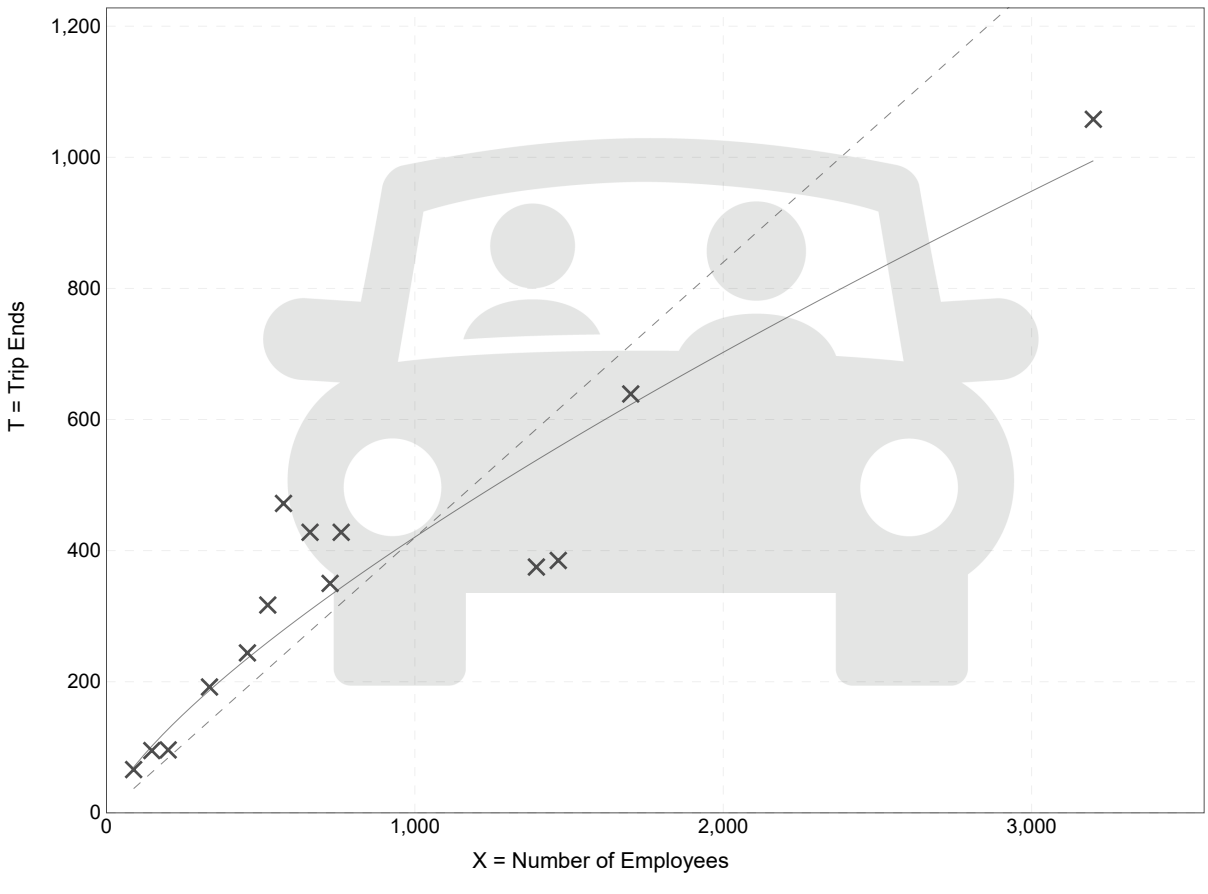
Industrial Park
(130)

Vehicle Trip Ends vs: **Employees**
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: 14
Avg. Num. of Employees: 873
Directional Distribution: 20% entering, 80% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.42	0.26 - 0.82	0.16

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.74 Ln(X) + 0.93 **R^2= 0.90**

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to make use of this resource while considering the local land use context and trip characteristics for all travel modes through local and regional data.

Table 2: Person-Trip Conversion Factor

Factor	Application	Apply To	Period	Value
Person-Trip Conversion Factor	**Vehicle to person-trip conversion**, to normalize the measure of trip rates to account for all modes. Applicable to the ITE trip generation rates, which are mainly reported as vehicle trip rates.	Vehicle trip rates	All	1.28

3 RESIDENTIAL TRIP GENERATION RATES

3.1 Development of Residential Trip Rates

The residential trip generation rates in this manual are reflect the number of **person-trips per household** during the **peak period**. The morning peak period is from 7:00 AM to 9:30 AM, while the afternoon peak period is from 3:30 PM to 6:00 PM.

A geographic review of trip generation rates found that rates varied by dwelling type but not significantly by the geographic sectors and districts used in the 2009 TRANS Trip Generation Study[1]. As such, residential trip generation rates in this manual are defined for the following three dwelling types:

- Single-Family Detached Housing
- Multifamily Housing (Low-Rise)
- Multifamily Housing (High-Rise)

Low-rise housing refers to any building that houses multiple families that is two storeys or less (e.g. semi-detached homes, townhouses). High-rise housing refers to any building that houses multiple families that is three or more storeys (e.g. apartments and condo buildings). These dwelling types are from the TRANS Origin-Destination Survey but are organized to be equivalent to the categories of the ITE *Trip Generation Manual* and local generator surveys.

[1] While person trip rates were not found to vary significantly with geographic area, location does have an impact on mode share as discussed in Section 4.2. As a result, vehicular trip rates do vary by geography as reflected in previous versions of the manual. The variation by dwelling type, in part, reflects differences in the number of persons per dwelling.

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

Table 7: Residential Mode Share for Low-Rise Multifamily Housing

District	Period	Mode				
		Auto Driver	Auto Pass.	Transit	Cycling	Walking
Ottawa Centre	AM	27%	9%	25%	9%	30%
	PM	31%	10%	20%	9%	30%
Ottawa Inner Area	AM	27%	8%	26%	9%	30%
	PM	31%	9%	20%	9%	31%
Île de Hull	AM	27%	9%	25%	9%	30%
	PM	34%	22%	16%	5%	22%
Ottawa East	AM	36%	11%	38%	7%	8%
	PM	39%	16%	29%	5%	11%
Beacon Hill	AM	45%	9%	35%	1%	10%
	PM	48%	16%	24%	1%	11%
Alta Vista	AM	38%	15%	35%	1%	10%
	PM	38%	19%	31%	2%	10%
Hunt Club	AM	44%	11%	38%	1%	6%
	PM	47%	15%	29%	1%	8%
Merivale	AM	44%	11%	32%	6%	7%
	PM	44%	12%	29%	4%	11%
Ottawa West	AM	36%	12%	24%	10%	19%
	PM	35%	12%	16%	10%	27%
Bayshore/Cedarview	AM	43%	11%	31%	1%	13%
	PM	44%	14%	25%	1%	15%
Hull Périphérie	AM	46%	22%	22%	4%	6%
	PM	46%	17%	22%	3%	11%
Orleans	AM	47%	15%	29%	1%	9%
	PM	51%	19%	24%	1%	6%
South Gloucester / Leitrim	AM	59%	20%	16%	1%	4%
	PM	62%	18%	17%	1%	3%
South Nepean	AM	49%	13%	26%	2%	9%
	PM	49%	13%	24%	2%	12%
Kanata - Stittsville	AM	52%	14%	22%	0%	11%
	PM	58%	17%	17%	0%	8%
Plateau	AM	44%	18%	28%	4%	6%
	PM	47%	17%	26%	2%	8%
Aylmer	AM	52%	18%	23%	0%	7%
	PM	52%	16%	20%	1%	12%
Pointe Gatineau	AM	46%	17%	23%	0%	14%
	PM	52%	16%	19%	1%	12%
Gatineau Est	AM	54%	17%	20%	1%	8%
	PM	56%	21%	16%	0%	7%
Masson-Angers	AM	60%	15%	21%	4%	1%
	PM	63%	15%	17%	3%	1%
Other Rural Districts	AM	66%	13%	21%	1%	0%
	PM	62%	19%	16%	3%	0%

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.

Appendix G – TDM Measures

TDM-Supportive Development Design and Infrastructure Checklist:
Non-Residential Developments (office, institutional, retail or industrial)

Legend

REQUIRED	The Official Plan or Zoning By-law provides related guidance that must be followed
BASIC	The measure is generally feasible and effective, and in most cases would benefit the development and its users
BETTER	The measure could maximize support for users of sustainable modes, and optimize development performance

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	☐
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☐
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☐
	1.2	**Facilities for walking & cycling**	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations *(see Official Plan policy 4.3.3)*	☐
REQUIRED	1.2.2	Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible *(see Official Plan policy 4.3.12)*	☐

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3	Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks *(see Official Plan policy 4.3.10)*	☐
REQUIRED	1.2.4	Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps *(see Official Plan policy 4.3.10)*	☐
REQUIRED	1.2.5	Include adequately spaced inter-block/street cycling and pedestrian connections to facilitate travel by active transportation. Provide links to the existing or planned network of public sidewalks, multi-use pathways and on-road cycle routes. Where public sidewalks and multi-use pathways intersect with roads, consider providing traffic control devices to give priority to cyclists and pedestrians *(see Official Plan policy 4.3.11)*	☐
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	☐
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	☐
BASIC	1.2.8	Design roads used for access or circulation by cyclists using a target operating speed of no more than 30 km/h, or provide a separated cycling facility	☐
	1.3	**Amenities for walking & cycling**	
BASIC	1.3.1	Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	☐
BASIC	1.3.2	Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	☐

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	☐
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas *(see Zoning By-law Section 111)*	☐
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored *(see Zoning By-law Section 111)*	☐
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met), plus the expected peak number of customer/visitor cyclists	☐
BETTER	2.1.5	Provide bicycle parking spaces equivalent to the expected number of commuter and customer/visitor cyclists, plus an additional buffer (e.g. 25 percent extra) to encourage other cyclists and ensure adequate capacity in peak cycling season	☐
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single office building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	☐
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met)	☐
	2.3	**Shower & change facilities**	
BASIC	2.3.1	Provide shower and change facilities for the use of active commuters	☐
BETTER	2.3.2	In addition to shower and change facilities, provide dedicated lockers, grooming stations, drying racks and laundry facilities for the use of active commuters	☐
	2.4	**Bicycle repair station**	
BETTER	2.4.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☐

	TDM-supportive design & infrastructure measures: *Non-residential developments*		Check if completed & add descriptions, explanations or plan/drawing references
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	☐
	4.2	**Carpool parking**	
BASIC	4.2.1	Provide signed parking spaces for carpools in a priority location close to a major building entrance, sufficient in number to accommodate the mode share target for carpools	☐
BETTER	4.2.2	At large developments, provide spaces for carpools in a separate, access-controlled parking area to simplify enforcement	☐
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide carshare parking spaces in permitted non-residential zones, occupying either required or provided parking spaces *(see Zoning By-law Section 94)*	☐
	5.2	**Bikeshare station location**	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☐

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	6.	**PARKING**	
	6.1	**Number of parking spaces**	
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	☐
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☐
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking *(see Zoning By-law Section 111)*	☐
	6.2	**Separate long-term & short-term parking areas**	
BETTER	6.2.1	Separate short-term and long-term parking areas using signage or physical barriers, to permit access controls and simplify enforcement (i.e. to discourage employees from parking in visitor spaces, and vice versa)	☐
	7.	**OTHER**	
	7.1	**On-site amenities to minimize off-site trips**	
BETTER	7.1.1	Provide on-site amenities to minimize mid-day or mid-commute errands	☐

TDM Measures Checklist:
Non-Residential Developments (office, institutional, retail or industrial)

Legend

BASIC — The measure is generally feasible and effective, and in most cases would benefit the development and its users

BETTER — The measure could maximize support for users of sustainable modes, and optimize development performance

★ — The measure is one of the most dependably effective tools to encourage the use of sustainable modes

		TDM measures: *Non-residential developments*	Check if proposed & add descriptions
	1.	**TDM PROGRAM MANAGEMENT**	
	1.1	**Program coordinator**	
BASIC ★	1.1.1	Designate an internal coordinator, or contract with an external coordinator	☐
	1.2	**Travel surveys**	
BETTER	1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	☐
	2.	**WALKING AND CYCLING**	
	2.1	**Information on walking/cycling routes & destinations**	
BASIC	2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances	☐
	2.2	**Bicycle skills training**	
		Commuter travel	
BETTER ★	2.2.1	Offer on-site cycling courses for commuters, or subsidize off-site courses	☐
	2.3	**Valet bike parking**	
		Visitor travel	
BETTER	2.3.1	Offer secure valet bike parking during public events when demand exceeds fixed supply (e.g. for festivals, concerts, games)	☐

			TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		3.	**TRANSIT**	
		3.1	**Transit information**	
BASIC		3.1.1	Display relevant transit schedules and route maps at entrances	☐
BASIC		3.1.2	Provide online links to OC Transpo and STO information	☐
BETTER		3.1.3	Provide real-time arrival information display at entrances	☐
		3.2	**Transit fare incentives**	
			Commuter travel	
BETTER		3.2.1	Offer preloaded PRESTO cards to encourage commuters to use transit	☐
BETTER	★	3.2.2	Subsidize or reimburse monthly transit pass purchases by employees	☐
			Visitor travel	
BETTER		3.2.3	Arrange inclusion of same-day transit fare in price of tickets (e.g. for festivals, concerts, games)	☐
		3.3	**Enhanced public transit service**	
			Commuter travel	
BETTER		3.3.1	Contract with OC Transpo to provide enhanced transit services (e.g. for shift changes, weekends)	☐
			Visitor travel	
BETTER		3.3.2	Contract with OC Transpo to provide enhanced transit services (e.g. for festivals, concerts, games)	☐
		3.4	**Private transit service**	
			Commuter travel	
BETTER		3.4.1	Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for shift changes, weekends)	☐
			Visitor travel	
BETTER		3.4.2	Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for festivals, concerts, games)	☐

			TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		4.	**RIDESHARING**	
		4.1	**Ridematching service**	
			Commuter travel	
BASIC	★	4.1.1	Provide a dedicated ridematching portal at OttawaRideMatch.com	☐
		4.2	**Carpool parking price incentives**	
			Commuter travel	
BETTER		4.2.1	Provide discounts on parking costs for registered carpools	☐
		4.3	**Vanpool service**	
			Commuter travel	
BETTER		4.3.1	Provide a vanpooling service for long-distance commuters	☐
		5.	**CARSHARING & BIKESHARING**	
		5.1	**Bikeshare stations & memberships**	
BETTER		5.1.1	Contract with provider to install on-site bikeshare station for use by commuters and visitors	☐
			Commuter travel	
BETTER		5.1.2	Provide employees with bikeshare memberships for local business travel	☐
		5.2	**Carshare vehicles & memberships**	
			Commuter travel	
BETTER		5.2.1	Contract with provider to install on-site carshare vehicles and promote their use by tenants	☐
BETTER		5.2.2	Provide employees with carshare memberships for local business travel	☐
		6.	**PARKING**	
		6.1	**Priced parking**	
			Commuter travel	
BASIC	★	6.1.1	Charge for long-term parking (daily, weekly, monthly)	☐
BASIC		6.1.2	Unbundle parking cost from lease rates at multi-tenant sites	☐
			Visitor travel	
BETTER		6.1.3	Charge for short-term parking (hourly)	☐

			TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		7.	**TDM MARKETING & COMMUNICATIONS**	
		7.1	**Multimodal travel information**	
			Commuter travel	
BASIC	★	7.1.1	Provide a multimodal travel option information package to new/relocating employees and students	☐
			Visitor travel	
BETTER	★	7.1.2	Include multimodal travel option information in invitations or advertising that attract visitors or customers (e.g. for festivals, concerts, games)	☐
		7.2	**Personalized trip planning**	
			Commuter travel	
BETTER	★	7.2.1	Offer personalized trip planning to new/relocating employees	☐
		7.3	**Promotions**	
			Commuter travel	
BETTER		7.3.1	Deliver promotions and incentives to maintain awareness, build understanding, and encourage trial of sustainable modes	☐
		8.	**OTHER INCENTIVES & AMENITIES**	
		8.1	**Emergency ride home**	
			Commuter travel	
BETTER	★	8.1.1	Provide emergency ride home service to non-driving commuters	☐
		8.2	**Alternative work arrangements**	
			Commuter travel	
BASIC	★	8.2.1	Encourage flexible work hours	☐
BETTER		8.2.2	Encourage compressed workweeks	☐
BETTER	★	8.2.3	Encourage telework	☐
		8.3	**Local business travel options**	
			Commuter travel	
BASIC	★	8.3.1	Provide local business travel options that minimize the need for employees to bring a personal car to work	☐
		8.4	**Commuter incentives**	
			Commuter travel	
BETTER		8.4.1	Offer employees a taxable, mode-neutral commuting allowance	☐
		8.5	**On-site amenities**	
			Commuter travel	
BETTER		8.5.1	Provide on-site amenities/services to minimize mid-day or mid-commute errands	☐

TDM Measures Checklist:
Residential Developments (multi-family, condominium or subdivision)

Legend

BASIC — The measure is generally feasible and effective, and in most cases would benefit the development and its users

BETTER — The measure could maximize support for users of sustainable modes, and optimize development performance

★ — The measure is one of the most dependably effective tools to encourage the use of sustainable modes

		TDM measures: *Residential developments*	Check if proposed & add descriptions
	1.	**TDM PROGRAM MANAGEMENT**	
	1.1	**Program coordinator**	
BASIC ★	1.1.1	Designate an internal coordinator, or contract with an external coordinator	☐ Not Applicable to Subdivisions
	1.2	**Travel surveys**	
BETTER	1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	☐
	2.	**WALKING AND CYCLING**	
	2.1	**Information on walking/cycling routes & destinations**	
BASIC	2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances *(multi-family, condominium)*	☐ Not Applicable to Subdivisions
	2.2	**Bicycle skills training**	
BETTER	2.2.1	Offer on-site cycling courses for residents, or subsidize off-site courses	☐

			TDM measures: *Residential developments*	Check if proposed & add descriptions
		3.	**TRANSIT**	
		3.1	**Transit information**	
BASIC		3.1.1	Display relevant transit schedules and route maps at entrances *(multi-family, condominium)*	☐ Not Applicable to Subdivisions
BETTER		3.1.2	Provide real-time arrival information display at entrances *(multi-family, condominium)*	☐ Not Applicable to Subdivisions
		3.2	**Transit fare incentives**	
BASIC	★	3.2.1	Offer PRESTO cards preloaded with one monthly transit pass on residence purchase/move-in, to encourage residents to use transit	☐
BETTER		3.2.2	Offer at least one year of free monthly transit passes on residence purchase/move-in	☐
		3.3	**Enhanced public transit service**	
BETTER	★	3.3.1	Contract with OC Transpo to provide early transit services until regular services are warranted by occupancy levels *(subdivision)*	☐
		3.4	**Private transit service**	
BETTER		3.4.1	Provide shuttle service for seniors homes or lifestyle communities (e.g. scheduled mall or supermarket runs)	☐ Not Applicable to Subdivisions
		4.	**CARSHARING & BIKESHARING**	
		4.1	**Bikeshare stations & memberships**	
BETTER		4.1.1	Contract with provider to install on-site bikeshare station (*multi-family)*	☐ Not Applicable to Subdivisions
BETTER		4.1.2	Provide residents with bikeshare memberships, either free or subsidized *(multi-family)*	☐ Not Applicable to Subdivisions
		4.2	**Carshare vehicles & memberships**	
BETTER		4.2.1	Contract with provider to install on-site carshare vehicles and promote their use by residents	☐ Not Applicable to Subdivisions
BETTER		4.2.2	Provide residents with carshare memberships, either free or subsidized	☐ Not Applicable to Subdivisions
		5.	**PARKING**	
		5.1	**Priced parking**	
BASIC	★	5.1.1	Unbundle parking cost from purchase price *(condominium)*	☐ Not Applicable to Subdivisions
BASIC	★	5.1.2	Unbundle parking cost from monthly rent *(multi-family)*	☐ Not Applicable to Subdivisions

TDM measures: *Residential developments*				Check if proposed & add descriptions
		6.	**TDM MARKETING & COMMUNICATIONS**	
		6.1	**Multimodal travel information**	
BASIC	★	6.1.1	Provide a multimodal travel option information package to new residents	☐
		6.2	**Personalized trip planning**	
BETTER	★	6.2.1	Offer personalized trip planning to new residents	☐

Appendix H – MMLOS Analyses

Multi-Modal Level of Service - Intersections Form

Consultant	**IBI Group**	**Project**	**136974**
Scenario	**Existing & Future**	**Date**	**2022-07-26**
Comments			

	INTERSECTIONS	Limebank & Spratt (Existing)				Spratt & Urbandale Plaza (Existing)				Spratt & Urbandal Plaza (Future)				Leitrim & Limebank (Existing)				Realigned Leitrim & Limebank (Future)			
	Crossing Side	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**
Pedestrian	Lanes	10+	10+	10+	10+		4	7	6	4	4	7	7	10+	10+	10+	10+	8	8	7	7
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m		No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Protected	Protected	Protected	Protected		Permissive	No left turn / Prohib.	Permissive	Permissive	Permissive	Permissive	Permissive	Protected	Protected	Protected	Protected	Protected	Protected	Protected/ Permissive	Protected/ Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control		Permissive or yield control	Permissive or yield control	No right turn	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed		RTOR allowed	RTOR prohibited	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
	Right Turn Channel	Conv'tl without Receiving Lane	Conv'tl without Receiving Lane	Conv'tl without Receiving Lane	Conv'tl without Receiving Lane		No Channel	No Right Turn	No Channel	No Channel	No Channel	No Channel	No Channel	Conv'tl without Receiving Lane	Conv'tl without Receiving Lane	Conv'tl without Receiving Lane	Conv'tl without Receiving Lane	No Channel	No Channel	No Channel	No Channel
	Corner Radius	10-15m	15-25m	10-15m	15-25m		5-10m	No Right Turn	5-10m	5-10m	5-10m	5-10m	5-10m	>25m	15-25m	15-25m	>25m	10-15m	10-15m	10-15m	10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings		Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	**-33**	**-35**	**-33**	**-35**		**54**	**25**	**26**	**54**	**54**	**5**	**5**	**-36**	**-35**	**-35**	**-36**	**-4**	**-4**	**4**	**4**
	Ped. Exposure to Traffic LoS	**#N/A**	**#N/A**	**#N/A**	**#N/A**	**-**	**D**	**F**	**F**	**D**	**D**	**F**	**F**	**#N/A**	**#N/A**	**#N/A**	**#N/A**	**F**	**F**	**F**	**F**
	Cycle Length	171	171	121	171		80	80	80	80	80	80	80	136	131	136	136	130	130	130	130
	Effective Walk Time	0	0	5	0		32	7	7	32	32	7	7	8	3	31	16	7	7	28	14
	Average Pedestrian Delay	**86**	**86**	**56**	**86**		**14**	**33**	**33**	**14**	**14**	**33**	**33**	**60**	**63**	**41**	**53**	**58**	**58**	**40**	**52**
	Pedestrian Delay LoS	**F**	**F**	**E**	**F**	**-**	**B**	**D**	**D**	**B**	**B**	**D**	**D**	**F**	**F**	**E**	**E**	**E**	**E**	**E**	**E**
	Level of Service	**#N/A**	**#N/A**	**#N/A**	**#N/A**	**-**	**D**	**F**	**F**	**D**	**D**	**F**	**F**	**#N/A**	**#N/A**	**#N/A**	**#N/A**	**F**	**F**	**F**	**F**
		#N/A				**F**				**F**				**#N/A**				**F**			
	Approach From	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**
Bicycle	Bicycle Lane Arrangement on Approach	Pocket Bike Lane	Pocket Bike Lane	Pocket Bike Lane	Pocket Bike Lane		Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Pocket Bike Lane	Pocket Bike Lane	Pocket Bike Lane	Pocket Bike Lane	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP
	IF Dedicated Right Turn Lane, THEN Right Turn Configuration, ELSE <blank>	> 50 m Introduced right turn lane	> 50 m Introduced right turn lane	> 50 m Introduced right turn lane	> 50 m Introduced right turn lane		≤ 50 m	Not Applicable			≤ 50 m	Not Applicable		> 50 m Introduced right turn lane	> 50 m Introduced right turn lane	> 50 m Introduced right turn lane	> 50 m Introduced right turn lane	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Dedicated Right Turning Speed	>25 to 30 km/h	>25 to 30 km/h	>25 to 30 km/h	>25 to 30 km/h		≤ 25 km/h	Not Applicable	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	Not Applicable	≤ 25 km/h	>25 to 30 km/h	>25 to 30 km/h	>25 to 30 km/h	>25 to 30 km/h	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Cyclist Through Movement	**D**	**D**	**D**	**D**	**-**	**D**	**Not Applicable**			**D**	**Not Applicable**		**D**	**D**	**D**	**D**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**
	Separated or Mixed Traffic	**Separated**	**Separated**	**Separated**	**Separated**	**-**	**Mixed Traffic**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Mixed Traffic**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**
	Left Turn Approach	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed		No lane crossed	≥ 2 lanes crossed		≥ 2 lanes crossed	One lane crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	2-stage, LT box	2-stage, LT box	2-stage, LT box	2-stage, LT box
	Operating Speed	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h		> 40 to ≤ 50 km/h	≥ 60 km/h		> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h
	Left Turning Cyclist	**F**	**F**	**F**	**F**	**-**	**B**	**F**	**-**	**E**	**D**	**F**	**F**	**F**	**F**	**F**	**F**	**A**	**A**	**A**	**A**
	Level of Service	**F**	**F**	**F**	**F**	**-**	**D**	**F**	**-**	**E**	**D**	**F**	**F**	**F**	**F**	**F**	**F**	**A**	**A**	**A**	**A**
		F				**F**				**F**				**F**				**A**			
Transit	Average Signal Delay	≤ 30 sec	≤ 20 sec	≤ 40 sec	≤ 30 sec			≤ 10 sec	≤ 10 sec			≤ 10 sec	≤ 10 sec	≤ 30 sec	≤ 40 sec	> 40 sec	≤ 40 sec	≤ 20 sec	≤ 20 sec	> 40 sec	> 40 sec
	Level of Service	**D**	**C**	**E**	**D**	**-**	**-**	**B**	**B**	**-**	**-**	**B**	**B**	**D**	**E**	**F**	**E**	**C**	**C**	**F**	**F**
		E				**B**				**B**				**F**				**F**			
Truck	Effective Corner Radius	> 15 m	> 15 m	> 15 m	> 15 m		10 - 15 m		< 10 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	> 15 m	> 15 m	> 15 m	> 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	≥ 2	≥ 2	≥ 2	≥ 2		≥ 2		1	≥ 2	≥ 2	1	1	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2
	Level of Service	**A**	**A**	**A**	**A**	**-**	**B**	**-**	**F**	**B**	**B**	**E**	**E**	**A**	**A**	**A**	**A**	**B**	**B**	**B**	**B**
		A				**F**				**E**				**A**				**B**			

Multi-Modal Level of Service - Segments Form

Consultant	**IBI Group**	**Project**	**136974**
Scenario	**Existing**	**Date**	**2022-07-26**
Comments			

SEGMENTS		Limebank Road	Section 1	Section 2	Section 3
Pedestrian	Sidewalk Width Boulevard Width	-	≥ 2 m 0.5 - 2 m		
	Avg Daily Curb Lane Traffic Volume		≤ 3000		
	Operating Speed On-Street Parking		> 60 km/h no		
	Exposure to Traffic PLoS		**B**	-	-
	Effective Sidewalk Width				
	Pedestrian Volume				
	Crowding PLoS		-	-	-
	Level of Service		**-**	**-**	**-**
Bicycle	Type of Cycling Facility	-	Curbside Bike Lane		
	Number of Travel Lanes		2 ea. dir. (w median)		
	Operating Speed		> 70 km/h		
	# of Lanes & Operating Speed LoS		**E**	-	-
	Bike Lane (+ Parking Lane) Width		≥ 1.8 m		
	Bike Lane Width LoS		**A**	-	-
	Bike Lane Blockages		Rare		
	Blockage LoS		**A**	-	-
	Median Refuge Width (no median = < 1.8 m)				
	No. of Lanes at Unsignalized Crossing				
	Sidestreet Operating Speed				
	Unsignalized Crossing - Lowest LoS		-	-	-
	Level of Service		**-**	**-**	**-**
Transit	Facility Type	D	Mixed Traffic		
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≥ 0.8		
	Level of Service		**D**	**-**	**-**
Truck	Truck Lane Width	A	≤ 3.5 m		
	Travel Lanes per Direction		> 1		
	Level of Service		**A**	**-**	**-**

Multi-Modal Level of Service - Segments Form

Consultant	**IBI Group**	**Project**	**136974**
Scenario	**Existing**	**Date**	**2022-07-26**
Comments			

SEGMENTS		Spratt Road	Section 1	Section 2	Section 3
Pedestrian	Sidewalk Width Boulevard Width	-	≥ 2 m 0.5 - 2 m	≥ 2 m > 2 m	
	Avg Daily Curb Lane Traffic Volume		≤ 3000	≤ 3000	
	Operating Speed On-Street Parking		> 60 km/h no	> 60 km/h no	
	Exposure to Traffic PLoS		**B**	**B**	**-**
	Effective Sidewalk Width				
	Pedestrian Volume				
	Crowding PLoS		**-**	**-**	**-**
	Level of Service		**-**	**-**	**-**
Bicycle	Type of Cycling Facility	-	Curbside Bike Lane	Mixed Traffic	
	Number of Travel Lanes		2 ea. dir. (w median)	4-5 lanes total	
	Operating Speed		>50 to 70 km/h	≥ 60 km/h	
	# of Lanes & Operating Speed LoS		**C**	**F**	**-**
	Bike Lane (+ Parking Lane) Width		≥ 1.8 m		
	Bike Lane Width LoS		**A**	**-**	**-**
	Bike Lane Blockages		Rare		
	Blockage LoS		**A**	**-**	**-**
	Median Refuge Width (no median = < 1.8 m)				
	No. of Lanes at Unsignalized Crossing				
	Sidestreet Operating Speed				
	Unsignalized Crossing - Lowest LoS		**-**	**-**	**-**
	Level of Service		**-**	**-**	**-**
Transit	Facility Type	D	Mixed Traffic	Mixed Traffic	
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8	
	Level of Service		**D**	**D**	**-**
Truck	Truck Lane Width	A	≤ 3.5 m	≤ 3.5 m	
	Travel Lanes per Direction		> 1	> 1	
	Level of Service		**A**	**A**	**-**

Multi-Modal Level of Service - Segments Form

Consultant	**IBI Group**	**Project**	**136974**
Scenario	**Future**	**Date**	**2022-07-25**
Comments			

SEGMENTS		Realigned Leitrim Road	Section 1	Section 2	Section 3
Pedestrian	Sidewalk Width Boulevard Width	**-**	no sidewalk n/a		
	Avg Daily Curb Lane Traffic Volume		> 3000		
	Operating Speed On-Street Parking		> 60 km/h no		
	Exposure to Traffic PLoS		**F**	-	-
	Effective Sidewalk Width				
	Pedestrian Volume				
	Crowding PLoS		-	-	-
	Level of Service		**-**	**-**	**-**
Bicycle	Type of Cycling Facility	**-**	Mixed Traffic		
	Number of Travel Lanes		2-3 lanes total		
	Operating Speed		≥ 60 km/h		
	# of Lanes & Operating Speed LoS		**F**	-	-
	Bike Lane (+ Parking Lane) Width				
	Bike Lane Width LoS		-	-	-
	Bike Lane Blockages				
	Blockage LoS		-	-	-
	Median Refuge Width (no median = < 1.8 m)				
	No. of Lanes at Unsignalized Crossing				
	Sidestreet Operating Speed				
	Unsignalized Crossing - Lowest LoS		-	-	-
	Level of Service		**-**	**-**	**-**
Transit	Facility Type	**D**	Mixed Traffic		
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≥ 0.8		
	Level of Service		**D**	**-**	**-**
Truck	Truck Lane Width	**C**	≤ 3.5 m		
	Travel Lanes per Direction		1		
	Level of Service		**C**	**-**	**-**

Appendix I – Intersection Control Warrants

IBI

OTM BOOK 12* - TRAFFIC SIGNAL WARRANT

Project: Riverside South Employment Lands & Blocks 13, 14 **Date:** July 25, 2022

Project #: 136974

Location: Limebank Road (Major Roadway) at Realigned Leitrim Road (Minor Roadway)

Orientation: North/South East/West

Municipality: City of Ottawa **Scenario:** Future (2031) Background Traffic

Justification 1 - Minimum Vehicle Volume

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, all approaches	480	720	**720**	1080	2498 100%	1249 100%	1249 100%	1249 100%	2424 100%	1212 100%	1212 100%	1212 100%	100%
B. Vehicle volume along minor roads	120	170	**216**	306	20 9%	10 5%	10 5%	10 5%	54 25%	27 12%	27 12%	27 12%	11%

Justification 2 - Delay to Cross Traffic

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, along artery	480	720	**720**	1080	2478 100%	1239 100%	1239 100%	1239 100%	2371 100%	1185 100%	1185 100%	1185 100%	100%
B. Combined vehicle and pedestrian volume crossing artery from minor roads	50	70	**60**	84	15 25%	7 12%	7 12%	7 12%	46 77%	23 38%	23 38%	23 38%	32%

Justification 3 - Volume/Delay Combination

JUSTIFICATION	SATISFIED TO 80% OR MORE?	BOTH SATISFIED TO 80% OR MORE?
Justification 1 - Minimum Vehicular Volume	N/A	N/A
Justification 2 - Delay to Cross Traffic	N/A	

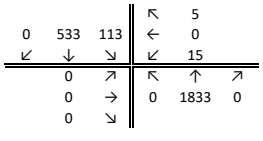
Justification 7 - Projected Volumes

WARRANT	DESCRIPTION	MINIMUM REQUIREMENT				COMPLIANCE		
		FREE FLOW	RESTRICTED FLOW	ADJUSTED FREE FLOW	ADJUSTED RESTRICTED FLOW	SECTIONAL AHV	SECTIONAL %	ENTIRE %
1. MINIMUM VEHICULAR VOLUME	A. Vehicle volumes, all approaches (Average Hour)	480	720	**900**	1350	1231	100%	7%
	B. Vehicle volume along minor roads (Average Hour)	120	170	**270**	383	18	7%	
2. DELAY TO CROSS TRAFFIC	A. Vehicle volumes, along artery (Average Hour)	480	720	**900**	1350	1213	100%	20%
	B. Combined vehicle and pedestrian volume crossing artery from minor roads (Average Hour)	50	75	**75**	113	15	20%	

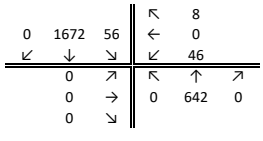
Projected Traffic Volumes:

Average Hourly Volume (AHV) Equation: AHV = (amPHV + pmPHV)/4

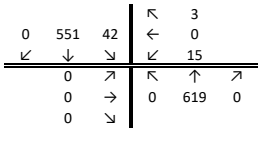
AM Peak Hour Volumes



PM Peak Hour Volumes



Average Hourly Volumes (AHV)



Eight Hour Traffic Volumes:**

Hour	Major Road						Minor Road						Ped*
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	
7:00 AM	0	1833	0	113	533	0	0	0	0	15	0	5	0
8:00 AM	0	916	0	56	266	0	0	0	0	7	0	3	0
9:00 AM	0	916	0	56	266	0	0	0	0	7	0	3	0
10:00 AM	0	916	0	56	266	0	0	0	0	7	0	3	0
3:00 PM	0	642	0	56	1672	0	0	0	0	46	0	8	0
4:00 PM	0	321	0	28	836	0	0	0	0	23	0	4	0
5:00 PM	0	321	0	28	836	0	0	0	0	23	0	4	0
6:00 PM	0	321	0	28	836	0	0	0	0	23	0	4	0

** Number of pedestrians crossing the major road*
*** These are projected 8-hour traffic volumes.*

Notes:

1. Vehicle volume warrant (1A) and (2A) for intersections of roadways having two or more moving lanes in one direction should be 25% higher than the values given above.

2+ Lanes per Direction

2. Warrant values for free flow apply when the 85th percentile speed of artery traffic equals or exceeds 70 km/h or when the intersection lies within the built-up area of an isolated community having a population of less than 10,000. Warrant values for restricted flow apply to large urban communities when the 85th percentile speed of artery traffic does not exceed 70 km/h.

Free Flow

3. The lowest sectional percentage governs the entire warrant.

4. For "T" intersections the warrant values for the minor road should be increased by 50% (Warrant 1B only).

3-legged Intersection

5. All flow values for Justification 1 and 2 are to be increased by 20% in the case of new intersections, Justification 3 is to only be used for existing intersections and all flow values for Warrant 1 and Warrant 2 of Justification 7 are to be increased by 20% for existing intersections and by 50% in the case of new intersections.

New Intersection

6. The crossing volumes are defined as the sum of:
   (a) Left-turns from both minor road approaches.
   (b) The heaviest through volume from the minor road.
   (c) 50% of the heavier left turn movement from major road when both of the following are met:
      (i) the left-turn volume >120 vph
      (ii) the left-turn volume plus the opposing volume >720 vph
   (d) Pedestrians crossing the main road.

CONCLUSION: **The intersection does NOT meet the minimum warrants for traffic control signals.**

* "Ontario Traffic Manual, Book 12 (March 2012)", Ontario Ministry of Transportation.

IBI

OTM BOOK 12* - TRAFFIC SIGNAL WARRANT

Project: Riverside South Employment Lands & Blocks 13, 14 **Date:** July 25, 2022

Project #: 136974

Location: Limebank Road (Major Roadway) at Realigned Leitrim Road (Minor Roadway)

Orientation: North/South East/West

Municipality: City of Ottawa **Scenario:** Future (2031) Total Traffic

Justification 1 - Minimum Vehicle Volume

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, all approaches	480	720	**720**	1080	3259 100%	1630 100%	1630 100%	1630 100%	3132 100%	1566 100%	1566 100%	1566 100%	100%
B. Vehicle volume along minor roads	120	170	**144**	204	126 87%	63 44%	63 44%	63 44%	616 100%	308 100%	308 100%	308 100%	77%

Justification 2 - Delay to Cross Traffic

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, along artery	480	720	**720**	1080	3133 100%	1567 100%	1567 100%	1567 100%	2516 100%	1258 100%	1258 100%	1258 100%	100%
B. Combined vehicle and pedestrian volume crossing artery from minor roads	50	70	**60**	84	196 100%	42 70%	42 70%	42 70%	415 100%	207 100%	207 100%	207 100%	89%

Justification 3 - Volume/Delay Combination

JUSTIFICATION	SATISFIED TO 80% OR MORE?	BOTH SATISFIED TO 80% OR MORE?
Justification 1 - Minimum Vehicular Volume	N/A	N/A
Justification 2 - Delay to Cross Traffic	N/A	

Justification 7 - Projected Volumes

WARRANT	DESCRIPTION	MINIMUM REQUIREMENT				COMPLIANCE		
		FREE FLOW	RESTRICTED FLOW	ADJUSTED FREE FLOW	ADJUSTED RESTRICTED FLOW	SECTIONAL AHV	SECTIONAL %	ENTIRE %
1. MINIMUM VEHICULAR VOLUME	A. Vehicle volumes, all approaches (Average Hour)	480	720	**900**	1350	1597	100%	100%
	B. Vehicle volume along minor roads (Average Hour)	120	170	**180**	255	185	100%	
2. DELAY TO CROSS TRAFFIC	A. Vehicle volumes, along artery (Average Hour)	480	720	**900**	1350	1412	100%	100%
	B. Combined vehicle and pedestrian volume crossing artery from minor roads (Average Hour)	50	75	**75**	113	125	100%	

Projected Traffic Volumes:

Average Hourly Volume (AHV) Equation: AHV = (amPHV + pmPHV)/4

AM Peak Hour Volumes

			↖	←	↙
426	↙		5	0	15
534	↓				
113	↘				
70	↗	↖	↑	↗	
0	→	224	1836	0	
36	↘				

PM Peak Hour Volumes

			↖	←	↙
92	↙		8	0	46
1675	↓				
56	↘				
369	↗	↖	↑	↗	
0	→	48	644	0	
193	↘				

Average Hourly Volumes (AHV)

			↖	←	↙
130	↙		3	0	15
552	↓				
42	↘				
110	↗	↖	↑	↗	
0	→	68	620	0	
57	↘				

Eight Hour Traffic Volumes:**

Hour	Major Road						Minor Road						Ped*
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	
7:00 AM	224	1836	0	113	534	426	70	0	36	15	0	5	0
8:00 AM	112	918	0	56	267	213	35	0	18	7	0	3	0
9:00 AM	112	918	0	56	267	213	35	0	18	7	0	3	0
10:00 AM	112	918	0	56	267	213	35	0	18	7	0	3	0
3:00 PM	48	644	0	56	1675	92	369	0	193	46	0	8	0
4:00 PM	24	322	0	28	838	46	184	0	97	23	0	4	0
5:00 PM	24	322	0	28	838	46	184	0	97	23	0	4	0
6:00 PM	24	322	0	28	838	46	184	0	97	23	0	4	0

** Number of pedestrians crossing the major road*
*** These are projected 8-hour traffic volumes.*

Notes:

1. Vehicle volume warrant (1A) and (2A) for intersections of roadways having two or more moving lanes in one direction should be 25% higher than the values given above.

2+ Lanes per Direction

2. Warrant values for free flow apply when the 85th percentile speed of artery traffic equals or exceeds 70 km/h or when the intersection lies within the built-up area of an isolated community having a population of less than 10,000. Warrant values for restricted flow apply to large urban communities when the 85th percentile speed of artery traffic does not exceed 70 km/h.

Free Flow

3. The lowest sectional percentage governs the entire warrant.

4. For "T" intersections the warrant values for the minor road should be increased by 50% (Warrant 1B only).

4-legged Intersection

5. All flow values for Justification 1 and 2 are to be increased by 20% in the case of new intersections, Justification 3 is to only be used for existing intersections and all flow values for Warrant 1 and Warrant 2 of Justification 7 are to be increased by 20% for existing intersections and by 50% in the case of new intersections.

New Intersection

6. The crossing volumes are defined as the sum of:
   (a) Left-turns from both minor road approaches.
   (b) The heaviest through volume from the minor road.
   (c) 50% of the heavier left turn movement from major road when both of the following are met:
      (i) the left-turn volume >120 vph
      (ii) the left-turn volume plus the opposing volume >720 vph
   (d) Pedestrians crossing the main road.

CONCLUSION: **Based on Justification 7, the intersection meets the minimum warrants for traffic control signals.**

* "Ontario Traffic Manual, Book 12 (March 2012)", Ontario Ministry of Transportation.

City of Ottawa
Roundabout Initial Feasability Screening Tool

The intent of this screening tool is to provide a relatively quick assessment of the feasibility of a roundabout at a particular intersection in comparison to other appropriate forms of traffic control or road modifications including all-way stop control, traffic signals, auxiliary lanes, etc. The intended outcome of this tool is to provide enough information to assist staff in deciding whether or not to proceed with an Intersection Control Study to investigate the feasibility of a roundabout in more detail.

1	Project Name:	Riverside South Employment Lands & Blocks 13, 14
2	Intersection:	Limebank Road & Realigned Leitrim Road
3	Location and Description of Intersection: Lane Configuration, total or approach AADT, distance to nearby intersection(s), etc. Attach or sketch a diagram and include existing and/or horizon-year turning movements. If an existing intersection then indicate type of control	Future four-legged intersection approximatley 600m south of the existing Limebank & Leitrim intersection.
4	What traditional modifications are proposed? All-way stop control, traffic signals, auxiliary lanes, etc. Attach or sketch a diagram if necessary.	Traffic signals
5	What size of roundabout is being considered? Describe, and attach a Roundabout Traffic Flow Worksheet	Two-lane roundabout
6	Why is a roundabout being considered?	As an alternative to traffic signals

7 Are there contra-indications for

If "Yes" is indicated for one or more of the contra-indications then a roundabout may be problematic at the subject intersection. That is not to say that a roundabout is not possible, just that there may be difficulties or high

No.	Contra-Indication	Outcome
1	Is there insufficient property at the intersection (i.e. less than 44 metres diameter if considering a single-lane roundabout, and less than 60 metres if considering a two-lane roundabout) or property constraints that would require demolition of adjacent structures?	Yes ☐ No ☒
2	Are there any instances where stopping sight distance (SSD) of a roundabout yield line may not be attainable (i.e. the intersection is on a crest vertical curve)?	Yes ☐ No ☒
3	Is there an existing uncontrolled approach with a grade in excess of 4 percent?	Yes ☐ No ☒
4	Is the intersection located within a coordinated signal system?	Yes ☐ No ☒
5	Is there a closely-spaced traffic signal or railway crossing that could not be controlled with a nearby roundabout?	Yes ☐ No ☒
6	Are significant differences in directional flows or any situations of sudden high demand expected?	Yes ☒ No ☐
7	Are there known visually-impaired pedestrians that cross this intersection?	Yes ☐ No ☒

8 Are there suitability factors for a roundabout?

If "Yes" is indicated for two or more of the suitability factors then a roundabout should be technically feasible at the subject intersection..

No.	Suitability Factor	Outcome
1	Does the intersection currently experience an average collision frequency of more than 1.5 injury crashes per year, or a collision rate in excess of 1 injury crash per 1 million vehicles entering (MVE)?	Yes ☐ No ☒
2	Has there been a fatal crash at the intersection in the last 10 years?	Yes ☐ No ☒
3	Are capacity problems currently being experienced, or expected in the future?	Yes ☐ No ☒
4	Are traffic signals warranted, or expected to be warranted in the future?	Yes ☒ No ☐
5	Does the intersection have more than 4 legs, or unusual geometry?	Yes ☐ No ☒
6	Will Planned modifications to the intersection require that nearby structures be widened (i.e. to accommodate left-turn lanes)?	Yes ☐ No ☒
7	Is the intersection located at a transition between rural and urban environments (i.e. an urban boundary) such that a roundabout could act as a means of speed transition?	Yes ☐ No ☒

9	Conclusions/recommendation whether to proceed with an Intersection Control Study:	Given that only one of the suitability factors has been met and that traffic flows are highly directional (primarily north-south), a roundabout is not recommended at this location.

City of Ottawa
Mini-Roundabout Screening Criteria

Mini roundabouts are best suited and most effective when they meet the following conditions;

No.	Criteria	Outcome
1	Located at minor collector road intersecting a minor collector road or a local residential road	Yes [ ] No [X]
2	ADT lesser than 15,000 (estimated ADT in case of new development area)	Yes [ ] No [X]
3	At least 10% of the total traffic has generated from minor road (estimated in case of new development area)	Yes [ ] No [X]
4	Operating speed <55km/hr or posted speed ≤ 50km/hr in a new development area	Yes [ ] No [X]
5	A right of way wide enough to accommodate a 13 m to 27 m Inscribed Circle Diameter roundabout and adjacent sidewalks	Yes [X] No [ ]
6	Situated on a non truck route or roads without heavy truck movements	Yes [ ] No [X]
7	Intersections with no more than four legs	Yes [X] No [ ]

Conclusion

Multiple screening criteria have not been met and therefore a mini-roundabout is not appropriate for this location.

Appendix J – Intersection Capacity Analyses

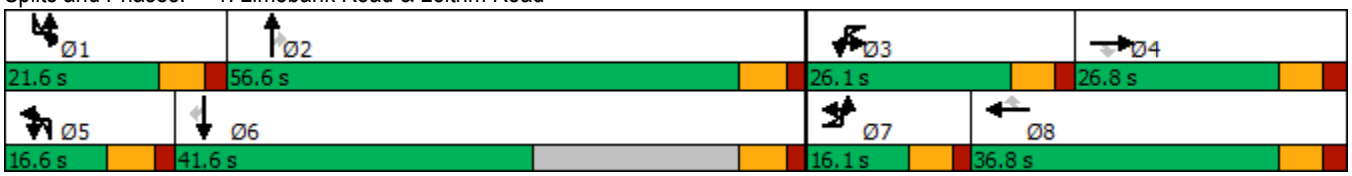
Existing (2022) Traffic

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	158	10	206	109	178	6	1065	473	131	241	6
Future Volume (vph)	2	158	10	206	109	178	6	1065	473	131	241	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	130.0		130.0	120.0		150.0	195.0		180.0	210.0		185.0
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor									0.99	1.00		
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3354	1820	1031	2942	1733	1488	3354	3357	1419	3077	3357	1547
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3354	1820	1031	2942	1733	1488	3354	3357	1400	3075	3357	1547
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			186			198			502			188
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		395.5			472.5			509.3			517.2	
Travel Time (s)		17.8			21.3			22.9			23.3	
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 (%)	0%	0%	50%	14%	5%	4%	0%	3%	9%	9%	3%	0%
Adj. Flow (vph)	2	176	11	229	121	198	7	1183	526	146	268	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	2	176	11	229	121	198	7	1183	526	146	268	7
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	21.0	21.0	5.0	21.0	21.0
Minimum Split (s)	11.1	30.8	30.8	11.1	30.8	30.8	11.6	27.6	27.6	11.6	27.6	27.6
Total Split (s)	16.1	26.8	26.8	26.1	36.8	36.8	16.6	56.6	56.6	21.6	41.6	41.6
Total Split (%)	12.3%	20.4%	20.4%	19.9%	28.1%	28.1%	12.7%	43.2%	43.2%	16.5%	31.7%	31.7%
Maximum Green (s)	10.0	20.0	20.0	20.0	30.0	30.0	10.0	50.0	50.0	15.0	35.0	35.0
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	1.9	2.6	2.6	1.9	2.6	2.6	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.8	6.8	6.1	6.8	6.8	6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	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	Min	Min
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		17.0	17.0		17.0	17.0		14.0	14.0		14.0	14.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	5.7	15.8	15.8	14.5	34.4	34.4	5.9	46.9	46.9	11.0	62.3	62.3
Actuated g/C Ratio	0.05	0.14	0.14	0.13	0.30	0.30	0.05	0.41	0.41	0.10	0.54	0.54
v/c Ratio	0.01	0.70	0.04	0.62	0.23	0.34	0.04	0.86	0.61	0.50	0.15	0.01

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	58.5	64.6	0.2	56.8	33.8	6.5	58.3	39.8	6.3	57.6	15.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.5	64.6	0.2	56.8	33.8	6.5	58.3	39.8	6.3	57.6	15.0	0.0
LOS	E	E	A	E	C	A	E	D	A	E	B	A
Approach Delay		60.8			33.6			29.6			29.5	
Approach LOS		E			C			C			C	
Queue Length 50th (m)	0.2	39.3	0.0	26.4	20.6	0.0	0.8	126.5	3.2	16.9	14.4	0.0
Queue Length 95th (m)	1.7	67.4	0.0	41.6	42.0	18.2	3.5	#194.6	32.6	29.0	30.4	0.0
Internal Link Dist (m)		371.5			448.5			485.3			493.2	
Turn Bay Length (m)	130.0		130.0	120.0		150.0	195.0		180.0	210.0		185.0
Base Capacity (vph)	297	322	335	521	535	596	297	1489	900	409	1859	940
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.55	0.03	0.44	0.23	0.33	0.02	0.79	0.58	0.36	0.14	0.01

Intersection Summary			
Area Type:	Other		
Cycle Length: 131.1			
Actuated Cycle Length: 114.7			
Natural Cycle: 95			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 32.4		Intersection LOS: C	
Intersection Capacity Utilization 72.8%		ICU Level of Service C	
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 & Leitrim Road



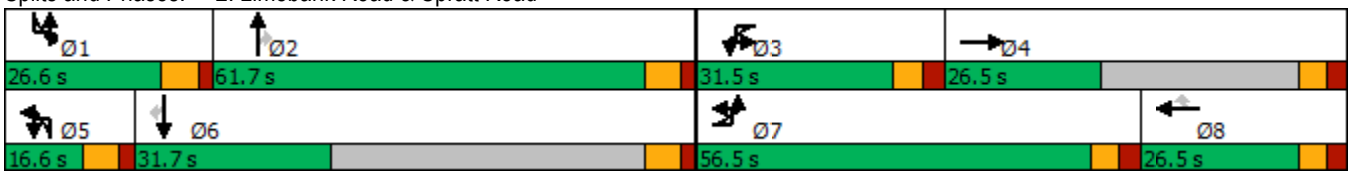
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	621	206	37	130	118	210	18	38	713	192	110	224
Future Volume (vph)	621	206	37	130	118	210	18	38	713	192	110	224
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		0.0	95.0		60.0		205.0		180.0	255.0	
Storage Lanes	2		0	2		1		2		1	2	
Taper Length (m)	7.6			7.6				7.6			7.6	
Lane Util. Factor	0.97	0.95	0.95	0.97	0.95	1.00	0.95	0.97	0.95	1.00	0.97	0.95
Ped Bike Factor	0.88	1.00		0.98		0.90		0.99		0.96	0.98	
Frt		0.977				0.850				0.850		
Flt Protected	0.950			0.950				0.950			0.950	
Satd. Flow (prot)	3321	3292	0	3022	3357	1419	0	3244	3390	1419	2968	3144
Flt Permitted	0.950			0.950				0.950			0.950	
Satd. Flow (perm)	2908	3292	0	2956	3357	1278	0	3207	3390	1357	2915	3144
Right Turn on Red			Yes			Yes				Yes		
Satd. Flow (RTOR)		12				190				213		
Link Speed (k/h)		60			60				80			80
Link Distance (m)		243.4			525.1				473.0			635.3
Travel Time (s)		14.6			31.5				21.3			28.6
Confl. Peds. (#/hr)	61		13	13		61		11		22	22	
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%	2%	3%	11%	3%	9%	0%	5%	2%	9%	13%	10%
Adj. Flow (vph)	690	229	41	144	131	233	20	42	792	213	122	249
Shared Lane Traffic (%)												
Lane Group Flow (vph)	690	270	0	144	131	233	0	62	792	213	122	249
Turn Type	Prot	NA		Prot	NA	Perm	Prot	Prot	NA	Perm	Prot	NA
Protected Phases	7	4		3	8		5	5	2		1	6
Permitted Phases						8				2		
Detector Phase	7	4		3	8	8	5	5	2	2	1	6
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	5.0	15.0	15.0	5.0	15.0
Minimum Split (s)	11.5	41.5		11.5	41.5	41.5	11.6	11.6	41.7	41.7	11.6	41.7
Total Split (s)	56.5	26.5		31.5	26.5	26.5	16.6	16.6	61.7	61.7	26.6	31.7
Total Split (%)	33.0%	15.5%		18.4%	15.5%	15.5%	9.7%	9.7%	36.0%	36.0%	15.5%	18.5%
Maximum Green (s)	50.0	20.0		25.0	20.0	20.0	10.0	10.0	55.0	55.0	20.0	25.0
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.8	2.8		2.8	2.8	2.8	2.0	2.0	2.1	2.1	2.0	2.1
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)	6.5	6.5		6.5	6.5	6.5		6.6	6.7	6.7	6.6	6.7
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	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
Recall Mode	Min	None		None	None	None	None	None	Min	Min	None	Min
Walk Time (s)		10.0			10.0	10.0			10.0	10.0		10.0
Flash Dont Walk (s)		25.0			25.0	25.0			25.0	25.0		25.0
Pedestrian Calls (#/hr)		0			0	0			0	0		0
Act Effct Green (s)	32.0	33.3		11.9	13.2	13.2		8.0	36.2	36.2	11.0	42.6
Actuated g/C Ratio	0.27	0.28		0.10	0.11	0.11		0.07	0.30	0.30	0.09	0.36
v/c Ratio	0.78	0.29		0.48	0.36	0.75		0.29	0.77	0.38	0.45	0.22

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	123
Future Volume (vph)	123
Ideal Flow (vphpl)	1800
Storage Length (m)	230.0
Storage Lanes	1
Taper Length (m)	
Lane Util. Factor	1.00
Ped Bike Factor	0.97
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1502
Flt Permitted	
Satd. Flow (perm)	1460
Right Turn on Red	Yes
Satd. Flow (RTOR)	147
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	11
Peak Hour Factor	0.90
Heavy Vehicles (%)	3%
Adj. Flow (vph)	137
Shared Lane Traffic (%)	
Lane Group Flow (vph)	137
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Detector Phase	6
Switch Phase	
Minimum Initial (s)	15.0
Minimum Split (s)	41.7
Total Split (s)	31.7
Total Split (%)	18.5%
Maximum Green (s)	25.0
Yellow Time (s)	4.6
All-Red Time (s)	2.1
Lost Time Adjust (s)	0.0
Total Lost Time (s)	6.7
Lead/Lag	Lag
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	Min
Walk Time (s)	10.0
Flash Dont Walk (s)	25.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	42.6
Actuated g/C Ratio	0.36
v/c Ratio	0.22

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Control Delay	48.8	34.8		61.3	56.7	30.1		64.4	45.0	6.7	62.0	30.2
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	48.8	34.8		61.3	56.7	30.1		64.4	45.0	6.7	62.0	30.2
LOS	D	C		E	E	C		E	D	A	E	C
Approach Delay		44.9			45.8				38.5			31.1
Approach LOS		D			D				D			C
Queue Length 50th (m)	72.7	24.1		15.8	14.6	9.1		6.8	83.3	0.0	13.4	20.9
Queue Length 95th (m)	126.0	45.4		34.7	31.8	44.9		18.2	142.4	18.8	30.5	40.5
Internal Link Dist (m)		219.4			501.1				449.0			611.3
Turn Bay Length (m)	100.0			95.0		60.0		205.0		180.0	255.0	
Base Capacity (vph)	1448	1321		659	585	379		283	1627	761	517	1783
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	0.48	0.20		0.22	0.22	0.61		0.22	0.49	0.28	0.24	0.14

Intersection Summary			
Area Type:	Other		
Cycle Length: 171.3			
Actuated Cycle Length: 119.9			
Natural Cycle: 130			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 40.5		Intersection LOS: D	
Intersection Capacity Utilization 97.7%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 2: Limebank Road & Spratt Road



Lane Group	SBR
Control Delay	5.1
Queue Delay	0.0
Total Delay	5.1
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (m)	0.0
Queue Length 95th (m)	12.4
Internal Link Dist (m)	
Turn Bay Length (m)	230.0
Base Capacity (vph)	891
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.15

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	860	20	25	254	15	4
Future Volume (vph)	860	20	25	254	15	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Ped Bike Factor	1.00		0.99		1.00	0.98
Frt	0.997					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3410	0	1662	3262	1530	1547
Flt Permitted			0.293		0.950	
Satd. Flow (perm)	3410	0	510	3262	1529	1523
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	4					4
Link Speed (k/h)	60			60	50	
Link Distance (m)	254.5			243.4	128.6	
Travel Time (s)	15.3			14.6	9.3	
Confl. Peds. (#/hr)		13	13		1	4
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	1%	0%	4%	6%	13%	0%
Adj. Flow (vph)	956	22	28	282	17	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	978	0	28	282	17	4
Turn Type	NA		Perm	NA	Perm	Perm
Protected Phases	2			6		
Permitted Phases			6		8	8
Detector Phase	2		6	6	8	8
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	5.0	5.0
Minimum Split (s)	24.0		24.0	24.0	32.0	32.0
Total Split (s)	48.0		48.0	48.0	32.0	32.0
Total Split (%)	60.0%		60.0%	60.0%	40.0%	40.0%
Maximum Green (s)	42.0		42.0	42.0	26.0	26.0
Yellow Time (s)	3.7		3.7	3.7	3.3	3.3
All-Red Time (s)	2.3		2.3	2.3	2.7	2.7
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0		6.0	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	C-Max		C-Max	C-Max	None	None
Walk Time (s)	7.0		0.0	0.0	7.0	7.0
Flash Dont Walk (s)	10.0		0.0	0.0	19.0	19.0
Pedestrian Calls (#/hr)	0		0	0	0	0
Act Effct Green (s)	72.2		72.2	72.2	6.5	6.5
Actuated g/C Ratio	0.90		0.90	0.90	0.08	0.08
v/c Ratio	0.32		0.06	0.10	0.14	0.03
Control Delay	2.0		2.4	1.6	36.0	22.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	2.0		2.4	1.6	36.0	22.2

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
LOS	A		A	A	D	C
Approach Delay	2.0			1.6	33.4	
Approach LOS	A			A	C	
Queue Length 50th (m)	0.0		0.0	0.0	2.5	0.0
Queue Length 95th (m)	28.5		2.7	7.5	8.1	2.7
Internal Link Dist (m)	230.5			219.4	104.6	
Turn Bay Length (m)						
Base Capacity (vph)	3076		460	2942	496	497
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.32		0.06	0.10	0.03	0.01

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.32			
Intersection Signal Delay: 2.4		Intersection LOS: A	
Intersection Capacity Utilization 42.1%		ICU Level of Service A	
Analysis Period (min) 15			

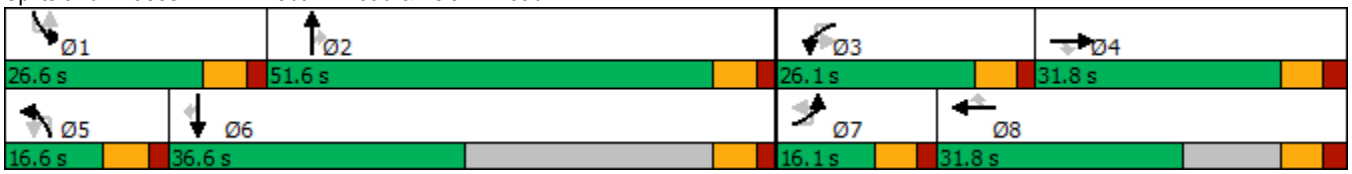
Splits and Phases: 3: Urbandale Plaza & Spratt Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	125	15	492	243	186	4	354	186	185	927	5
Future Volume (vph)	7	125	15	492	243	186	4	354	186	185	927	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	130.0		130.0	120.0		150.0	195.0		180.0	210.0		185.0
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor									0.99	1.00		
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3354	1767	1381	3257	1802	1488	3354	3325	1419	3106	3424	1289
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3354	1767	1381	3257	1802	1488	3354	3325	1400	3100	3424	1289
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			232			207			234			181
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		395.5			472.5			509.3			517.2	
Travel Time (s)		17.8			21.3			22.9			23.3	
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 (%)	0%	3%	12%	3%	1%	4%	0%	4%	9%	8%	1%	20%
Adj. Flow (vph)	8	139	17	547	270	207	4	393	207	206	1030	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	139	17	547	270	207	4	393	207	206	1030	6
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	21.0	21.0	5.0	21.0	21.0
Minimum Split (s)	11.1	30.8	30.8	11.1	30.8	30.8	11.6	27.6	27.6	11.6	27.6	27.6
Total Split (s)	16.1	31.8	31.8	26.1	31.8	31.8	16.6	51.6	51.6	26.6	36.6	36.6
Total Split (%)	11.8%	23.4%	23.4%	19.2%	23.4%	23.4%	12.2%	37.9%	37.9%	19.5%	26.9%	26.9%
Maximum Green (s)	10.0	25.0	25.0	20.0	25.0	25.0	10.0	45.0	45.0	20.0	30.0	30.0
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	1.9	2.6	2.6	1.9	2.6	2.6	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.8	6.8	6.1	6.8	6.8	6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	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	Min	Min
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		17.0	17.0		17.0	17.0		14.0	14.0		14.0	14.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	5.8	13.1	13.1	20.1	37.1	37.1	5.7	21.6	21.6	11.6	37.6	37.6
Actuated g/C Ratio	0.06	0.14	0.14	0.22	0.40	0.40	0.06	0.23	0.23	0.13	0.41	0.41
v/c Ratio	0.04	0.56	0.04	0.77	0.37	0.29	0.02	0.51	0.41	0.53	0.74	0.01

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	44.3	46.6	0.2	43.9	23.3	4.6	44.5	34.4	5.7	43.8	28.8	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.3	46.6	0.2	43.9	23.3	4.6	44.5	34.4	5.7	43.8	28.8	0.0
LOS	D	D	A	D	C	A	D	C	A	D	C	A
Approach Delay		41.7			30.5			24.6			31.2	
Approach LOS		D			C			C			C	
Queue Length 50th (m)	0.7	23.2	0.0	46.6	31.2	0.0	0.3	31.7	0.0	17.6	75.4	0.0
Queue Length 95th (m)	3.2	44.0	0.0	#83.3	68.5	15.6	2.1	51.5	12.8	30.9	#145.3	0.0
Internal Link Dist (m)		371.5			448.5			485.3			493.2	
Turn Bay Length (m)	130.0		130.0	120.0		150.0	195.0		180.0	210.0		185.0
Base Capacity (vph)	363	478	543	706	732	727	363	1622	802	673	2042	841
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.29	0.03	0.77	0.37	0.28	0.01	0.24	0.26	0.31	0.50	0.01

Intersection Summary			
Area Type:	Other		
Cycle Length: 136.1			
Actuated Cycle Length: 92.6			
Natural Cycle: 105			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 30.2		Intersection LOS: C	
Intersection Capacity Utilization 76.1%		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 & Leitrim Road



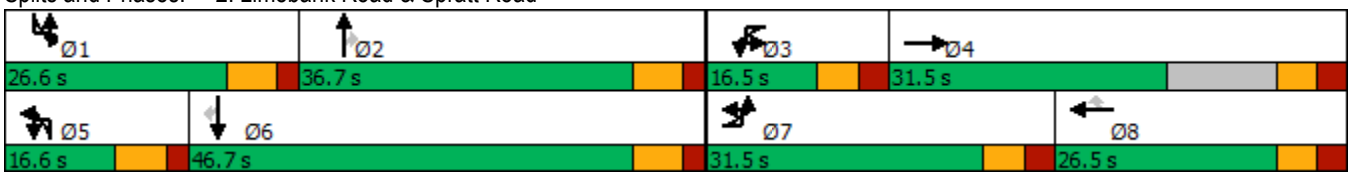
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	214	32	42	30	21	21	22	49	308	41	1	58
Future Volume (vph)	214	32	42	30	21	21	22	49	308	41	1	58
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		0.0	95.0		60.0		205.0		180.0		255.0
Storage Lanes	2		0	2		1		2		1		2
Taper Length (m)	7.6			7.6				7.6				7.6
Lane Util. Factor	0.97	0.95	0.95	0.97	0.95	1.00	0.95	0.97	0.95	1.00	0.95	0.97
Ped Bike Factor	1.00	0.99		0.99		0.99		1.00		0.98		1.00
Frt		0.915				0.850				0.850		
Flt Protected	0.950			0.950				0.950				0.950
Satd. Flow (prot)	3321	3086	0	3257	3293	1473	0	3308	3232	1517	0	3289
Flt Permitted	0.950			0.950				0.950				0.950
Satd. Flow (perm)	3315	3086	0	3211	3293	1454	0	3305	3232	1492	0	3279
Right Turn on Red			Yes			Yes				Yes		
Satd. Flow (RTOR)		47				269				267		
Link Speed (k/h)		60			60				80			
Link Distance (m)		243.4			525.1				473.0			
Travel Time (s)		14.6			31.5				21.3			
Confl. Peds. (#/hr)	1		9	9		1		4		3		3
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 (%)	1%	3%	0%	3%	5%	5%	0%	2%	7%	2%	0%	2%
Adj. Flow (vph)	238	36	47	33	23	23	24	54	342	46	1	64
Shared Lane Traffic (%)												
Lane Group Flow (vph)	238	83	0	33	23	23	0	78	342	46	0	65
Turn Type	Prot	NA		Prot	NA	Perm	Prot	Prot	NA	Perm	Prot	Prot
Protected Phases	7	4		3	8		5	5	2		1	1
Permitted Phases						8				2		
Detector Phase	7	4		3	8	8	5	5	2	2	1	1
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	5.0	15.0	15.0	5.0	5.0
Minimum Split (s)	11.5	41.5		11.5	41.5	41.5	11.6	11.6	41.7	41.7	11.6	11.6
Total Split (s)	31.5	31.5		16.5	26.5	26.5	16.6	16.6	36.7	36.7	26.6	26.6
Total Split (%)	26.0%	26.0%		13.6%	21.8%	21.8%	13.7%	13.7%	30.3%	30.3%	21.9%	21.9%
Maximum Green (s)	25.0	25.0		10.0	20.0	20.0	10.0	10.0	30.0	30.0	20.0	20.0
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.8	2.8		2.8	2.8	2.8	2.0	2.0	2.1	2.1	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5		6.6	6.7	6.7		6.6
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	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
Recall Mode	None	None		None	None	None	None	None	Min	Min	None	None
Walk Time (s)		10.0			10.0	10.0			10.0	10.0		
Flash Dont Walk (s)		25.0			25.0	25.0			25.0	25.0		
Pedestrian Calls (#/hr)		0			0	0			0	0		
Act Effct Green (s)	13.3	14.8		7.1	11.5	11.5		8.2	30.7	30.7		7.8
Actuated g/C Ratio	0.17	0.19		0.09	0.15	0.15		0.11	0.40	0.40		0.10

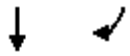
Lane Group	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	873	502
Future Volume (vph)	873	502
Ideal Flow (vphpl)	1800	1800
Storage Length (m)		230.0
Storage Lanes		1
Taper Length (m)		
Lane Util. Factor	0.95	1.00
Ped Bike Factor		0.98
Frt		0.850
Flt Protected		
Satd. Flow (prot)	3424	1532
Flt Permitted		
Satd. Flow (perm)	3424	1507
Right Turn on Red		Yes
Satd. Flow (RTOR)		558
Link Speed (k/h)	80	
Link Distance (m)	635.3	
Travel Time (s)	28.6	
Confl. Peds. (#/hr)		4
Confl. Bikes (#/hr)		
Peak Hour Factor	0.90	0.90
Heavy Vehicles (%)	1%	1%
Adj. Flow (vph)	970	558
Shared Lane Traffic (%)		
Lane Group Flow (vph)	970	558
Turn Type	NA	Perm
Protected Phases	6	
Permitted Phases		6
Detector Phase	6	6
Switch Phase		
Minimum Initial (s)	15.0	15.0
Minimum Split (s)	41.7	41.7
Total Split (s)	46.7	46.7
Total Split (%)	38.5%	38.5%
Maximum Green (s)	40.0	40.0
Yellow Time (s)	4.6	4.6
All-Red Time (s)	2.1	2.1
Lost Time Adjust (s)	0.0	0.0
Total Lost Time (s)	6.7	6.7
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Recall Mode	Min	Min
Walk Time (s)	10.0	10.0
Flash Dont Walk (s)	25.0	25.0
Pedestrian Calls (#/hr)	0	0
Act Effct Green (s)	30.4	30.4
Actuated g/C Ratio	0.39	0.39

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
v/c Ratio	0.42	0.13		0.11	0.05	0.05		0.22	0.27	0.06		0.20
Control Delay	37.4	18.5		42.6	39.9	0.2		41.3	18.5	0.1		41.7
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0
Total Delay	37.4	18.5		42.6	39.9	0.2		41.3	18.5	0.1		41.7
LOS	D	B		D	D	A		D	B	A		D
Approach Delay		32.5			29.5				20.5			
Approach LOS		C			C				C			
Queue Length 50th (m)	20.0	2.7		2.8	1.8	0.0		6.6	21.2	0.0		5.5
Queue Length 95th (m)	34.0	9.6		7.8	6.1	0.0		14.5	33.8	0.0		12.7
Internal Link Dist (m)		219.4			501.1				449.0			
Turn Bay Length (m)	100.0			95.0		60.0		205.0		180.0		255.0
Base Capacity (vph)	1225	1616		480	971	618		488	1593	871		971
Starvation Cap Reductn	0	0		0	0	0		0	0	0		0
Spillback Cap Reductn	0	0		0	0	0		0	0	0		0
Storage Cap Reductn	0	0		0	0	0		0	0	0		0
Reduced v/c Ratio	0.19	0.05		0.07	0.02	0.04		0.16	0.21	0.05		0.07

Intersection Summary			
Area Type:	Other		
Cycle Length: 121.3			
Actuated Cycle Length: 77.6			
Natural Cycle: 110			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 21.3		Intersection LOS: C	
Intersection Capacity Utilization 71.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 2: Limebank Road & Spratt Road





Lane Group	SBT	SBR
v/c Ratio	0.72	0.60
Control Delay	25.4	5.0
Queue Delay	0.0	0.0
Total Delay	25.4	5.0
LOS	C	A
Approach Delay	18.9	
Approach LOS	B	
Queue Length 50th (m)	75.6	0.0
Queue Length 95th (m)	107.1	20.5
Internal Link Dist (m)	611.3	
Turn Bay Length (m)		230.0
Base Capacity (vph)	1996	1111
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.49	0.50

Intersection Summary

Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Volume (vph)	282	36	2	44	526	70	4
Future Volume (vph)	282	36	2	44	526	70	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	0.95	0.95	0.95	1.00	0.95	1.00	1.00
Ped Bike Factor	1.00			1.00			
Frt	0.983						0.850
Flt Protected				0.950		0.950	
Satd. Flow (prot)	3359	0	0	1729	3424	1712	1547
Flt Permitted				0.540		0.950	
Satd. Flow (perm)	3359	0	0	979	3424	1712	1547
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)	26						4
Link Speed (k/h)	60				60	50	
Link Distance (m)	254.5				243.4	128.6	
Travel Time (s)	15.3				14.6	9.3	
Confl. Peds. (#/hr)		3		3			
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	1%	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	313	40	2	49	584	78	4
Shared Lane Traffic (%)							
Lane Group Flow (vph)	353	0	0	51	584	78	4
Turn Type	NA		Perm	Perm	NA	Perm	Perm
Protected Phases	2				6		
Permitted Phases			6	6		8	8
Detector Phase	2		6	6	6	8	8
Switch Phase							
Minimum Initial (s)	10.0		10.0	10.0	10.0	5.0	5.0
Minimum Split (s)	24.0		32.0	32.0	32.0	32.0	32.0
Total Split (s)	48.0		48.0	48.0	48.0	32.0	32.0
Total Split (%)	60.0%		60.0%	60.0%	60.0%	40.0%	40.0%
Maximum Green (s)	42.0		42.0	42.0	42.0	26.0	26.0
Yellow Time (s)	3.7		3.7	3.7	3.7	3.3	3.3
All-Red Time (s)	2.3		2.3	2.3	2.3	2.7	2.7
Lost Time Adjust (s)	0.0			0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0			6.0	6.0	6.0	6.0
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max		C-Max	C-Max	C-Max	None	None
Walk Time (s)	7.0					7.0	7.0
Flash Dont Walk (s)	10.0					19.0	19.0
Pedestrian Calls (#/hr)	0					0	0
Act Effct Green (s)	62.5			62.5	62.5	9.0	9.0
Actuated g/C Ratio	0.78			0.78	0.78	0.11	0.11
v/c Ratio	0.13			0.07	0.22	0.41	0.02
Control Delay	3.1			3.7	3.5	38.5	19.8
Queue Delay	0.0			0.0	0.0	0.0	0.0
Total Delay	3.1			3.7	3.5	38.5	19.8

Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
LOS	A			A	A	D	B
Approach Delay	3.1				3.6	37.6	
Approach LOS	A				A	D	
Queue Length 50th (m)	6.0			1.7	11.7	11.2	0.0
Queue Length 95th (m)	11.5			5.2	20.3	22.6	2.5
Internal Link Dist (m)	230.5				219.4	104.6	
Turn Bay Length (m)							
Base Capacity (vph)	2630			765	2675	556	505
Starvation Cap Reductn	0			0	0	0	0
Spillback Cap Reductn	0			0	0	0	0
Storage Cap Reductn	0			0	0	0	0
Reduced v/c Ratio	0.13			0.07	0.22	0.14	0.01

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.41			
Intersection Signal Delay: 6.0		Intersection LOS: A	
Intersection Capacity Utilization 41.7%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Urbandale Plaza & Spratt Road

Future (2031) Background Traffic

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	240	28	241	124	203	6	1271	600	199	332	7
Future Volume (vph)	3	240	28	241	124	203	6	1271	600	199	332	7
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	130.0		130.0	120.0		150.0	195.0		180.0	210.0		185.0
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor									0.99	1.00		
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3354	1820	1031	2942	1733	1488	3354	3357	1419	3077	3357	1547
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3354	1820	1031	2942	1733	1488	3354	3357	1400	3076	3357	1547
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			188			192			365			190
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		395.5			472.5			509.3			517.2	
Travel Time (s)		17.8			21.3			22.9			23.3	
Confl. Peds. (#/hr)									1	1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	50%	14%	5%	4%	0%	3%	9%	9%	3%	0%
Adj. Flow (vph)	3	240	28	241	124	203	6	1271	600	199	332	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	240	28	241	124	203	6	1271	600	199	332	7
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	21.0	21.0	5.0	21.0	21.0
Minimum Split (s)	11.1	30.8	30.8	11.1	30.8	30.8	11.6	27.6	27.6	11.6	27.6	27.6
Total Split (s)	12.0	31.0	31.0	20.0	39.0	39.0	12.0	61.0	61.0	18.0	67.0	67.0
Total Split (%)	9.2%	23.8%	23.8%	15.4%	30.0%	30.0%	9.2%	46.9%	46.9%	13.8%	51.5%	51.5%
Maximum Green (s)	5.9	24.2	24.2	13.9	32.2	32.2	5.4	54.4	54.4	11.4	60.4	60.4
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	1.9	2.6	2.6	1.9	2.6	2.6	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.8	6.8	6.1	6.8	6.8	6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	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	Min	Min
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		17.0	17.0		17.0	17.0		14.0	14.0		14.0	14.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	5.7	20.3	20.3	13.2	37.5	37.5	5.4	52.0	52.0	11.0	67.4	67.4
Actuated g/C Ratio	0.05	0.17	0.17	0.11	0.31	0.31	0.04	0.42	0.42	0.09	0.55	0.55
v/c Ratio	0.02	0.80	0.09	0.76	0.23	0.35	0.04	0.90	0.75	0.72	0.18	0.01

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	59.7	69.9	0.5	70.7	35.2	7.7	60.3	42.9	18.0	71.6	15.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.7	69.9	0.5	70.7	35.2	7.7	60.3	42.9	18.0	71.6	15.4	0.0
LOS	E	E	A	E	D	A	E	D	B	E	B	A
Approach Delay		62.6			40.4			35.0			36.0	
Approach LOS		E			D			C			D	
Queue Length 50th (m)	0.4	58.2	0.0	30.8	22.5	1.9	0.7	153.3	50.4	25.5	20.2	0.0
Queue Length 95th (m)	2.0	87.2	0.0	#49.5	43.3	21.4	3.1	#195.0	102.9	#42.2	35.8	0.0
Internal Link Dist (m)		371.5			448.5			485.3			493.2	
Turn Bay Length (m)	130.0		130.0	120.0		150.0	195.0		180.0	210.0		185.0
Base Capacity (vph)	162	361	355	335	534	591	148	1498	827	287	1853	939
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.66	0.08	0.72	0.23	0.34	0.04	0.85	0.73	0.69	0.18	0.01

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 122.9			
Natural Cycle: 105			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 38.4		Intersection LOS: D	
Intersection Capacity Utilization 87.7%		ICU Level of Service E	
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 & Leitrim Road

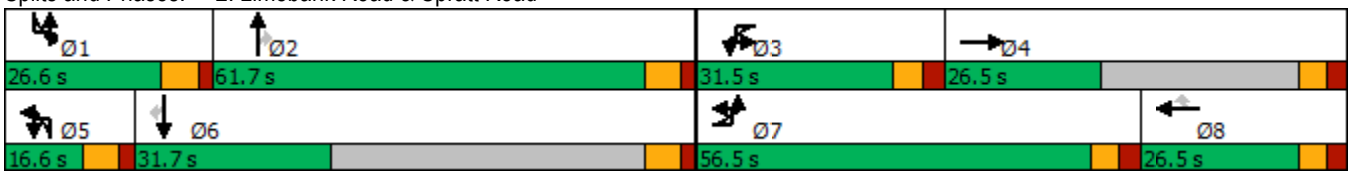
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	515	171	31	108	98	174	21	32	864	159	91	276
Future Volume (vph)	515	171	31	108	98	174	21	32	864	159	91	276
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		0.0	95.0		60.0		205.0		180.0	255.0	
Storage Lanes	2		0	2		1		2		1	2	
Taper Length (m)	7.6			7.6				7.6			7.6	
Lane Util. Factor	0.97	0.95	0.95	0.97	0.95	1.00	0.95	0.97	0.95	1.00	0.97	0.95
Ped Bike Factor	0.87	1.00		0.98		0.90		0.99		0.96	0.98	
Frt		0.977				0.850				0.850		
Flt Protected	0.950			0.950				0.950			0.950	
Satd. Flow (prot)	3321	3292	0	3022	3357	1419	0	3256	3390	1419	2968	3144
Flt Permitted	0.950			0.950				0.950			0.950	
Satd. Flow (perm)	2888	3292	0	2949	3357	1278	0	3220	3390	1357	2920	3144
Right Turn on Red			Yes			Yes				Yes		
Satd. Flow (RTOR)		12				190				189		
Link Speed (k/h)		60			60				80			80
Link Distance (m)		243.4			525.1				473.0			635.3
Travel Time (s)		14.6			31.5				21.3			28.6
Confl. Peds. (#/hr)	61		13	13		61		11		22	22	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	2%	3%	11%	3%	9%	0%	5%	2%	9%	13%	10%
Adj. Flow (vph)	515	171	31	108	98	174	21	32	864	159	91	276
Shared Lane Traffic (%)												
Lane Group Flow (vph)	515	202	0	108	98	174	0	53	864	159	91	276
Turn Type	Prot	NA		Prot	NA	Perm	Prot	Prot	NA	Perm	Prot	NA
Protected Phases	7	4		3	8		5	5	2		1	6
Permitted Phases						8				2		
Detector Phase	7	4		3	8	8	5	5	2	2	1	6
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	5.0	15.0	15.0	5.0	15.0
Minimum Split (s)	11.5	41.5		11.5	41.5	41.5	11.6	11.6	41.7	41.7	11.6	41.7
Total Split (s)	56.5	26.5		31.5	26.5	26.5	16.6	16.6	61.7	61.7	26.6	31.7
Total Split (%)	33.0%	15.5%		18.4%	15.5%	15.5%	9.7%	9.7%	36.0%	36.0%	15.5%	18.5%
Maximum Green (s)	50.0	20.0		25.0	20.0	20.0	10.0	10.0	55.0	55.0	20.0	25.0
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.8	2.8		2.8	2.8	2.8	2.0	2.0	2.1	2.1	2.0	2.1
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)	6.5	6.5		6.5	6.5	6.5		6.6	6.7	6.7	6.6	6.7
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	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
Recall Mode	Min	None		None	None	None	None	None	Min	Min	None	Min
Walk Time (s)		10.0			10.0	10.0			10.0	10.0		10.0
Flash Dont Walk (s)		25.0			25.0	25.0			25.0	25.0		25.0
Pedestrian Calls (#/hr)		0			0	0			0	0		0
Act Effct Green (s)	23.6	24.6		9.8	10.8	10.8		7.5	34.5	34.5	9.2	39.3
Actuated g/C Ratio	0.22	0.23		0.09	0.10	0.10		0.07	0.33	0.33	0.09	0.37
v/c Ratio	0.69	0.26		0.38	0.28	0.58		0.23	0.78	0.28	0.35	0.23

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	102
Future Volume (vph)	102
Ideal Flow (vphpl)	1800
Storage Length (m)	230.0
Storage Lanes	1
Taper Length (m)	
Lane Util. Factor	1.00
Ped Bike Factor	0.97
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1502
Flt Permitted	
Satd. Flow (perm)	1460
Right Turn on Red	Yes
Satd. Flow (RTOR)	147
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	11
Peak Hour Factor	1.00
Heavy Vehicles (%)	3%
Adj. Flow (vph)	102
Shared Lane Traffic (%)	
Lane Group Flow (vph)	102
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Detector Phase	6
Switch Phase	
Minimum Initial (s)	15.0
Minimum Split (s)	41.7
Total Split (s)	31.7
Total Split (%)	18.5%
Maximum Green (s)	25.0
Yellow Time (s)	4.6
All-Red Time (s)	2.1
Lost Time Adjust (s)	0.0
Total Lost Time (s)	6.7
Lead/Lag	Lag
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	Min
Walk Time (s)	10.0
Flash Dont Walk (s)	25.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	39.3
Actuated g/C Ratio	0.37
v/c Ratio	0.16

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Control Delay	43.9	33.7		52.6	50.4	14.1		53.8	37.7	3.4	53.1	24.8
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	43.9	33.7		52.6	50.4	14.1		53.8	37.7	3.4	53.1	24.8
LOS	D	C		D	D	B		D	D	A	D	C
Approach Delay		41.1			34.4				33.5			25.3
Approach LOS		D			C				C			C
Queue Length 50th (m)	48.6	16.3		10.6	9.6	0.0		5.2	80.7	0.0	8.9	20.5
Queue Length 95th (m)	81.8	32.3		23.4	21.9	17.3		13.8	124.8	8.8	20.6	36.1
Internal Link Dist (m)		219.4			501.1				449.0			611.3
Turn Bay Length (m)	100.0			95.0		60.0		205.0		180.0	255.0	
Base Capacity (vph)	1623	1454		738	656	402		318	1822	816	580	1997
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	0.32	0.14		0.15	0.15	0.43		0.17	0.47	0.19	0.16	0.14

Intersection Summary			
Area Type:	Other		
Cycle Length: 171.3			
Actuated Cycle Length: 105.1			
Natural Cycle: 120			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 34.2		Intersection LOS: C	
Intersection Capacity Utilization 96.3%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 2: Limebank Road & Spratt Road



Lane Group	SBR
Control Delay	1.7
Queue Delay	0.0
Total Delay	1.7
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (m)	0.0
Queue Length 95th (m)	3.6
Internal Link Dist (m)	
Turn Bay Length (m)	230.0
Base Capacity (vph)	980
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.10

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	714	17	21	211	12	3
Future Volume (vph)	714	17	21	211	12	3
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Ped Bike Factor	1.00		0.99		1.00	0.98
Frt	0.997					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3410	0	1662	3262	1530	1547
Flt Permitted			0.374		0.950	
Satd. Flow (perm)	3410	0	648	3262	1529	1523
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	4					3
Link Speed (k/h)	60			60	50	
Link Distance (m)	254.5			243.4	128.6	
Travel Time (s)	15.3			14.6	9.3	
Confl. Peds. (#/hr)		13	13		1	4
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	0%	4%	6%	13%	0%
Adj. Flow (vph)	714	17	21	211	12	3
Shared Lane Traffic (%)						
Lane Group Flow (vph)	731	0	21	211	12	3
Turn Type	NA		Perm	NA	Perm	Perm
Protected Phases	2			6		
Permitted Phases			6		8	8
Detector Phase	2		6	6	8	8
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	5.0	5.0
Minimum Split (s)	24.0		24.0	24.0	32.0	32.0
Total Split (s)	48.0		48.0	48.0	32.0	32.0
Total Split (%)	60.0%		60.0%	60.0%	40.0%	40.0%
Maximum Green (s)	42.0		42.0	42.0	26.0	26.0
Yellow Time (s)	3.7		3.7	3.7	3.3	3.3
All-Red Time (s)	2.3		2.3	2.3	2.7	2.7
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0		6.0	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	C-Max		C-Max	C-Max	None	None
Walk Time (s)	7.0		0.0	0.0	7.0	7.0
Flash Dont Walk (s)	10.0		0.0	0.0	19.0	19.0
Pedestrian Calls (#/hr)	0		0	0	0	0
Act Effct Green (s)	76.1		76.1	76.1	6.3	6.3
Actuated g/C Ratio	0.95		0.95	0.95	0.08	0.08
v/c Ratio	0.23		0.03	0.07	0.10	0.02
Control Delay	1.0		1.4	0.9	35.6	23.7
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	1.0		1.4	0.9	35.6	23.7

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
LOS	A		A	A	D	C
Approach Delay	1.0			0.9	33.2	
Approach LOS	A			A	C	
Queue Length 50th (m)	0.0		0.0	0.0	1.7	0.0
Queue Length 95th (m)	19.1		2.1	5.6	6.5	2.4
Internal Link Dist (m)	230.5			219.4	104.6	
Turn Bay Length (m)						
Base Capacity (vph)	3243		616	3102	496	497
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.23		0.03	0.07	0.02	0.01

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.23			
Intersection Signal Delay: 1.5		Intersection LOS: A	
Intersection Capacity Utilization 37.8%		ICU Level of Service A	
Analysis Period (min) 15			

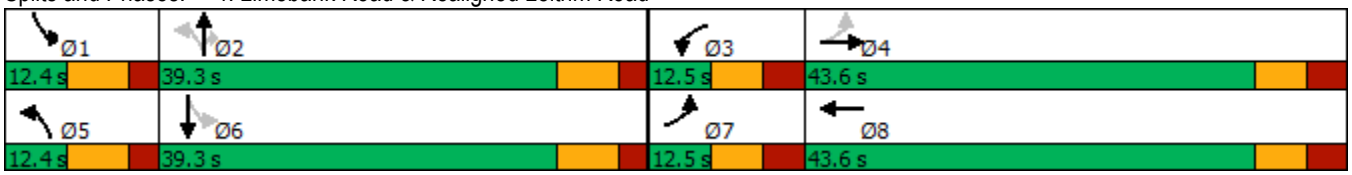
Splits and Phases: 3: Urbandale Plaza & Spratt Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	15	0	5	0	1833	0	113	533	0
Future Volume (vph)	0	0	0	15	0	5	0	1833	0	113	533	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	90.0		0.0	125.0		0.0	90.0		160.0	90.0		0.0
Storage Lanes	1		0	2		0	1		1	1		0
Taper Length (m)	7.6			2.5			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Frt					0.850							
Flt Protected				0.950						0.950		
Satd. Flow (prot)	1625	3087	0	3354	2939	0	1625	3357	1820	1729	3172	0
Flt Permitted				0.950						0.089		
Satd. Flow (perm)	1625	3087	0	3354	2939	0	1625	3357	1820	162	3172	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					260							
Link Speed (k/h)		48			48			80			80	
Link Distance (m)		472.7			426.7			635.3			509.3	
Travel Time (s)		35.5			32.0			28.6			22.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	12%	12%	12%	0%	12%	0%	12%	3%	0%	0%	9%	12%
Adj. Flow (vph)	0	0	0	15	0	5	0	1833	0	113	533	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	15	5	0	0	1833	0	113	533	0
Turn Type	pm+pt			Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4						2		2	6		
Detector Phase	7	4		3	8		5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	12.5	43.6		12.5	43.6		12.4	39.3	39.3	12.4	39.3	
Total Split (s)	12.5	43.6		12.5	43.6		12.4	39.3	39.3	12.4	39.3	
Total Split (%)	11.6%	40.4%		11.6%	40.4%		11.5%	36.5%	36.5%	11.5%	36.5%	
Maximum Green (s)	5.0	36.1		5.0	36.1		5.0	31.9	31.9	5.0	31.9	
Yellow Time (s)	4.1	4.1		4.1	4.1		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	3.4	3.4		3.4	3.4		2.4	2.4	2.4	2.4	2.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.5	7.5		7.5	7.5		7.4	7.4	7.4	7.4	7.4	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	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	
Recall Mode	None	None		None	None		None	Min	Min	None	Min	
Walk Time (s)		7.0			7.0			7.0	7.0		7.0	
Flash Dont Walk (s)		29.1			29.1			24.9	24.9		24.9	
Pedestrian Calls (#/hr)		0			0			0	0		0	
Act Effct Green (s)				6.0	10.2			37.4		50.0	56.2	
Actuated g/C Ratio				0.10	0.17			0.62		0.83	0.93	
v/c Ratio				0.05	0.01			0.88		0.43	0.18	
Control Delay				23.9	0.0			19.2		9.6	1.8	
Queue Delay				0.0	0.0			0.0		0.0	0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay				23.9	0.0			19.2		9.6	1.8	
LOS				C	A			B		A	A	
Approach Delay					17.9			19.2			3.1	
Approach LOS					B			B			A	
Queue Length 50th (m)				0.6	0.0			62.2		0.4	0.0	
Queue Length 95th (m)				3.2	0.0			#193.3		14.9	19.7	
Internal Link Dist (m)		448.7			402.7			611.3			485.3	
Turn Bay Length (m)				125.0						90.0		
Base Capacity (vph)				329	1880			2073		264	2944	
Starvation Cap Reductn				0	0			0		0	0	
Spillback Cap Reductn				0	0			0		0	0	
Storage Cap Reductn				0	0			0		0	0	
Reduced v/c Ratio				0.05	0.00			0.88		0.43	0.18	

Intersection Summary			
Area Type:	Other		
Cycle Length: 107.8			
Actuated Cycle Length: 60.6			
Natural Cycle: 120			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 15.0		Intersection LOS: B	
Intersection Capacity Utilization 87.0%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 4: Limebank Road & Realigned Leitrim Road

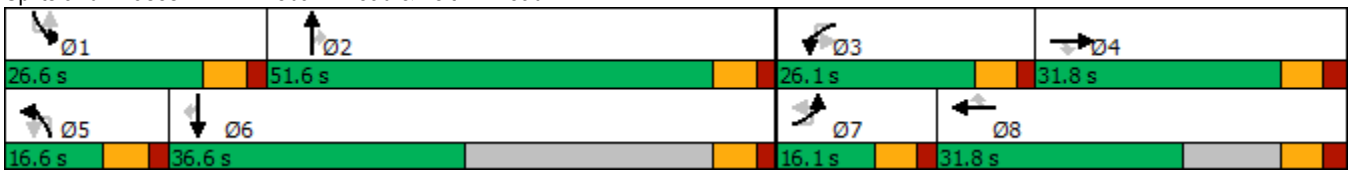


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	190	30	484	277	212	4	501	242	280	1108	6
Future Volume (vph)	11	190	30	484	277	212	4	501	242	280	1108	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	130.0		130.0	120.0		150.0	195.0		180.0	210.0		185.0
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor									0.99	1.00		
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3354	1767	1381	3257	1802	1488	3354	3325	1419	3106	3424	1289
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3354	1767	1381	3257	1802	1488	3354	3325	1400	3101	3424	1289
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			232			212			242			181
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		395.5			472.5			509.3			517.2	
Travel Time (s)		17.8			21.3			22.9			23.3	
Confl. Peds. (#/hr)									1	1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	12%	3%	1%	4%	0%	4%	9%	8%	1%	20%
Adj. Flow (vph)	11	190	30	484	277	212	4	501	242	280	1108	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	190	30	484	277	212	4	501	242	280	1108	6
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	21.0	21.0	5.0	21.0	21.0
Minimum Split (s)	11.1	30.8	30.8	11.1	30.8	30.8	11.6	27.6	27.6	11.6	27.6	27.6
Total Split (s)	16.1	31.8	31.8	26.1	31.8	31.8	16.6	51.6	51.6	26.6	36.6	36.6
Total Split (%)	11.8%	23.4%	23.4%	19.2%	23.4%	23.4%	12.2%	37.9%	37.9%	19.5%	26.9%	26.9%
Maximum Green (s)	10.0	25.0	25.0	20.0	25.0	25.0	10.0	45.0	45.0	20.0	30.0	30.0
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	1.9	2.6	2.6	1.9	2.6	2.6	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.8	6.8	6.1	6.8	6.8	6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	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	Min	Min
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		17.0	17.0		17.0	17.0		14.0	14.0		14.0	14.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	5.9	16.4	16.4	20.3	40.7	40.7	5.7	24.0	24.0	14.6	43.1	43.1
Actuated g/C Ratio	0.06	0.16	0.16	0.20	0.40	0.40	0.06	0.24	0.24	0.14	0.42	0.42
v/c Ratio	0.06	0.67	0.07	0.75	0.38	0.29	0.02	0.64	0.47	0.63	0.76	0.01

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	51.5	53.0	0.3	48.3	25.9	4.9	51.8	40.1	7.8	48.9	30.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.5	53.0	0.3	48.3	25.9	4.9	51.8	40.1	7.8	48.9	30.4	0.0
LOS	D	D	A	D	C	A	D	D	A	D	C	A
Approach Delay		46.1			32.5			29.7			33.9	
Approach LOS		D			C			C			C	
Queue Length 50th (m)	1.0	34.2	0.0	44.6	34.5	0.0	0.3	46.3	0.0	26.0	90.4	0.0
Queue Length 95th (m)	4.4	64.7	0.0	#88.4	80.0	16.9	2.4	73.0	19.8	45.9	157.2	0.0
Internal Link Dist (m)		371.5			448.5			485.3			493.2	
Turn Bay Length (m)	130.0		130.0	120.0		150.0	195.0		180.0	210.0		185.0
Base Capacity (vph)	334	440	518	649	721	723	334	1491	761	619	1876	788
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.43	0.06	0.75	0.38	0.29	0.01	0.34	0.32	0.45	0.59	0.01

Intersection Summary			
Area Type:	Other		
Cycle Length: 136.1			
Actuated Cycle Length: 101.7			
Natural Cycle: 105			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 33.4		Intersection LOS: C	
Intersection Capacity Utilization 83.4%		ICU Level of Service E	
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 & Leitrim Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	178	27	35	25	17	17	26	41	367	34	1	48
Future Volume (vph)	178	27	35	25	17	17	26	41	367	34	1	48
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		0.0	95.0		60.0		205.0		180.0		255.0
Storage Lanes	2		0	2		1		2		1		2
Taper Length (m)	7.6			7.6				7.6				7.6
Lane Util. Factor	0.97	0.95	0.95	0.97	0.95	1.00	0.95	0.97	0.95	1.00	0.95	0.97
Ped Bike Factor	1.00	0.99		0.99		0.99		1.00		0.98		1.00
Frt		0.915				0.850				0.850		
Flt Protected	0.950			0.950				0.950				0.950
Satd. Flow (prot)	3321	3086	0	3257	3293	1473	0	3314	3232	1517	0	3290
Flt Permitted	0.950			0.950				0.950				0.950
Satd. Flow (perm)	3315	3086	0	3210	3293	1454	0	3311	3232	1492	0	3280
Right Turn on Red			Yes			Yes				Yes		
Satd. Flow (RTOR)		35				269				267		
Link Speed (k/h)		60			60				80			
Link Distance (m)		243.4			525.1				473.0			
Travel Time (s)		14.6			31.5				21.3			
Confl. Peds. (#/hr)	1		9	9		1		4		3		3
Confl. Bikes (#/hr)										1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	3%	0%	3%	5%	5%	0%	2%	7%	2%	0%	2%
Adj. Flow (vph)	178	27	35	25	17	17	26	41	367	34	1	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	178	62	0	25	17	17	0	67	367	34	0	49
Turn Type	Prot	NA		Prot	NA	Perm	Prot	Prot	NA	Perm	Prot	Prot
Protected Phases	7	4		3	8		5	5	2		1	1
Permitted Phases						8				2		
Detector Phase	7	4		3	8	8	5	5	2	2	1	1
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	5.0	15.0	15.0	5.0	5.0
Minimum Split (s)	11.5	41.5		11.5	41.5	41.5	11.6	11.6	41.7	41.7	11.6	11.6
Total Split (s)	31.5	31.5		16.5	26.5	26.5	16.6	16.6	36.7	36.7	26.6	26.6
Total Split (%)	26.0%	26.0%		13.6%	21.8%	21.8%	13.7%	13.7%	30.3%	30.3%	21.9%	21.9%
Maximum Green (s)	25.0	25.0		10.0	20.0	20.0	10.0	10.0	30.0	30.0	20.0	20.0
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.8	2.8		2.8	2.8	2.8	2.0	2.0	2.1	2.1	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5		6.6	6.7	6.7		6.6
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	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
Recall Mode	None	None		None	None	None	None	None	Min	Min	None	None
Walk Time (s)		10.0			10.0	10.0			10.0	10.0		
Flash Dont Walk (s)		25.0			25.0	25.0			25.0	25.0		
Pedestrian Calls (#/hr)		0			0	0			0	0		
Act Effct Green (s)	11.8	15.6		6.7	11.0	11.0		7.6	37.7	37.7		7.2
Actuated g/C Ratio	0.15	0.20		0.08	0.14	0.14		0.10	0.48	0.48		0.09

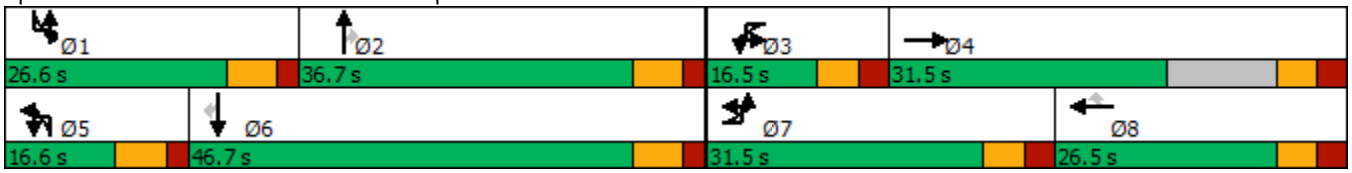
Lane Group	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	1064	417
Future Volume (vph)	1064	417
Ideal Flow (vphpl)	1800	1800
Storage Length (m)		230.0
Storage Lanes		1
Taper Length (m)		
Lane Util. Factor	0.95	1.00
Ped Bike Factor		0.98
Frt		0.850
Flt Protected		
Satd. Flow (prot)	3424	1532
Flt Permitted		
Satd. Flow (perm)	3424	1507
Right Turn on Red		Yes
Satd. Flow (RTOR)		417
Link Speed (k/h)	80	
Link Distance (m)	635.3	
Travel Time (s)	28.6	
Confl. Peds. (#/hr)		4
Confl. Bikes (#/hr)		
Peak Hour Factor	1.00	1.00
Heavy Vehicles (%)	1%	1%
Adj. Flow (vph)	1064	417
Shared Lane Traffic (%)		
Lane Group Flow (vph)	1064	417
Turn Type	NA	Perm
Protected Phases	6	
Permitted Phases		6
Detector Phase	6	6
Switch Phase		
Minimum Initial (s)	15.0	15.0
Minimum Split (s)	41.7	41.7
Total Split (s)	46.7	46.7
Total Split (%)	38.5%	38.5%
Maximum Green (s)	40.0	40.0
Yellow Time (s)	4.6	4.6
All-Red Time (s)	2.1	2.1
Lost Time Adjust (s)	0.0	0.0
Total Lost Time (s)	6.7	6.7
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Recall Mode	Min	Min
Walk Time (s)	10.0	10.0
Flash Dont Walk (s)	25.0	25.0
Pedestrian Calls (#/hr)	0	0
Act Effct Green (s)	34.2	34.2
Actuated g/C Ratio	0.43	0.43

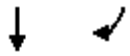
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
v/c Ratio	0.36	0.10		0.09	0.04	0.04		0.21	0.24	0.04		0.16
Control Delay	38.5	18.7		42.4	39.3	0.2		41.3	15.7	0.1		41.7
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0
Total Delay	38.5	18.7		42.4	39.3	0.2		41.3	15.7	0.1		41.7
LOS	D	B		D	D	A		D	B	A		D
Approach Delay		33.4			29.4				18.3			
Approach LOS		C			C				B			
Queue Length 50th (m)	15.6	1.8		2.2	1.4	0.0		5.9	21.8	0.0		4.3
Queue Length 95th (m)	26.4	8.0		6.4	4.8	0.0		12.6	34.2	0.0		10.1
Internal Link Dist (m)		219.4			501.1				449.0			
Turn Bay Length (m)	100.0			95.0		60.0		205.0		180.0		255.0
Base Capacity (vph)	1149	1513		450	912	597		458	1653	893		911
Starvation Cap Reductn	0	0		0	0	0		0	0	0		0
Spillback Cap Reductn	0	0		0	0	0		0	0	0		0
Storage Cap Reductn	0	0		0	0	0		0	0	0		0
Reduced v/c Ratio	0.15	0.04		0.06	0.02	0.03		0.15	0.22	0.04		0.05

Intersection Summary

Area Type: Other
Cycle Length: 121.3
Actuated Cycle Length: 79.2
Natural Cycle: 110
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 20.7 Intersection LOS: C
Intersection Capacity Utilization 65.0% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 2: Limebank Road & Spratt Road





Lane Group	SBT	SBR
v/c Ratio	0.72	0.47
Control Delay	24.1	4.0
Queue Delay	0.0	0.0
Total Delay	24.1	4.0
LOS	C	A
Approach Delay	19.2	
Approach LOS	B	
Queue Length 50th (m)	82.3	0.0
Queue Length 95th (m)	115.2	17.3
Internal Link Dist (m)	611.3	
Turn Bay Length (m)		230.0
Base Capacity (vph)	1897	1020
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.56	0.41

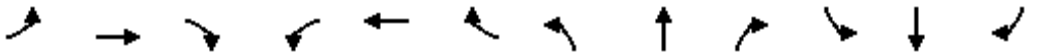
Intersection Summary

Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Volume (vph)	234	30	2	37	437	58	3
Future Volume (vph)	234	30	2	37	437	58	3
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	0.95	0.95	0.95	1.00	0.95	1.00	1.00
Ped Bike Factor	1.00			1.00			
Frt	0.983						0.850
Flt Protected				0.950		0.950	
Satd. Flow (prot)	3359	0	0	1729	3424	1712	1547
Flt Permitted				0.589		0.950	
Satd. Flow (perm)	3359	0	0	1067	3424	1712	1547
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)	26						3
Link Speed (k/h)	60				60	50	
Link Distance (m)	254.5				243.4	128.6	
Travel Time (s)	15.3				14.6	9.3	
Confl. Peds. (#/hr)		3		3			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	234	30	2	37	437	58	3
Shared Lane Traffic (%)							
Lane Group Flow (vph)	264	0	0	39	437	58	3
Turn Type	NA		Perm	Perm	NA	Perm	Perm
Protected Phases	2				6		
Permitted Phases			6	6		8	8
Detector Phase	2		6	6	6	8	8
Switch Phase							
Minimum Initial (s)	10.0		10.0	10.0	10.0	5.0	5.0
Minimum Split (s)	24.0		32.0	32.0	32.0	32.0	32.0
Total Split (s)	48.0		48.0	48.0	48.0	32.0	32.0
Total Split (%)	60.0%		60.0%	60.0%	60.0%	40.0%	40.0%
Maximum Green (s)	42.0		42.0	42.0	42.0	26.0	26.0
Yellow Time (s)	3.7		3.7	3.7	3.7	3.3	3.3
All-Red Time (s)	2.3		2.3	2.3	2.3	2.7	2.7
Lost Time Adjust (s)	0.0			0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0			6.0	6.0	6.0	6.0
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max		C-Max	C-Max	C-Max	None	None
Walk Time (s)	7.0					7.0	7.0
Flash Dont Walk (s)	10.0					19.0	19.0
Pedestrian Calls (#/hr)	0					0	0
Act Effct Green (s)	67.1			67.1	67.1	8.2	8.2
Actuated g/C Ratio	0.84			0.84	0.84	0.10	0.10
v/c Ratio	0.09			0.04	0.15	0.33	0.02
Control Delay	2.3			3.1	2.6	37.8	21.3
Queue Delay	0.0			0.0	0.0	0.0	0.0
Total Delay	2.3			3.1	2.6	37.8	21.3

Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
LOS	A			A	A	D	C
Approach Delay	2.3				2.7	37.0	
Approach LOS	A				A	D	
Queue Length 50th (m)	4.0			1.2	7.8	8.4	0.0
Queue Length 95th (m)	8.0			3.9	13.8	18.4	2.3
Internal Link Dist (m)	230.5				219.4	104.6	
Turn Bay Length (m)							
Base Capacity (vph)	2821			894	2872	556	504
Starvation Cap Reductn	0			0	0	0	0
Spillback Cap Reductn	0			0	0	0	0
Storage Cap Reductn	0			0	0	0	0
Reduced v/c Ratio	0.09			0.04	0.15	0.10	0.01

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.33			
Intersection Signal Delay: 5.2		Intersection LOS: A	
Intersection Capacity Utilization 41.7%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Urbandale Plaza & Spratt Road

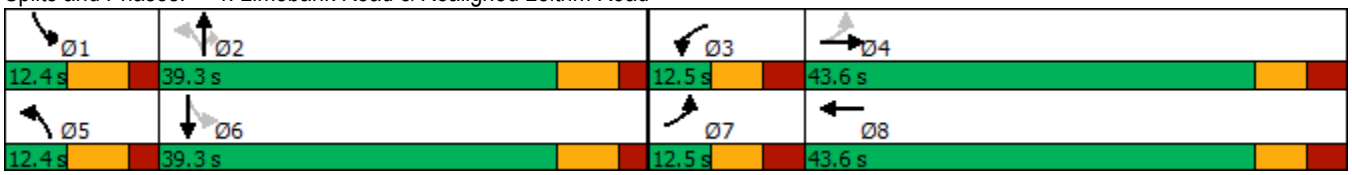


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	46	0	8	0	642	0	56	1672	0
Future Volume (vph)	0	0	0	46	0	8	0	642	0	56	1672	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	90.0		0.0	125.0		0.0	90.0		160.0	90.0		0.0
Storage Lanes	1		0	2		0	1		1	1		0
Taper Length (m)	7.6			2.5			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Frt					0.850							
Flt Protected				0.950						0.950		
Satd. Flow (prot)	1625	3087	0	3354	2939	0	1625	3262	1820	1729	3424	0
Flt Permitted				0.950						0.330		
Satd. Flow (perm)	1625	3087	0	3354	2939	0	1625	3262	1820	601	3424	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					306							
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		472.7			426.7			635.3			509.3	
Travel Time (s)		28.4			25.6			28.6			22.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	12%	12%	12%	0%	12%	0%	12%	6%	0%	0%	1%	12%
Adj. Flow (vph)	0	0	0	46	0	8	0	642	0	56	1672	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	46	8	0	0	642	0	56	1672	0
Turn Type	pm+pt			Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4						2		2	6		
Detector Phase	7	4		3	8		5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	12.5	43.6		12.5	43.6		12.4	39.3	39.3	12.4	39.3	
Total Split (s)	12.5	43.6		12.5	43.6		12.4	39.3	39.3	12.4	39.3	
Total Split (%)	11.6%	40.4%		11.6%	40.4%		11.5%	36.5%	36.5%	11.5%	36.5%	
Maximum Green (s)	5.0	36.1		5.0	36.1		5.0	31.9	31.9	5.0	31.9	
Yellow Time (s)	4.1	4.1		4.1	4.1		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	3.4	3.4		3.4	3.4		2.4	2.4	2.4	2.4	2.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.5	7.5		7.5	7.5		7.4	7.4	7.4	7.4	7.4	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	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	
Recall Mode	None	None		None	None		None	Min	Min	None	Min	
Walk Time (s)		7.0			7.0			7.0	7.0		7.0	
Flash Dont Walk (s)		29.1			29.1			24.9	24.9		24.9	
Pedestrian Calls (#/hr)		0			0			0	0		0	
Act Effct Green (s)				6.9	10.1			34.3		39.1	43.9	
Actuated g/C Ratio				0.13	0.19			0.65		0.74	0.83	
v/c Ratio				0.11	0.01			0.30		0.10	0.59	
Control Delay				20.2	0.0			9.9		4.8	7.3	
Queue Delay				0.0	0.0			0.0		0.0	0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay				20.2	0.0			9.9		4.8	7.3	
LOS				C	A			A		A	A	
Approach Delay					17.2			9.9			7.2	
Approach LOS					B			A			A	
Queue Length 50th (m)				1.5	0.0			12.3		0.2	0.0	
Queue Length 95th (m)				5.7	0.0			41.4		6.0	#101.2	
Internal Link Dist (m)		448.7			402.7			611.3			485.3	
Turn Bay Length (m)				125.0						90.0		
Base Capacity (vph)				436	2121			2526		550	2831	
Starvation Cap Reductn				0	0			0		0	0	
Spillback Cap Reductn				0	0			0		0	0	
Storage Cap Reductn				0	0			0		0	0	
Reduced v/c Ratio				0.11	0.00			0.25		0.10	0.59	

Intersection Summary			
Area Type:	Other		
Cycle Length: 107.8			
Actuated Cycle Length: 53.1			
Natural Cycle: 120			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.59			
Intersection Signal Delay: 8.2		Intersection LOS: A	
Intersection Capacity Utilization 69.9%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 4: Limebank Road & Realigned Leitrim Road



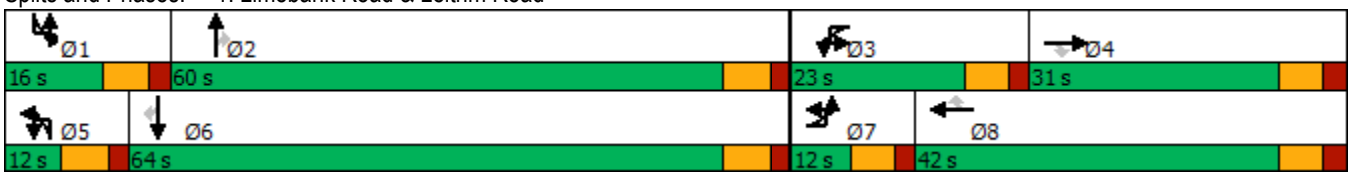
Future (2031) Total Traffic

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	240	28	348	124	203	6	1317	619	199	600	7
Future Volume (vph)	3	240	28	348	124	203	6	1317	619	199	600	7
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	130.0		130.0	120.0		150.0	195.0		180.0	210.0		185.0
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor									0.99	1.00		
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3354	1820	1031	2942	1733	1488	3354	3357	1419	3077	3357	1547
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3354	1820	1031	2942	1733	1488	3354	3357	1400	3076	3357	1547
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			188			190			416			190
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		395.5			472.5			509.3			517.2	
Travel Time (s)		17.8			21.3			22.9			23.3	
Confl. Peds. (#/hr)									1	1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	50%	14%	5%	4%	0%	3%	9%	9%	3%	0%
Adj. Flow (vph)	3	240	28	348	124	203	6	1317	619	199	600	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	240	28	348	124	203	6	1317	619	199	600	7
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	21.0	21.0	5.0	21.0	21.0
Minimum Split (s)	11.1	30.8	30.8	11.1	30.8	30.8	11.6	27.6	27.6	11.6	27.6	27.6
Total Split (s)	12.0	31.0	31.0	23.0	42.0	42.0	12.0	60.0	60.0	16.0	64.0	64.0
Total Split (%)	9.2%	23.8%	23.8%	17.7%	32.3%	32.3%	9.2%	46.2%	46.2%	12.3%	49.2%	49.2%
Maximum Green (s)	5.9	24.2	24.2	16.9	35.2	35.2	5.4	53.4	53.4	9.4	57.4	57.4
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	1.9	2.6	2.6	1.9	2.6	2.6	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.8	6.8	6.1	6.8	6.8	6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	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	Min	Min
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		17.0	17.0		17.0	17.0		14.0	14.0		14.0	14.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	5.7	20.5	20.5	16.7	41.1	41.1	5.4	52.9	52.9	9.4	66.6	66.6
Actuated g/C Ratio	0.05	0.16	0.16	0.13	0.33	0.33	0.04	0.42	0.42	0.07	0.53	0.53
v/c Ratio	0.02	0.81	0.09	0.89	0.22	0.33	0.04	0.93	0.75	0.87	0.34	0.01

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	59.7	71.7	0.5	79.1	33.0	7.3	60.3	48.1	16.1	90.8	18.7	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.7	71.7	0.5	79.1	33.0	7.3	60.3	48.1	16.1	90.8	18.7	0.0
LOS	E	E	A	E	C	A	E	D	B	F	B	A
Approach Delay		64.2			49.0			37.9			36.4	
Approach LOS		E			D			D			D	
Queue Length 50th (m)	0.4	58.2	0.0	45.0	21.7	2.1	0.7	164.8	43.2	26.0	42.5	0.0
Queue Length 95th (m)	2.0	87.2	0.0	#73.1	41.9	21.1	3.1	#218.0	96.4	#48.7	69.1	0.0
Internal Link Dist (m)		371.5			448.5			485.3			493.2	
Turn Bay Length (m)	130.0		130.0	120.0		150.0	195.0		180.0	210.0		185.0
Base Capacity (vph)	157	350	350	396	566	614	144	1428	835	230	1778	908
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.69	0.08	0.88	0.22	0.33	0.04	0.92	0.74	0.87	0.34	0.01

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 125.7			
Natural Cycle: 115			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.93			
Intersection Signal Delay: 41.5		Intersection LOS: D	
Intersection Capacity Utilization 92.1%		ICU Level of Service F	
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 & Leitrim Road



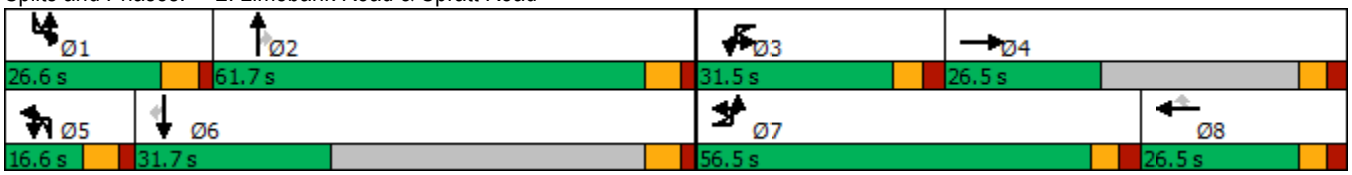
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	542	171	33	108	98	192	21	32	1100	159	94	315
Future Volume (vph)	542	171	33	108	98	192	21	32	1100	159	94	315
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		0.0	95.0		60.0		205.0		180.0	255.0	
Storage Lanes	2		0	2		1		2		1	2	
Taper Length (m)	7.6			7.6				7.6			7.6	
Lane Util. Factor	0.97	0.95	0.95	0.97	0.95	1.00	0.95	0.97	0.95	1.00	0.97	0.95
Ped Bike Factor	0.87	1.00		0.98		0.90		0.99		0.96	0.99	
Frt		0.976				0.850				0.850		
Flt Protected	0.950			0.950				0.950			0.950	
Satd. Flow (prot)	3321	3287	0	3022	3357	1419	0	3256	3390	1419	2968	3144
Flt Permitted	0.950			0.950				0.950			0.950	
Satd. Flow (perm)	2888	3287	0	2949	3357	1278	0	3222	3390	1357	2934	3144
Right Turn on Red			Yes			Yes				Yes		
Satd. Flow (RTOR)		13				190				189		
Link Speed (k/h)		60			60				80			80
Link Distance (m)		243.4			525.1				473.0			635.3
Travel Time (s)		14.6			31.5				21.3			28.6
Confl. Peds. (#/hr)	61		13	13		61		11		22	22	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	2%	3%	11%	3%	9%	0%	5%	2%	9%	13%	10%
Adj. Flow (vph)	542	171	33	108	98	192	21	32	1100	159	94	315
Shared Lane Traffic (%)												
Lane Group Flow (vph)	542	204	0	108	98	192	0	53	1100	159	94	315
Turn Type	Prot	NA		Prot	NA	Perm	Prot	Prot	NA	Perm	Prot	NA
Protected Phases	7	4		3	8		5	5	2		1	6
Permitted Phases						8				2		
Detector Phase	7	4		3	8	8	5	5	2	2	1	6
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	5.0	15.0	15.0	5.0	15.0
Minimum Split (s)	11.5	41.5		11.5	41.5	41.5	11.6	11.6	41.7	41.7	11.6	41.7
Total Split (s)	56.5	26.5		31.5	26.5	26.5	16.6	16.6	61.7	61.7	26.6	31.7
Total Split (%)	33.0%	15.5%		18.4%	15.5%	15.5%	9.7%	9.7%	36.0%	36.0%	15.5%	18.5%
Maximum Green (s)	50.0	20.0		25.0	20.0	20.0	10.0	10.0	55.0	55.0	20.0	25.0
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.8	2.8		2.8	2.8	2.8	2.0	2.0	2.1	2.1	2.0	2.1
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)	6.5	6.5		6.5	6.5	6.5		6.6	6.7	6.7	6.6	6.7
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	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
Recall Mode	Min	None		None	None	None	None	None	Min	Min	None	Min
Walk Time (s)		10.0			10.0	10.0			10.0	10.0		10.0
Flash Dont Walk (s)		25.0			25.0	25.0			25.0	25.0		25.0
Pedestrian Calls (#/hr)		0			0	0			0	0		0
Act Effct Green (s)	26.2	27.4		10.1	11.3	11.3		7.6	53.1	53.1	9.6	57.8
Actuated g/C Ratio	0.21	0.22		0.08	0.09	0.09		0.06	0.42	0.42	0.08	0.46
v/c Ratio	0.79	0.28		0.45	0.33	0.67		0.27	0.78	0.23	0.42	0.22

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	107
Future Volume (vph)	107
Ideal Flow (vphpl)	1800
Storage Length (m)	230.0
Storage Lanes	1
Taper Length (m)	
Lane Util. Factor	1.00
Ped Bike Factor	0.97
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1502
Flt Permitted	
Satd. Flow (perm)	1460
Right Turn on Red	Yes
Satd. Flow (RTOR)	147
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	11
Peak Hour Factor	1.00
Heavy Vehicles (%)	3%
Adj. Flow (vph)	107
Shared Lane Traffic (%)	
Lane Group Flow (vph)	107
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Detector Phase	6
Switch Phase	
Minimum Initial (s)	15.0
Minimum Split (s)	41.7
Total Split (s)	31.7
Total Split (%)	18.5%
Maximum Green (s)	25.0
Yellow Time (s)	4.6
All-Red Time (s)	2.1
Lost Time Adjust (s)	0.0
Total Lost Time (s)	6.7
Lead/Lag	Lag
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	Min
Walk Time (s)	10.0
Flash Dont Walk (s)	25.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	57.8
Actuated g/C Ratio	0.46
v/c Ratio	0.14

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Control Delay	57.0	40.3		63.6	59.3	20.3		63.6	37.5	2.8	63.9	23.4
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	57.0	40.3		63.6	59.3	20.3		63.6	37.5	2.8	63.9	23.4
LOS	E	D		E	E	C		E	D	A	E	C
Approach Delay		52.4			41.7				34.3			26.3
Approach LOS		D			D				C			C
Queue Length 50th (m)	66.0	21.1		13.3	12.2	0.5		6.5	118.7	0.0	11.5	24.7
Queue Length 95th (m)	93.7	34.1		25.3	23.2	25.2		14.7	183.2	8.7	22.7	43.4
Internal Link Dist (m)		219.4			501.1				449.0			611.3
Turn Bay Length (m)	100.0			95.0		60.0		205.0		180.0	255.0	
Base Capacity (vph)	1321	1185		601	534	363		259	1484	700	472	1626
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	0.41	0.17		0.18	0.18	0.53		0.20	0.74	0.23	0.20	0.19

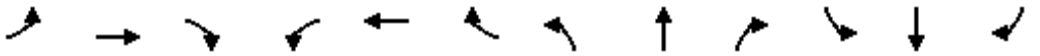
Intersection Summary			
Area Type:	Other		
Cycle Length: 171.3			
Actuated Cycle Length: 126.7			
Natural Cycle: 120			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 38.5		Intersection LOS: D	
Intersection Capacity Utilization 102.1%		ICU Level of Service G	
Analysis Period (min) 15			

Splits and Phases: 2: Limebank Road & Spratt Road



Lane Group	SBR
Control Delay	1.7
Queue Delay	0.0
Total Delay	1.7
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (m)	0.0
Queue Length 95th (m)	4.4
Internal Link Dist (m)	
Turn Bay Length (m)	230.0
Base Capacity (vph)	826
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.13

Intersection Summary



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	737	17	21	215	2	12	0	3	6	0	2
Future Volume (vph)	1	737	17	21	215	2	12	0	3	6	0	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		0.99			1.00	0.98			0.99	
Frt		0.997			0.999			0.850			0.966	
Flt Protected	0.950			0.950			0.950				0.964	
Satd. Flow (prot)	1729	3410	0	1662	3261	0	1530	1523	0	0	1689	0
Flt Permitted	0.616			0.366								
Satd. Flow (perm)	1121	3410	0	635	3261	0	1609	1523	0	0	1748	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			2			161			41	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		254.5			243.4			128.6			121.2	
Travel Time (s)		15.3			14.6			9.3			8.7	
Confl. Peds. (#/hr)			13	13			1		4	4		1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	1%	0%	4%	6%	0%	13%	0%	0%	0%	0%	0%
Adj. Flow (vph)	1	737	17	21	215	2	12	0	3	6	0	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1	754	0	21	217	0	12	3	0	0	8	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		32.0	32.0		32.0	32.0	
Total Split (s)	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%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	42.0	42.0		42.0	42.0		26.0	26.0		26.0	26.0	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.3	2.3		2.3	2.3		2.7	2.7		2.7	2.7	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	10.0	10.0		10.0	10.0		19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	76.0	76.0		76.0	76.0		6.5	6.5			6.0	
Actuated g/C Ratio	0.95	0.95		0.95	0.95		0.08	0.08			0.08	
v/c Ratio	0.00	0.23		0.03	0.07		0.09	0.01			0.05	
Control Delay	2.0	1.1		1.5	0.9		34.9	0.0			0.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Delay	2.0	1.1		1.5	0.9		34.9	0.0			0.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	A	A		A	A		C	A			A	
Approach Delay		1.1			1.0			27.9			0.5	
Approach LOS		A			A			C			A	
Queue Length 50th (m)	0.0	0.0		0.0	0.0		1.7	0.0			0.0	
Queue Length 95th (m)	0.3	20.5		2.2	5.9		6.4	0.0			0.0	
Internal Link Dist (m)		230.5			219.4			104.6			97.2	
Turn Bay Length (m)												
Base Capacity (vph)	1065	3239		603	3097		522	603			595	
Starvation Cap Reductn	0	0		0	0		0	0			0	
Spillback Cap Reductn	0	0		0	0		0	0			0	
Storage Cap Reductn	0	0		0	0		0	0			0	
Reduced v/c Ratio	0.00	0.23		0.03	0.07		0.02	0.00			0.01	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.23			
Intersection Signal Delay: 1.5		Intersection LOS: A	
Intersection Capacity Utilization 38.5%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Urbandale Plaza & Spratt Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	0	45	15	0	5	277	1836	0	113	534	373
Future Volume (vph)	61	0	45	15	0	5	277	1836	0	113	534	373
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	90.0		0.0	125.0		0.0	90.0		160.0	90.0		0.0
Storage Lanes	1		0	2		0	1		1	1		0
Taper Length (m)	7.6			2.5			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.850			0.850						0.938	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1544	2624	0	3354	2939	0	1544	3357	1820	1729	2942	0
Flt Permitted	0.444			0.950			0.173			0.099		
Satd. Flow (perm)	722	2624	0	3354	2939	0	281	3357	1820	180	2942	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		373			224						139	
Link Speed (k/h)		48			48			80			80	
Link Distance (m)		472.7			426.7			635.3			509.3	
Travel Time (s)		35.5			32.0			28.6			22.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	12%	12%	12%	0%	12%	0%	12%	3%	0%	0%	9%	12%
Adj. Flow (vph)	61	0	45	15	0	5	277	1836	0	113	534	373
Shared Lane Traffic (%)												
Lane Group Flow (vph)	61	45	0	15	5	0	277	1836	0	113	907	0
Turn Type	pm+pt	NA		Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4						2		2	6		
Detector Phase	7	4		3	8		5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	12.5	43.6		12.5	43.6		12.4	39.3	39.3	12.4	39.3	
Total Split (s)	13.0	44.0		13.0	44.0		27.0	60.0	60.0	13.0	46.0	
Total Split (%)	10.0%	33.8%		10.0%	33.8%		20.8%	46.2%	46.2%	10.0%	35.4%	
Maximum Green (s)	5.5	36.5		5.5	36.5		19.6	52.6	52.6	5.6	38.6	
Yellow Time (s)	4.1	4.1		4.1	4.1		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	3.4	3.4		3.4	3.4		2.4	2.4	2.4	2.4	2.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.5	7.5		7.5	7.5		7.4	7.4	7.4	7.4	7.4	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	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	
Recall Mode	None	None		None	None		None	Min	Min	None	Min	
Walk Time (s)		7.0			7.0			7.0	7.0		7.0	
Flash Dont Walk (s)		29.1			29.1			24.9	24.9		24.9	
Pedestrian Calls (#/hr)		0			0			0	0		0	
Act Effct Green (s)	12.3	10.2		5.6	10.2		66.7	53.5		46.1	40.4	
Actuated g/C Ratio	0.13	0.11		0.06	0.11		0.72	0.58		0.50	0.44	
v/c Ratio	0.32	0.07		0.07	0.01		0.60	0.94		0.61	0.66	
Control Delay	39.8	0.2		46.3	0.0		16.4	32.4		33.7	22.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	39.8	0.2		46.3	0.0		16.4	32.4		33.7	22.4	
LOS	D	A		D	A		B	C		C	C	
Approach Delay		23.0			34.7			30.3			23.7	
Approach LOS		C			C			C			C	
Queue Length 50th (m)	10.0	0.0		1.2	0.0		13.5	143.9		4.8	55.3	
Queue Length 95th (m)	21.0	0.0		4.8	0.0		50.4	#259.7		#33.4	95.7	
Internal Link Dist (m)		448.7			402.7			611.3			485.3	
Turn Bay Length (m)	90.0			125.0			90.0			90.0		
Base Capacity (vph)	190	1278		203	1316		476	1946		185	1367	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.32	0.04		0.07	0.00		0.58	0.94		0.61	0.66	

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 92.2			
Natural Cycle: 120			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.94			
Intersection Signal Delay: 28.0		Intersection LOS: C	
Intersection Capacity Utilization 89.0%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

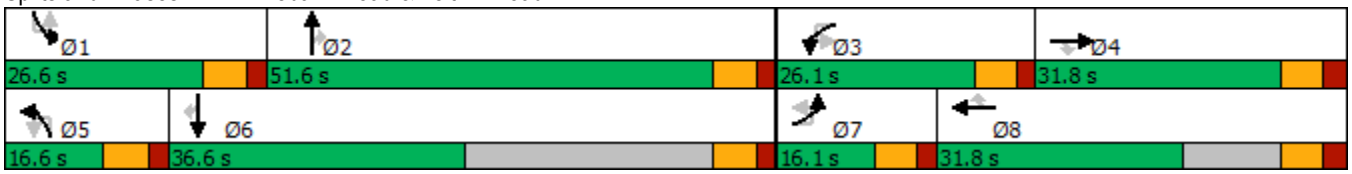
Splits and Phases: 4: Limebank Road & Realigned Leitrim Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	190	30	508	277	212	4	733	335	280	1167	6
Future Volume (vph)	11	190	30	508	277	212	4	733	335	280	1167	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	130.0		130.0	120.0		150.0	195.0		180.0	210.0		185.0
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor									0.99	1.00		
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3354	1767	1381	3257	1802	1488	3354	3325	1419	3106	3424	1289
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3354	1767	1381	3257	1802	1488	3354	3325	1400	3102	3424	1289
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			232			212			335			181
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		395.5			472.5			509.3			517.2	
Travel Time (s)		17.8			21.3			22.9			23.3	
Confl. Peds. (#/hr)									1	1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	12%	3%	1%	4%	0%	4%	9%	8%	1%	20%
Adj. Flow (vph)	11	190	30	508	277	212	4	733	335	280	1167	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	190	30	508	277	212	4	733	335	280	1167	6
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	21.0	21.0	5.0	21.0	21.0
Minimum Split (s)	11.1	30.8	30.8	11.1	30.8	30.8	11.6	27.6	27.6	11.6	27.6	27.6
Total Split (s)	16.1	31.8	31.8	26.1	31.8	31.8	16.6	51.6	51.6	26.6	36.6	36.6
Total Split (%)	11.8%	23.4%	23.4%	19.2%	23.4%	23.4%	12.2%	37.9%	37.9%	19.5%	26.9%	26.9%
Maximum Green (s)	10.0	25.0	25.0	20.0	25.0	25.0	10.0	45.0	45.0	20.0	30.0	30.0
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	1.9	2.6	2.6	1.9	2.6	2.6	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.8	6.8	6.1	6.8	6.8	6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	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	Min	Min
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		17.0	17.0		17.0	17.0		14.0	14.0		14.0	14.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	6.0	17.4	17.4	20.5	42.0	42.0	5.8	32.5	32.5	15.3	52.5	52.5
Actuated g/C Ratio	0.05	0.15	0.15	0.18	0.37	0.37	0.05	0.29	0.29	0.14	0.47	0.47
v/c Ratio	0.06	0.70	0.07	0.86	0.41	0.31	0.02	0.76	0.52	0.66	0.73	0.01

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	58.7	60.8	0.3	61.9	31.8	5.7	59.2	42.6	6.5	56.1	28.3	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.7	60.8	0.3	61.9	31.8	5.7	59.2	42.6	6.5	56.1	28.3	0.0
LOS	E	E	A	E	C	A	E	D	A	E	C	A
Approach Delay		52.8			41.6			31.4			33.5	
Approach LOS		D			D			C			C	
Queue Length 50th (m)	1.1	39.7	0.0	56.1	42.9	0.0	0.4	76.6	0.0	30.2	100.5	0.0
Queue Length 95th (m)	4.7	72.6	0.0	#112.1	92.2	18.6	2.5	110.6	21.7	51.8	167.8	0.0
Internal Link Dist (m)		371.5			448.5			485.3			493.2	
Turn Bay Length (m)	130.0		130.0	120.0		150.0	195.0		180.0	210.0		185.0
Base Capacity (vph)	305	401	493	592	672	688	305	1361	770	564	1777	756
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.47	0.06	0.86	0.41	0.31	0.01	0.54	0.44	0.50	0.66	0.01

Intersection Summary			
Area Type:	Other		
Cycle Length: 136.1			
Actuated Cycle Length: 112.5			
Natural Cycle: 105			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 36.2		Intersection LOS: D	
Intersection Capacity Utilization 85.8%		ICU Level of Service E	
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 & Leitrim Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	185	27	36	25	18	21	26	43	418	34	1	63
Future Volume (vph)	185	27	36	25	18	21	26	43	418	34	1	63
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		0.0	95.0		60.0		205.0		180.0		255.0
Storage Lanes	2		0	2		1		2		1		2
Taper Length (m)	7.6			7.6				7.6				7.6
Lane Util. Factor	0.97	0.95	0.95	0.97	0.95	1.00	0.95	0.97	0.95	1.00	0.95	0.97
Ped Bike Factor	1.00	0.99		0.99		0.99		1.00		0.98		1.00
Frt		0.914				0.850				0.850		
Flt Protected	0.950			0.950				0.950				0.950
Satd. Flow (prot)	3321	3083	0	3257	3293	1473	0	3313	3232	1517	0	3289
Flt Permitted	0.950			0.950				0.950				0.950
Satd. Flow (perm)	3315	3083	0	3210	3293	1454	0	3311	3232	1492	0	3280
Right Turn on Red			Yes			Yes				Yes		
Satd. Flow (RTOR)		36				269				267		
Link Speed (k/h)		60			60				80			
Link Distance (m)		243.4			525.1				473.0			
Travel Time (s)		14.6			31.5				21.3			
Confl. Peds. (#/hr)	1		9	9		1		4		3		3
Confl. Bikes (#/hr)										1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	3%	0%	3%	5%	5%	0%	2%	7%	2%	0%	2%
Adj. Flow (vph)	185	27	36	25	18	21	26	43	418	34	1	63
Shared Lane Traffic (%)												
Lane Group Flow (vph)	185	63	0	25	18	21	0	69	418	34	0	64
Turn Type	Prot	NA		Prot	NA	Perm	Prot	Prot	NA	Perm	Prot	Prot
Protected Phases	7	4		3	8		5	5	2		1	1
Permitted Phases						8				2		
Detector Phase	7	4		3	8	8	5	5	2	2	1	1
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	5.0	15.0	15.0	5.0	5.0
Minimum Split (s)	11.5	41.5		11.5	41.5	41.5	11.6	11.6	41.7	41.7	11.6	11.6
Total Split (s)	31.5	31.5		16.5	26.5	26.5	16.6	16.6	36.7	36.7	26.6	26.6
Total Split (%)	26.0%	26.0%		13.6%	21.8%	21.8%	13.7%	13.7%	30.3%	30.3%	21.9%	21.9%
Maximum Green (s)	25.0	25.0		10.0	20.0	20.0	10.0	10.0	30.0	30.0	20.0	20.0
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.8	2.8		2.8	2.8	2.8	2.0	2.0	2.1	2.1	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5		6.6	6.7	6.7		6.6
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	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
Recall Mode	None	None		None	None	None	None	None	Min	Min	None	None
Walk Time (s)		10.0			10.0	10.0			10.0	10.0		
Flash Dont Walk (s)		25.0			25.0	25.0			25.0	25.0		
Pedestrian Calls (#/hr)		0			0	0			0	0		
Act Effct Green (s)	11.3	15.4		6.3	10.3	10.3		7.4	41.4	41.4		7.2
Actuated g/C Ratio	0.13	0.18		0.07	0.12	0.12		0.09	0.48	0.48		0.08

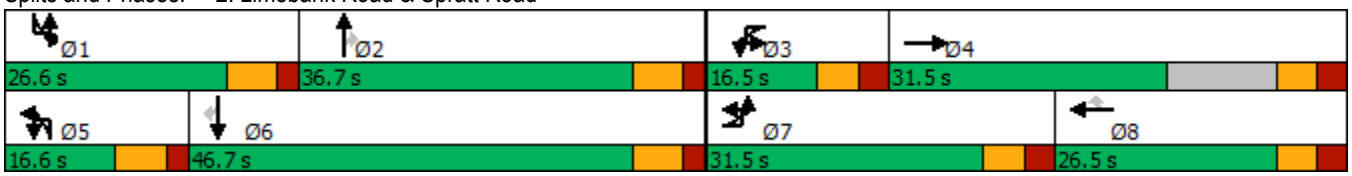
Lane Group	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	1268	440
Future Volume (vph)	1268	440
Ideal Flow (vphpl)	1800	1800
Storage Length (m)		230.0
Storage Lanes		1
Taper Length (m)		
Lane Util. Factor	0.95	1.00
Ped Bike Factor		0.98
Frt		0.850
Flt Protected		
Satd. Flow (prot)	3424	1532
Flt Permitted		
Satd. Flow (perm)	3424	1507
Right Turn on Red		Yes
Satd. Flow (RTOR)		440
Link Speed (k/h)	80	
Link Distance (m)	635.3	
Travel Time (s)	28.6	
Confl. Peds. (#/hr)		4
Confl. Bikes (#/hr)		
Peak Hour Factor	1.00	1.00
Heavy Vehicles (%)	1%	1%
Adj. Flow (vph)	1268	440
Shared Lane Traffic (%)		
Lane Group Flow (vph)	1268	440
Turn Type	NA	Perm
Protected Phases	6	
Permitted Phases		6
Detector Phase	6	6
Switch Phase		
Minimum Initial (s)	15.0	15.0
Minimum Split (s)	41.7	41.7
Total Split (s)	46.7	46.7
Total Split (%)	38.5%	38.5%
Maximum Green (s)	40.0	40.0
Yellow Time (s)	4.6	4.6
All-Red Time (s)	2.1	2.1
Lost Time Adjust (s)	0.0	0.0
Total Lost Time (s)	6.7	6.7
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Recall Mode	Min	Min
Walk Time (s)	10.0	10.0
Flash Dont Walk (s)	25.0	25.0
Pedestrian Calls (#/hr)	0	0
Act Effct Green (s)	41.3	41.3
Actuated g/C Ratio	0.48	0.48

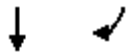
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
v/c Ratio	0.42	0.11		0.10	0.05	0.05		0.24	0.27	0.04		0.23
Control Delay	40.3	18.4		43.0	39.6	0.2		42.7	16.7	0.1		42.8
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0
Total Delay	40.3	18.4		43.0	39.6	0.2		42.7	16.7	0.1		42.8
LOS	D	B		D	D	A		D	B	A		D
Approach Delay		34.8			28.0				19.1			
Approach LOS		C			C				B			
Queue Length 50th (m)	16.5	1.8		2.2	1.5	0.0		6.2	25.6	0.0		5.7
Queue Length 95th (m)	27.2	8.1		6.4	5.0	0.0		12.9	39.7	0.0		12.2
Internal Link Dist (m)		219.4			501.1				449.0			
Turn Bay Length (m)	100.0			95.0		60.0		205.0		180.0		255.0
Base Capacity (vph)	994	1313		390	788	553		396	1558	857		787
Starvation Cap Reductn	0	0		0	0	0		0	0	0		0
Spillback Cap Reductn	0	0		0	0	0		0	0	0		0
Storage Cap Reductn	0	0		0	0	0		0	0	0		0
Reduced v/c Ratio	0.19	0.05		0.06	0.02	0.04		0.17	0.27	0.04		0.08

Intersection Summary

Area Type: Other
Cycle Length: 121.3
Actuated Cycle Length: 85.9
Natural Cycle: 110
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 22.1 Intersection LOS: C
Intersection Capacity Utilization 66.5% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Limebank Road & Spratt Road





Lane Group	SBT	SBR
v/c Ratio	0.77	0.46
Control Delay	25.9	3.7
Queue Delay	0.0	0.0
Total Delay	25.9	3.7
LOS	C	A
Approach Delay	21.0	
Approach LOS	C	
Queue Length 50th (m)	108.1	0.0
Queue Length 95th (m)	#162.3	17.7
Internal Link Dist (m)	611.3	
Turn Bay Length (m)		230.0
Base Capacity (vph)	1646	953
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.77	0.46

Intersection Summary

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	1	239	30	2	37	457	6	58	0	3	4	0
Future Volume (vph)	1	239	30	2	37	457	6	58	0	3	4	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00							
Frt		0.983				0.998			0.850			0.973
Flt Protected	0.950				0.950			0.950				0.962
Satd. Flow (prot)	1729	3359	0	0	1729	3417	0	1712	1547	0	0	1704
Flt Permitted	0.486				0.586			0.754				0.767
Satd. Flow (perm)	885	3359	0	0	1061	3417	0	1359	1547	0	0	1358
Right Turn on Red			Yes				Yes			Yes		
Satd. Flow (RTOR)		25				2			588			41
Link Speed (k/h)		60				60			50			50
Link Distance (m)		254.5				243.4			128.6			121.2
Travel Time (s)		15.3				14.6			9.3			8.7
Confl. Peds. (#/hr)			3		3							
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%
Adj. Flow (vph)	1	239	30	2	37	457	6	58	0	3	4	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1	269	0	0	39	463	0	58	3	0	0	5
Turn Type	Perm	NA		Perm	Perm	NA		Perm	NA		Perm	NA
Protected Phases		2				6			8			4
Permitted Phases	2			6	6			8			4	
Detector Phase	2	2		6	6	6		8	8		4	4
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0		5.0	5.0		5.0	5.0
Minimum Split (s)	24.0	24.0		32.0	32.0	32.0		32.0	32.0		32.0	32.0
Total Split (s)	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%		40.0%	40.0%		40.0%	40.0%
Maximum Green (s)	42.0	42.0		42.0	42.0	42.0		26.0	26.0		26.0	26.0
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7		3.3	3.3		3.3	3.3
All-Red Time (s)	2.3	2.3		2.3	2.3	2.3		2.7	2.7		2.7	2.7
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0	0.0			0.0
Total Lost Time (s)	6.0	6.0			6.0	6.0		6.0	6.0			6.0
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
Recall Mode	C-Max	C-Max		C-Max	C-Max	C-Max		None	None		None	None
Walk Time (s)	7.0	7.0		7.0	7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)	10.0	10.0		10.0	10.0	10.0		19.0	19.0		19.0	19.0
Pedestrian Calls (#/hr)	0	0		0	0	0		0	0		0	0
Act Effct Green (s)	66.5	66.5			66.5	66.5		8.9	8.9			8.5
Actuated g/C Ratio	0.83	0.83			0.83	0.83		0.11	0.11			0.11
v/c Ratio	0.00	0.10			0.04	0.16		0.39	0.00			0.03
Control Delay	4.0	2.6			3.4	2.9		39.5	0.0			0.2
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			0.0
Total Delay	4.0	2.6			3.4	2.9		39.5	0.0			0.2

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	1
Future Volume (vph)	1
Ideal Flow (vphpl)	1800
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)	
Peak Hour Factor	1.00
Heavy Vehicles (%)	0%
Adj. Flow (vph)	1
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	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
LOS	A	A			A	A		D	A			A
Approach Delay		2.6				2.9			37.6			0.2
Approach LOS		A				A			D			A
Queue Length 50th (m)	0.0	4.3			1.3	8.7		8.3	0.0			0.0
Queue Length 95th (m)	0.4	8.8			4.2	15.9		18.4	0.0			0.0
Internal Link Dist (m)		230.5				219.4			104.6			97.2
Turn Bay Length (m)												
Base Capacity (vph)	735	2794			881	2839		441	899			469
Starvation Cap Reductn	0	0			0	0		0	0			0
Spillback Cap Reductn	0	0			0	0		0	0			0
Storage Cap Reductn	0	0			0	0		0	0			0
Reduced v/c Ratio	0.00	0.10			0.04	0.16		0.13	0.00			0.01

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.39			
Intersection Signal Delay: 5.3		Intersection LOS: A	
Intersection Capacity Utilization 41.7%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Urbandale Plaza & Spratt Road

Lane Group	SBR
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	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	323	0	239	46	0	8	60	644	0	56	1675	80
Future Volume (vph)	323	0	239	46	0	8	60	644	0	56	1675	80
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	90.0		0.0	125.0		0.0	90.0		160.0	90.0		0.0
Storage Lanes	1		0	2		0	1		1	1		0
Taper Length (m)	7.6			2.5			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.850			0.850						0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1544	2624	0	3354	2939	0	1544	3262	1820	1729	3383	0
Flt Permitted	0.404			0.950			0.075			0.370		
Satd. Flow (perm)	656	2624	0	3354	2939	0	122	3262	1820	673	3383	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		162			213						4	
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		472.7			426.7			635.3			509.3	
Travel Time (s)		28.4			25.6			28.6			22.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	12%	12%	12%	0%	12%	0%	12%	6%	0%	0%	1%	12%
Adj. Flow (vph)	323	0	239	46	0	8	60	644	0	56	1675	80
Shared Lane Traffic (%)												
Lane Group Flow (vph)	323	239	0	46	8	0	60	644	0	56	1755	0
Turn Type	pm+pt	NA		Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4						2		2	6		
Detector Phase	7	4		3	8		5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	12.5	43.6		12.5	43.6		12.4	39.3	39.3	12.4	39.3	
Total Split (s)	13.0	44.0		13.0	44.0		13.0	60.0	60.0	13.0	60.0	
Total Split (%)	10.0%	33.8%		10.0%	33.8%		10.0%	46.2%	46.2%	10.0%	46.2%	
Maximum Green (s)	5.5	36.5		5.5	36.5		5.6	52.6	52.6	5.6	52.6	
Yellow Time (s)	4.1	4.1		4.1	4.1		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	3.4	3.4		3.4	3.4		2.4	2.4	2.4	2.4	2.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.5	7.5		7.5	7.5		7.4	7.4	7.4	7.4	7.4	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	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	
Recall Mode	None	None		None	None		None	Min	Min	None	Min	
Walk Time (s)		7.0			7.0			7.0	7.0		7.0	
Flash Dont Walk (s)		29.1			29.1			24.9	24.9		24.9	
Pedestrian Calls (#/hr)		0			0			0	0		0	
Act Effct Green (s)	19.3	10.8		5.6	10.7		57.6	53.4		57.6	53.4	
Actuated g/C Ratio	0.19	0.11		0.06	0.11		0.58	0.54		0.58	0.54	
v/c Ratio	1.16	0.56		0.24	0.02		0.39	0.37		0.12	0.96	
Control Delay	141.3	21.0		51.2	0.0		18.0	15.5		8.6	38.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	141.3	21.0		51.2	0.0		18.0	15.5		8.6	38.6	
LOS	F	C		D	A		B	B		A	D	
Approach Delay		90.2			43.6			15.7			37.7	
Approach LOS		F			D			B			D	
Queue Length 50th (m)	64.2	7.7		4.6	0.0		4.2	40.0		3.9	~189.7	
Queue Length 95th (m)	#158.6	19.6		10.6	0.0		11.4	56.3		9.1	#252.8	
Internal Link Dist (m)		448.7			402.7			611.3			485.3	
Turn Bay Length (m)	90.0			125.0			90.0			90.0		
Base Capacity (vph)	278	1082		189	1232		152	1757		452	1825	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	1.16	0.22		0.24	0.01		0.39	0.37		0.12	0.96	

Intersection Summary

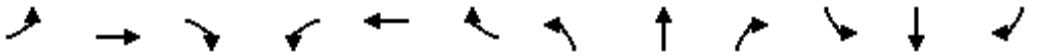
Area Type: Other
Cycle Length: 130
Actuated Cycle Length: 99
Natural Cycle: 120
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.16
Intersection Signal Delay: 42.3 Intersection LOS: D
Intersection Capacity Utilization 90.6% ICU Level of Service E
Analysis Period (min) 15

~ 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: 4: Limebank Road & Realigned Leitrim Road

Future (2031) Total Traffic (Dual EBL)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	0	45	15	0	5	277	1836	0	113	534	373
Future Volume (vph)	61	0	45	15	0	5	277	1836	0	113	534	373
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	90.0		0.0	125.0		0.0	90.0		160.0	90.0		0.0
Storage Lanes	2		0	2		0	1		1	1		0
Taper Length (m)	7.6			2.5			7.6			7.6		
Lane Util. Factor	0.97	0.95	0.95	0.97	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.850			0.850						0.938	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2995	2624	0	3354	2939	0	1544	3357	1820	1729	2942	0
Flt Permitted	0.950			0.950			0.173			0.099		
Satd. Flow (perm)	2995	2624	0	3354	2939	0	281	3357	1820	180	2942	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		373			224						139	
Link Speed (k/h)		48			48			80			80	
Link Distance (m)		472.7			426.7			635.3			509.3	
Travel Time (s)		35.5			32.0			28.6			22.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	12%	12%	12%	0%	12%	0%	12%	3%	0%	0%	9%	12%
Adj. Flow (vph)	61	0	45	15	0	5	277	1836	0	113	534	373
Shared Lane Traffic (%)												
Lane Group Flow (vph)	61	45	0	15	5	0	277	1836	0	113	907	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2		2	6		
Detector Phase	7	4		3	8		5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	12.5	43.6		12.5	43.6		12.4	39.3	39.3	12.4	39.3	
Total Split (s)	13.0	44.0		13.0	44.0		27.0	60.0	60.0	13.0	46.0	
Total Split (%)	10.0%	33.8%		10.0%	33.8%		20.8%	46.2%	46.2%	10.0%	35.4%	
Maximum Green (s)	5.5	36.5		5.5	36.5		19.6	52.6	52.6	5.6	38.6	
Yellow Time (s)	4.1	4.1		4.1	4.1		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	3.4	3.4		3.4	3.4		2.4	2.4	2.4	2.4	2.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.5	7.5		7.5	7.5		7.4	7.4	7.4	7.4	7.4	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	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	
Recall Mode	None	None		None	None		None	Min	Min	None	Min	
Walk Time (s)		7.0			7.0			7.0	7.0		7.0	
Flash Dont Walk (s)		29.1			29.1			24.9	24.9		24.9	
Pedestrian Calls (#/hr)		0			0			0	0		0	
Act Effct Green (s)	10.5	10.2		5.6	10.2		66.7	53.5		46.1	40.4	
Actuated g/C Ratio	0.11	0.11		0.06	0.11		0.72	0.58		0.50	0.44	
v/c Ratio	0.18	0.07		0.07	0.01		0.60	0.94		0.61	0.66	
Control Delay	41.1	0.2		46.3	0.0		16.4	32.4		33.7	22.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	41.1	0.2		46.3	0.0		16.4	32.4		33.7	22.4	
LOS	D	A		D	A		B	C		C	C	
Approach Delay		23.7			34.7			30.3			23.7	
Approach LOS		C			C			C			C	
Queue Length 50th (m)	5.0	0.0		1.2	0.0		13.5	143.9		4.8	55.3	
Queue Length 95th (m)	12.8	0.0		4.8	0.0		50.4	#259.7		#33.4	95.7	
Internal Link Dist (m)		448.7			402.7			611.3			485.3	
Turn Bay Length (m)	90.0			125.0			90.0			90.0		
Base Capacity (vph)	342	1278		203	1316		476	1946		185	1367	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.18	0.04		0.07	0.00		0.58	0.94		0.61	0.66	

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 92.2			
Natural Cycle: 120			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.94			
Intersection Signal Delay: 28.0		Intersection LOS: C	
Intersection Capacity Utilization 87.3%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 4: Limebank Road & Realigned Leitrim Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	323	0	239	46	0	8	60	644	0	56	1675	80
Future Volume (vph)	323	0	239	46	0	8	60	644	0	56	1675	80
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	90.0		0.0	125.0		0.0	90.0		160.0	90.0		0.0
Storage Lanes	2		0	2		0	1		1	1		0
Taper Length (m)	7.6			2.5			7.6			7.6		
Lane Util. Factor	0.97	0.95	0.95	0.97	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.850			0.850						0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2995	2624	0	3354	2939	0	1544	3262	1820	1729	3383	0
Flt Permitted	0.950			0.950			0.075			0.370		
Satd. Flow (perm)	2995	2624	0	3354	2939	0	122	3262	1820	673	3383	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		162			206						4	
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		472.7			426.7			635.3			509.3	
Travel Time (s)		28.4			25.6			28.6			22.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	12%	12%	12%	0%	12%	0%	12%	6%	0%	0%	1%	12%
Adj. Flow (vph)	323	0	239	46	0	8	60	644	0	56	1675	80
Shared Lane Traffic (%)												
Lane Group Flow (vph)	323	239	0	46	8	0	60	644	0	56	1755	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2		2	6		
Detector Phase	7	4		3	8		5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	12.5	43.6		12.5	43.6		12.4	39.3	39.3	12.4	39.3	
Total Split (s)	13.0	44.0		13.0	44.0		13.0	60.0	60.0	13.0	60.0	
Total Split (%)	10.0%	33.8%		10.0%	33.8%		10.0%	46.2%	46.2%	10.0%	46.2%	
Maximum Green (s)	5.5	36.5		5.5	36.5		5.6	52.6	52.6	5.6	52.6	
Yellow Time (s)	4.1	4.1		4.1	4.1		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	3.4	3.4		3.4	3.4		2.4	2.4	2.4	2.4	2.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.5	7.5		7.5	7.5		7.4	7.4	7.4	7.4	7.4	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	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	
Recall Mode	None	None		None	None		None	Min	Min	None	Min	
Walk Time (s)		7.0			7.0			7.0	7.0		7.0	
Flash Dont Walk (s)		29.1			29.1			24.9	24.9		24.9	
Pedestrian Calls (#/hr)		0			0			0	0		0	
Act Effct Green (s)	16.8	10.8		5.6	10.7		57.6	53.4		57.6	53.4	
Actuated g/C Ratio	0.17	0.11		0.06	0.11		0.58	0.54		0.58	0.54	
v/c Ratio	0.63	0.56		0.24	0.02		0.39	0.37		0.12	0.96	
Control Delay	46.9	21.0		51.2	0.0		18.0	15.5		8.6	38.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	46.9	21.0		51.2	0.0		18.0	15.5		8.6	38.6	
LOS	D	C		D	A		B	B		A	D	
Approach Delay		35.9			43.6			15.7			37.7	
Approach LOS		D			D			B			D	
Queue Length 50th (m)	29.3	7.7		4.6	0.0		4.2	40.0		3.9	~189.7	
Queue Length 95th (m)	#82.3	19.6		10.6	0.0		11.4	56.3		9.1	#252.8	
Internal Link Dist (m)		448.7			402.7			611.3			485.3	
Turn Bay Length (m)	90.0			125.0			90.0			90.0		
Base Capacity (vph)	509	1082		189	1228		152	1757		452	1825	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.63	0.22		0.24	0.01		0.39	0.37		0.12	0.96	

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 99			
Natural Cycle: 120			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.96			
Intersection Signal Delay: 32.5		Intersection LOS: C	
Intersection Capacity Utilization 85.8%		ICU Level of Service E	
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: 4: Limebank Road & Realigned Leitrim Road

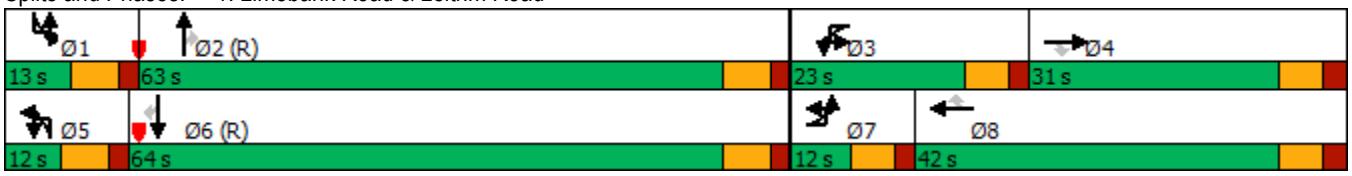
Future (2031) Total Traffic (Coordinated)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	240	28	348	124	203	6	1317	619	199	600	7
Future Volume (vph)	3	240	28	348	124	203	6	1317	619	199	600	7
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	130.0		130.0	120.0		150.0	195.0		180.0	210.0		185.0
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor									0.99	1.00		
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3354	1820	1031	2942	1733	1488	3354	3357	1419	3077	3357	1547
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3354	1820	1031	2942	1733	1488	3354	3357	1400	3076	3357	1547
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			188			185			413			190
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		395.5			472.5			509.3			517.2	
Travel Time (s)		17.8			21.3			22.9			23.3	
Confl. Peds. (#/hr)									1	1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	50%	14%	5%	4%	0%	3%	9%	9%	3%	0%
Adj. Flow (vph)	3	240	28	348	124	203	6	1317	619	199	600	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	240	28	348	124	203	6	1317	619	199	600	7
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	21.0	21.0	5.0	21.0	21.0
Minimum Split (s)	11.1	30.8	30.8	11.1	30.8	30.8	11.6	27.6	27.6	11.6	27.6	27.6
Total Split (s)	12.0	31.0	31.0	23.0	42.0	42.0	12.0	63.0	63.0	13.0	64.0	64.0
Total Split (%)	9.2%	23.8%	23.8%	17.7%	32.3%	32.3%	9.2%	48.5%	48.5%	10.0%	49.2%	49.2%
Maximum Green (s)	5.9	24.2	24.2	16.9	35.2	35.2	5.4	56.4	56.4	6.4	57.4	57.4
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	1.9	2.6	2.6	1.9	2.6	2.6	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.8	6.8	6.1	6.8	6.8	6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	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	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		17.0	17.0		17.0	17.0		14.0	14.0		14.0	14.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	5.7	21.1	21.1	16.9	41.6	41.6	5.5	56.4	56.4	9.6	70.2	70.2
Actuated g/C Ratio	0.04	0.16	0.16	0.13	0.32	0.32	0.04	0.43	0.43	0.07	0.54	0.54
v/c Ratio	0.02	0.82	0.09	0.91	0.22	0.34	0.04	0.90	0.74	0.88	0.33	0.01

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	59.7	73.8	0.5	84.6	33.9	7.8	86.5	24.2	8.2	94.5	18.6	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.7	73.8	0.5	84.6	33.9	7.8	86.5	24.2	8.2	94.5	18.6	0.0
LOS	E	E	A	F	C	A	F	C	A	F	B	A
Approach Delay		66.1			52.2			19.3			37.1	
Approach LOS		E			D			B			D	
Queue Length 50th (m)	0.4	59.3	0.0	45.9	22.2	3.0	0.6	138.3	65.6	~27.9	42.8	0.0
Queue Length 95th (m)	2.0	87.2	0.0	#73.1	41.9	22.3	m1.2	#148.3	m19.3	#58.5	69.1	0.0
Internal Link Dist (m)		371.5			448.5			485.3			493.2	
Turn Bay Length (m)	130.0		130.0	120.0		150.0	195.0		180.0	210.0		185.0
Base Capacity (vph)	152	338	344	382	555	602	141	1456	841	226	1812	922
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.71	0.08	0.91	0.22	0.34	0.04	0.90	0.74	0.88	0.33	0.01

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 130			
Offset: 18 (14%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 115			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.91			
Intersection Signal Delay: 32.6		Intersection LOS: C	
Intersection Capacity Utilization 92.1%		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.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 1: Limebank Road & Leitrim Road



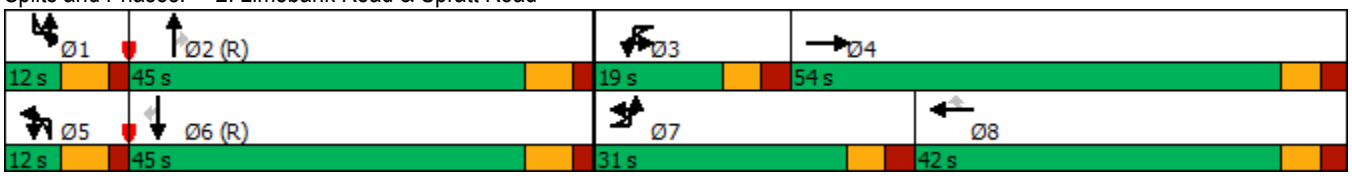
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	542	171	33	108	98	192	21	32	1100	159	94	315
Future Volume (vph)	542	171	33	108	98	192	21	32	1100	159	94	315
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		0.0	95.0		60.0		205.0		180.0	255.0	
Storage Lanes	2		0	2		1		2		1	2	
Taper Length (m)	7.6			7.6				7.6			7.6	
Lane Util. Factor	0.97	0.95	0.95	0.97	0.95	1.00	0.95	0.97	0.95	1.00	0.97	0.95
Ped Bike Factor	0.90	1.00		0.98		0.92		0.99		0.96	0.99	
Frt		0.976				0.850				0.850		
Flt Protected	0.950			0.950				0.950			0.950	
Satd. Flow (prot)	3321	3290	0	3022	3357	1419	0	3256	3390	1419	2968	3144
Flt Permitted	0.950			0.950				0.950			0.950	
Satd. Flow (perm)	2993	3290	0	2967	3357	1308	0	3230	3390	1368	2942	3144
Right Turn on Red			Yes			Yes				Yes		
Satd. Flow (RTOR)		19				196				194		
Link Speed (k/h)		60			60				80			80
Link Distance (m)		243.4			525.1				473.0			635.3
Travel Time (s)		14.6			31.5				21.3			28.6
Confl. Peds. (#/hr)	61		13	13		61		11		22	22	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	2%	3%	11%	3%	9%	0%	5%	2%	9%	13%	10%
Adj. Flow (vph)	542	171	33	108	98	192	21	32	1100	159	94	315
Shared Lane Traffic (%)												
Lane Group Flow (vph)	542	204	0	108	98	192	0	53	1100	159	94	315
Turn Type	Prot	NA		Prot	NA	Perm	Prot	Prot	NA	Perm	Prot	NA
Protected Phases	7	4		3	8		5	5	2		1	6
Permitted Phases						8				2		
Detector Phase	7	4		3	8	8	5	5	2	2	1	6
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	5.0	15.0	15.0	5.0	15.0
Minimum Split (s)	11.5	41.5		11.5	41.5	41.5	11.6	11.6	41.7	41.7	11.6	41.7
Total Split (s)	31.0	54.0		19.0	42.0	42.0	12.0	12.0	45.0	45.0	12.0	45.0
Total Split (%)	23.8%	41.5%		14.6%	32.3%	32.3%	9.2%	9.2%	34.6%	34.6%	9.2%	34.6%
Maximum Green (s)	24.5	47.5		12.5	35.5	35.5	5.4	5.4	38.3	38.3	5.4	38.3
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.8	2.8		2.8	2.8	2.8	2.0	2.0	2.1	2.1	2.0	2.1
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)	6.5	6.5		6.5	6.5	6.5		6.6	6.7	6.7	6.6	6.7
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	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
Recall Mode	Min	None		None	None	None	None	None	C-Max	C-Max	None	C-Max
Walk Time (s)		10.0			10.0	10.0			10.0	10.0		10.0
Flash Dont Walk (s)		25.0			25.0	25.0			25.0	25.0		25.0
Pedestrian Calls (#/hr)		0			0	0			0	0		0
Act Effct Green (s)	23.8	25.1		9.9	11.2	11.2		7.5	58.9	58.9	9.8	63.6
Actuated g/C Ratio	0.18	0.19		0.08	0.09	0.09		0.06	0.45	0.45	0.08	0.49
v/c Ratio	0.89	0.31		0.47	0.34	0.66		0.28	0.72	0.22	0.42	0.20

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	107
Future Volume (vph)	107
Ideal Flow (vphpl)	1800
Storage Length (m)	230.0
Storage Lanes	1
Taper Length (m)	
Lane Util. Factor	1.00
Ped Bike Factor	0.98
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1502
Flt Permitted	
Satd. Flow (perm)	1466
Right Turn on Red	Yes
Satd. Flow (RTOR)	194
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	11
Peak Hour Factor	1.00
Heavy Vehicles (%)	3%
Adj. Flow (vph)	107
Shared Lane Traffic (%)	
Lane Group Flow (vph)	107
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Detector Phase	6
Switch Phase	
Minimum Initial (s)	15.0
Minimum Split (s)	41.7
Total Split (s)	45.0
Total Split (%)	34.6%
Maximum Green (s)	38.3
Yellow Time (s)	4.6
All-Red Time (s)	2.1
Lost Time Adjust (s)	0.0
Total Lost Time (s)	6.7
Lead/Lag	Lag
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	C-Max
Walk Time (s)	10.0
Flash Dont Walk (s)	25.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	63.6
Actuated g/C Ratio	0.49
v/c Ratio	0.13

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Control Delay	69.8	42.0		63.9	58.7	18.2		62.0	33.0	2.3	57.8	20.8
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	69.8	42.0		63.9	58.7	18.2		62.0	33.0	2.3	57.8	20.8
LOS	E	D		E	E	B		E	C	A	E	C
Approach Delay		62.2			40.6				30.4			24.2
Approach LOS		E			D				C			C
Queue Length 50th (m)	70.1	21.6		13.9	12.7	0.0		6.8	117.4	0.0	11.4	36.7
Queue Length 95th (m)	#97.9	32.2		22.9	21.0	21.6		13.4	159.8	7.5	21.2	43.3
Internal Link Dist (m)		219.4			501.1				449.0			611.3
Turn Bay Length (m)	100.0			95.0		60.0		205.0		180.0	255.0	
Base Capacity (vph)	625	1214		290	916	499		187	1535	725	224	1539
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	0.87	0.17		0.37	0.11	0.38		0.28	0.72	0.22	0.42	0.20

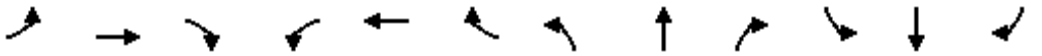
Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 130			
Offset: 88 (68%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 120			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 38.7		Intersection LOS: D	
Intersection Capacity Utilization 102.1%		ICU Level of Service G	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 2: Limebank Road & Spratt Road



Lane Group	SBR
Control Delay	4.7
Queue Delay	0.0
Total Delay	4.7
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (m)	3.9
Queue Length 95th (m)	10.7
Internal Link Dist (m)	
Turn Bay Length (m)	230.0
Base Capacity (vph)	816
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.13

Intersection Summary



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	737	17	21	215	2	12	0	3	6	0	2
Future Volume (vph)	1	737	17	21	215	2	12	0	3	6	0	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		0.99			1.00	0.98			0.99	
Frt		0.997			0.999			0.850			0.966	
Flt Protected	0.950			0.950			0.950				0.964	
Satd. Flow (prot)	1729	3410	0	1662	3261	0	1530	1523	0	0	1689	0
Flt Permitted	0.616			0.366								
Satd. Flow (perm)	1121	3410	0	635	3261	0	1609	1523	0	0	1748	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			2			161			41	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		254.5			243.4			128.6			121.2	
Travel Time (s)		15.3			14.6			9.3			8.7	
Confl. Peds. (#/hr)			13	13			1		4	4		1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	1%	0%	4%	6%	0%	13%	0%	0%	0%	0%	0%
Adj. Flow (vph)	1	737	17	21	215	2	12	0	3	6	0	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1	754	0	21	217	0	12	3	0	0	8	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		32.0	32.0		32.0	32.0	
Total Split (s)	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%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	42.0	42.0		42.0	42.0		26.0	26.0		26.0	26.0	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.3	2.3		2.3	2.3		2.7	2.7		2.7	2.7	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	10.0	10.0		10.0	10.0		19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	76.0	76.0		76.0	76.0		6.5	6.5			6.0	
Actuated g/C Ratio	0.95	0.95		0.95	0.95		0.08	0.08			0.08	
v/c Ratio	0.00	0.23		0.03	0.07		0.09	0.01			0.05	
Control Delay	2.0	1.1		1.5	0.9		34.9	0.0			0.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Delay	2.0	1.1		1.5	0.9		34.9	0.0			0.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	A	A		A	A		C	A			A	
Approach Delay		1.1			1.0			27.9			0.5	
Approach LOS		A			A			C			A	
Queue Length 50th (m)	0.0	0.0		0.0	0.0		1.7	0.0			0.0	
Queue Length 95th (m)	0.3	20.5		2.2	5.9		6.4	0.0			0.0	
Internal Link Dist (m)		230.5			219.4			104.6			97.2	
Turn Bay Length (m)												
Base Capacity (vph)	1065	3239		603	3097		522	603			595	
Starvation Cap Reductn	0	0		0	0		0	0			0	
Spillback Cap Reductn	0	0		0	0		0	0			0	
Storage Cap Reductn	0	0		0	0		0	0			0	
Reduced v/c Ratio	0.00	0.23		0.03	0.07		0.02	0.00			0.01	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.23			
Intersection Signal Delay: 1.5		Intersection LOS: A	
Intersection Capacity Utilization 38.5%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Urbandale Plaza & Spratt Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	0	45	15	0	5	277	1836	0	113	534	373
Future Volume (vph)	61	0	45	15	0	5	277	1836	0	113	534	373
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	90.0		0.0	125.0		0.0	90.0		160.0	90.0		0.0
Storage Lanes	2		0	2		0	1		1	1		0
Taper Length (m)	7.6			2.5			7.6			7.6		
Lane Util. Factor	0.97	0.95	0.95	0.97	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.850			0.850						0.938	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2995	2624	0	3354	2939	0	1544	3357	1820	1729	2942	0
Flt Permitted	0.950			0.950			0.211			0.062		
Satd. Flow (perm)	2995	2624	0	3354	2939	0	343	3357	1820	113	2942	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		373			224						139	
Link Speed (k/h)		48			48			80			80	
Link Distance (m)		472.7			426.7			635.3			509.3	
Travel Time (s)		35.5			32.0			28.6			22.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	12%	12%	12%	0%	12%	0%	12%	3%	0%	0%	9%	12%
Adj. Flow (vph)	61	0	45	15	0	5	277	1836	0	113	534	373
Shared Lane Traffic (%)												
Lane Group Flow (vph)	61	45	0	15	5	0	277	1836	0	113	907	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2		2	6		
Detector Phase	7	4		3	8		5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	12.5	43.6		12.5	43.6		12.4	39.3	39.3	12.4	39.3	
Total Split (s)	13.0	44.0		13.0	44.0		27.0	60.0	60.0	13.0	46.0	
Total Split (%)	10.0%	33.8%		10.0%	33.8%		20.8%	46.2%	46.2%	10.0%	35.4%	
Maximum Green (s)	5.5	36.5		5.5	36.5		19.6	52.6	52.6	5.6	38.6	
Yellow Time (s)	4.1	4.1		4.1	4.1		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	3.4	3.4		3.4	3.4		2.4	2.4	2.4	2.4	2.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.5	7.5		7.5	7.5		7.4	7.4	7.4	7.4	7.4	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	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	
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	
Walk Time (s)		7.0			7.0			7.0	7.0		7.0	
Flash Dont Walk (s)		29.1			29.1			24.9	24.9		24.9	
Pedestrian Calls (#/hr)		0			0			0	0		0	
Act Effct Green (s)	10.8	10.0		5.5	10.0		103.4	84.9		83.2	72.1	
Actuated g/C Ratio	0.08	0.08		0.04	0.08		0.80	0.65		0.64	0.55	
v/c Ratio	0.25	0.08		0.11	0.01		0.56	0.84		0.54	0.54	
Control Delay	57.9	0.3		61.7	0.0		11.3	17.1		33.5	15.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	57.9	0.3		61.7	0.0		11.3	17.1		33.5	15.5	
LOS	E	A		E	A		B	B		C	B	
Approach Delay		33.4			46.3			16.3			17.5	
Approach LOS		C			D			B			B	
Queue Length 50th (m)	7.7	0.0		1.9	0.0		5.3	161.8		9.4	62.2	
Queue Length 95th (m)	15.5	0.0		5.7	0.0		m24.0	#311.4		m22.9	m71.9	
Internal Link Dist (m)		448.7			402.7			611.3			485.3	
Turn Bay Length (m)	90.0			125.0			90.0			90.0		
Base Capacity (vph)	248	1005		141	986		500	2192		210	1693	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.25	0.04		0.11	0.01		0.55	0.84		0.54	0.54	

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 130			
Offset: 23 (18%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 120			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 17.5		Intersection LOS: B	
Intersection Capacity Utilization 87.3%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

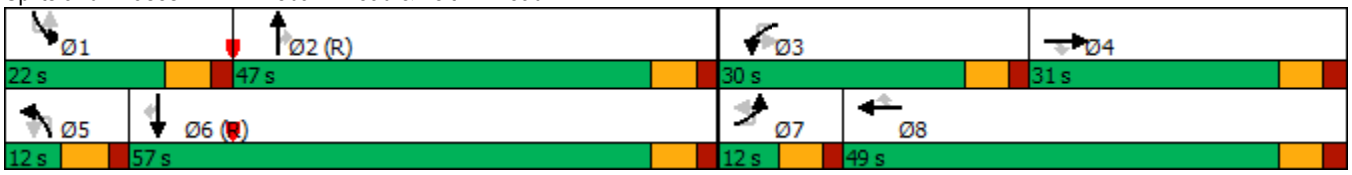
Splits and Phases: 4: Limebank Road & Realigned Leitrim Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	190	30	508	277	212	4	733	335	280	1167	6
Future Volume (vph)	11	190	30	508	277	212	4	733	335	280	1167	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	130.0		130.0	120.0		150.0	195.0		180.0	210.0		185.0
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor									0.99	1.00		
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3354	1767	1381	3257	1802	1488	3354	3325	1419	3106	3424	1289
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3354	1767	1381	3257	1802	1488	3354	3325	1400	3102	3424	1289
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			243			212			335			190
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		395.5			472.5			509.3			517.2	
Travel Time (s)		17.8			21.3			22.9			23.3	
Confl. Peds. (#/hr)									1	1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	12%	3%	1%	4%	0%	4%	9%	8%	1%	20%
Adj. Flow (vph)	11	190	30	508	277	212	4	733	335	280	1167	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	190	30	508	277	212	4	733	335	280	1167	6
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	21.0	21.0	5.0	21.0	21.0
Minimum Split (s)	11.1	30.8	30.8	11.1	30.8	30.8	11.6	27.6	27.6	11.6	27.6	27.6
Total Split (s)	12.0	31.0	31.0	30.0	49.0	49.0	12.0	47.0	47.0	22.0	57.0	57.0
Total Split (%)	9.2%	23.8%	23.8%	23.1%	37.7%	37.7%	9.2%	36.2%	36.2%	16.9%	43.8%	43.8%
Maximum Green (s)	5.9	24.2	24.2	23.9	42.2	42.2	5.4	40.4	40.4	15.4	50.4	50.4
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	1.9	2.6	2.6	1.9	2.6	2.6	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.8	6.8	6.1	6.8	6.8	6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	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	C-Min	C-Min	None	C-Min	C-Min
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		17.0	17.0		17.0	17.0		14.0	14.0		14.0	14.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	5.7	18.9	18.9	23.5	43.7	43.7	5.6	45.9	45.9	15.6	65.7	65.7
Actuated g/C Ratio	0.04	0.15	0.15	0.18	0.34	0.34	0.04	0.35	0.35	0.12	0.51	0.51
v/c Ratio	0.07	0.74	0.07	0.86	0.46	0.33	0.03	0.62	0.47	0.75	0.67	0.01

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	60.6	70.3	0.4	67.1	36.9	5.6	52.2	30.3	8.6	68.3	28.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.6	70.3	0.4	67.1	36.9	5.6	52.2	30.3	8.6	68.3	28.4	0.0
LOS	E	E	A	E	D	A	D	C	A	E	C	A
Approach Delay		60.8			45.6			23.6			35.9	
Approach LOS		E			D			C			D	
Queue Length 50th (m)	1.4	47.1	0.0	63.9	50.0	0.0	0.4	68.8	21.2	35.7	116.1	0.0
Queue Length 95th (m)	4.6	69.5	0.0	#91.5	82.9	17.0	m1.0	90.1	m44.6	#54.5	175.1	0.0
Internal Link Dist (m)		371.5			448.5			485.3			493.2	
Turn Bay Length (m)	130.0		130.0	120.0		150.0	195.0		180.0	210.0		185.0
Base Capacity (vph)	152	328	454	610	621	652	143	1173	710	387	1731	745
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.58	0.07	0.83	0.45	0.33	0.03	0.62	0.47	0.72	0.67	0.01

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 130			
Offset: 128 (98%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 105			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 36.5		Intersection LOS: D	
Intersection Capacity Utilization 85.8%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 1: Limebank Road & Leitrim Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	185	27	36	25	18	21	26	43	418	34	1	63
Future Volume (vph)	185	27	36	25	18	21	26	43	418	34	1	63
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		0.0	95.0		60.0		205.0		180.0		255.0
Storage Lanes	2		0	2		1		2		1		2
Taper Length (m)	7.6			7.6				7.6				7.6
Lane Util. Factor	0.97	0.95	0.95	0.97	0.95	1.00	0.95	0.97	0.95	1.00	0.95	0.97
Ped Bike Factor	1.00	0.99		0.98		0.99		1.00		0.98		1.00
Frt		0.914				0.850				0.850		
Flt Protected	0.950			0.950				0.950				0.950
Satd. Flow (prot)	3321	3082	0	3257	3293	1473	0	3313	3232	1517	0	3289
Flt Permitted	0.950			0.950				0.950				0.950
Satd. Flow (perm)	3315	3082	0	3207	3293	1454	0	3310	3232	1493	0	3279
Right Turn on Red			Yes			Yes				Yes		
Satd. Flow (RTOR)		36				141				139		
Link Speed (k/h)		60			60				80			
Link Distance (m)		243.4			525.1				473.0			
Travel Time (s)		14.6			31.5				21.3			
Confl. Peds. (#/hr)	1		9	9		1		4		3		3
Confl. Bikes (#/hr)										1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	3%	0%	3%	5%	5%	0%	2%	7%	2%	0%	2%
Adj. Flow (vph)	185	27	36	25	18	21	26	43	418	34	1	63
Shared Lane Traffic (%)												
Lane Group Flow (vph)	185	63	0	25	18	21	0	69	418	34	0	64
Turn Type	Prot	NA		Prot	NA	Perm	Prot	Prot	NA	Perm	Prot	Prot
Protected Phases	7	4		3	8		5	5	2		1	1
Permitted Phases						8				2		
Detector Phase	7	4		3	8	8	5	5	2	2	1	1
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	5.0	15.0	15.0	5.0	5.0
Minimum Split (s)	11.5	41.5		11.5	41.5	41.5	11.6	11.6	41.7	41.7	11.6	11.6
Total Split (s)	16.0	46.0		12.0	42.0	42.0	12.0	12.0	60.0	60.0	12.0	12.0
Total Split (%)	12.3%	35.4%		9.2%	32.3%	32.3%	9.2%	9.2%	46.2%	46.2%	9.2%	9.2%
Maximum Green (s)	9.5	39.5		5.5	35.5	35.5	5.4	5.4	53.3	53.3	5.4	5.4
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.8	2.8		2.8	2.8	2.8	2.0	2.0	2.1	2.1	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5		6.6	6.7	6.7		6.6
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	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
Recall Mode	None	None		None	None	None	None	None	C-Min	C-Min	None	None
Walk Time (s)		10.0			10.0	10.0			10.0	10.0		
Flash Dont Walk (s)		25.0			25.0	25.0			25.0	25.0		
Pedestrian Calls (#/hr)		0			0	0			0	0		
Act Effct Green (s)	10.9	13.2		6.0	10.0	10.0		8.1	83.9	83.9		7.9
Actuated g/C Ratio	0.08	0.10		0.05	0.08	0.08		0.06	0.65	0.65		0.06

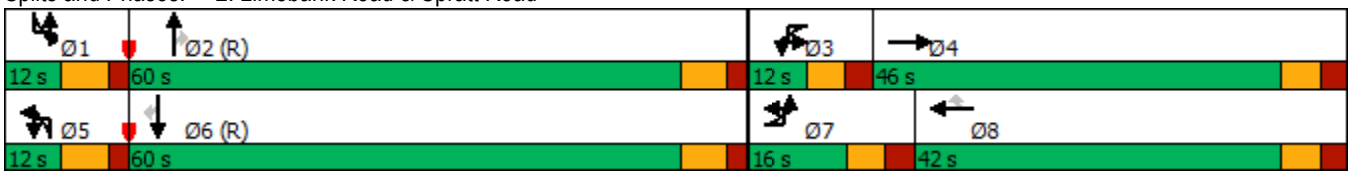
Lane Group	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	1268	440
Future Volume (vph)	1268	440
Ideal Flow (vphpl)	1800	1800
Storage Length (m)		230.0
Storage Lanes		1
Taper Length (m)		
Lane Util. Factor	0.95	1.00
Ped Bike Factor		0.98
Frt		0.850
Flt Protected		
Satd. Flow (prot)	3424	1532
Flt Permitted		
Satd. Flow (perm)	3424	1507
Right Turn on Red		Yes
Satd. Flow (RTOR)		440
Link Speed (k/h)	80	
Link Distance (m)	635.3	
Travel Time (s)	28.6	
Confl. Peds. (#/hr)		4
Confl. Bikes (#/hr)		
Peak Hour Factor	1.00	1.00
Heavy Vehicles (%)	1%	1%
Adj. Flow (vph)	1268	440
Shared Lane Traffic (%)		
Lane Group Flow (vph)	1268	440
Turn Type	NA	Perm
Protected Phases	6	
Permitted Phases		6
Detector Phase	6	6
Switch Phase		
Minimum Initial (s)	15.0	15.0
Minimum Split (s)	41.7	41.7
Total Split (s)	60.0	60.0
Total Split (%)	46.2%	46.2%
Maximum Green (s)	53.3	53.3
Yellow Time (s)	4.6	4.6
All-Red Time (s)	2.1	2.1
Lost Time Adjust (s)	0.0	0.0
Total Lost Time (s)	6.7	6.7
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Recall Mode	C-Min	C-Min
Walk Time (s)	10.0	10.0
Flash Dont Walk (s)	25.0	25.0
Pedestrian Calls (#/hr)	0	0
Act Effct Green (s)	83.8	83.8
Actuated g/C Ratio	0.64	0.64

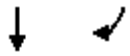
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
v/c Ratio	0.67	0.18		0.17	0.07	0.09		0.34	0.20	0.03		0.32
Control Delay	69.9	28.1		62.3	56.5	0.7		62.3	11.5	0.1		75.6
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0
Total Delay	69.9	28.1		62.3	56.5	0.7		62.3	11.5	0.1		75.6
LOS	E	C		E	E	A		E	B	A		E
Approach Delay		59.3			40.5				17.5			
Approach LOS		E			D				B			
Queue Length 50th (m)	23.6	3.2		3.2	2.3	0.0		8.9	27.3	0.0		8.9
Queue Length 95th (m)	#41.5	10.4		8.0	6.4	0.0		16.3	35.5	0.0		m11.8
Internal Link Dist (m)		219.4			501.1				449.0			
Turn Bay Length (m)	100.0			95.0		60.0		205.0		180.0		255.0
Base Capacity (vph)	278	961		149	899	499		205	2086	1013		200
Starvation Cap Reductn	0	0		0	0	0		0	0	0		0
Spillback Cap Reductn	0	0		0	0	0		0	0	0		0
Storage Cap Reductn	0	0		0	0	0		0	0	0		0
Reduced v/c Ratio	0.67	0.07		0.17	0.02	0.04		0.34	0.20	0.03		0.32

Intersection Summary

Area Type: Other
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 52 (40%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 15.8 Intersection LOS: B
Intersection Capacity Utilization 68.0% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Limebank Road & Spratt Road





Lane Group	SBT	SBR
v/c Ratio	0.57	0.39
Control Delay	7.5	1.1
Queue Delay	0.0	0.0
Total Delay	7.5	1.1
LOS	A	A
Approach Delay	8.4	
Approach LOS	A	
Queue Length 50th (m)	43.4	0.0
Queue Length 95th (m)	33.0	m0.4
Internal Link Dist (m)	611.3	
Turn Bay Length (m)		230.0
Base Capacity (vph)	2207	1127
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.57	0.39

Intersection Summary

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	1	239	30	2	37	457	6	58	0	3	4	0
Future Volume (vph)	1	239	30	2	37	457	6	58	0	3	4	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00							
Frt		0.983				0.998			0.850			0.973
Flt Protected	0.950				0.950			0.950				0.962
Satd. Flow (prot)	1729	3359	0	0	1729	3417	0	1712	1547	0	0	1704
Flt Permitted	0.486				0.586			0.754				0.767
Satd. Flow (perm)	885	3359	0	0	1061	3417	0	1359	1547	0	0	1358
Right Turn on Red			Yes				Yes			Yes		
Satd. Flow (RTOR)		25				2			588			41
Link Speed (k/h)		60				60			50			50
Link Distance (m)		254.5				243.4			128.6			121.2
Travel Time (s)		15.3				14.6			9.3			8.7
Confl. Peds. (#/hr)			3		3							
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%
Adj. Flow (vph)	1	239	30	2	37	457	6	58	0	3	4	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1	269	0	0	39	463	0	58	3	0	0	5
Turn Type	Perm	NA		Perm	Perm	NA		Perm	NA		Perm	NA
Protected Phases		2				6			8			4
Permitted Phases	2			6	6			8			4	
Detector Phase	2	2		6	6	6		8	8		4	4
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0		5.0	5.0		5.0	5.0
Minimum Split (s)	24.0	24.0		32.0	32.0	32.0		32.0	32.0		32.0	32.0
Total Split (s)	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%		40.0%	40.0%		40.0%	40.0%
Maximum Green (s)	42.0	42.0		42.0	42.0	42.0		26.0	26.0		26.0	26.0
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7		3.3	3.3		3.3	3.3
All-Red Time (s)	2.3	2.3		2.3	2.3	2.3		2.7	2.7		2.7	2.7
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0	0.0			0.0
Total Lost Time (s)	6.0	6.0			6.0	6.0		6.0	6.0			6.0
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
Recall Mode	C-Max	C-Max		C-Max	C-Max	C-Max		None	None		None	None
Walk Time (s)	7.0	7.0		7.0	7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)	10.0	10.0		10.0	10.0	10.0		19.0	19.0		19.0	19.0
Pedestrian Calls (#/hr)	0	0		0	0	0		0	0		0	0
Act Effct Green (s)	66.5	66.5			66.5	66.5		8.9	8.9			8.5
Actuated g/C Ratio	0.83	0.83			0.83	0.83		0.11	0.11			0.11
v/c Ratio	0.00	0.10			0.04	0.16		0.39	0.00			0.03
Control Delay	4.0	2.6			3.4	2.9		39.5	0.0			0.2
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			0.0
Total Delay	4.0	2.6			3.4	2.9		39.5	0.0			0.2

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	1
Future Volume (vph)	1
Ideal Flow (vphpl)	1800
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)	
Peak Hour Factor	1.00
Heavy Vehicles (%)	0%
Adj. Flow (vph)	1
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	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
LOS	A	A			A	A		D	A			A
Approach Delay		2.6				2.9			37.6			0.2
Approach LOS		A				A			D			A
Queue Length 50th (m)	0.0	4.3			1.3	8.7		8.3	0.0			0.0
Queue Length 95th (m)	0.4	8.8			4.2	15.9		18.4	0.0			0.0
Internal Link Dist (m)		230.5				219.4			104.6			97.2
Turn Bay Length (m)												
Base Capacity (vph)	735	2794			881	2839		441	899			469
Starvation Cap Reductn	0	0			0	0		0	0			0
Spillback Cap Reductn	0	0			0	0		0	0			0
Storage Cap Reductn	0	0			0	0		0	0			0
Reduced v/c Ratio	0.00	0.10			0.04	0.16		0.13	0.00			0.01

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.39			
Intersection Signal Delay: 5.3		Intersection LOS: A	
Intersection Capacity Utilization 41.7%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Urbandale Plaza & Spratt Road

Lane Group	SBR
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	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	323	0	239	46	0	8	60	644	0	56	1675	80
Future Volume (vph)	323	0	239	46	0	8	60	644	0	56	1675	80
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	90.0		0.0	125.0		0.0	90.0		160.0	90.0		0.0
Storage Lanes	2		0	2		0	1		1	1		0
Taper Length (m)	7.6			2.5			7.6			7.6		
Lane Util. Factor	0.97	0.95	0.95	0.97	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.850			0.850						0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2995	2624	0	3354	2939	0	1544	3262	1820	1729	3383	0
Flt Permitted	0.950			0.950			0.054			0.378		
Satd. Flow (perm)	2995	2624	0	3354	2939	0	88	3262	1820	688	3383	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		162			206						4	
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		472.7			426.7			635.3			509.3	
Travel Time (s)		28.4			25.6			28.6			22.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	12%	12%	12%	0%	12%	0%	12%	6%	0%	0%	1%	12%
Adj. Flow (vph)	323	0	239	46	0	8	60	644	0	56	1675	80
Shared Lane Traffic (%)												
Lane Group Flow (vph)	323	239	0	46	8	0	60	644	0	56	1755	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2		2	6		
Detector Phase	7	4		3	8		5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	12.5	43.6		12.5	43.6		12.4	39.3	39.3	12.4	39.3	
Total Split (s)	13.0	44.0		13.0	44.0		13.0	60.0	60.0	13.0	60.0	
Total Split (%)	10.0%	33.8%		10.0%	33.8%		10.0%	46.2%	46.2%	10.0%	46.2%	
Maximum Green (s)	5.5	36.5		5.5	36.5		5.6	52.6	52.6	5.6	52.6	
Yellow Time (s)	4.1	4.1		4.1	4.1		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	3.4	3.4		3.4	3.4		2.4	2.4	2.4	2.4	2.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.5	7.5		7.5	7.5		7.4	7.4	7.4	7.4	7.4	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	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	
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	
Walk Time (s)		7.0			7.0			7.0	7.0		7.0	
Flash Dont Walk (s)		29.1			29.1			24.9	24.9		24.9	
Pedestrian Calls (#/hr)		0			0			0	0		0	
Act Effct Green (s)	17.2	11.3		5.5	11.0		87.7	81.8		87.2	81.5	
Actuated g/C Ratio	0.13	0.09		0.04	0.08		0.67	0.63		0.67	0.63	
v/c Ratio	0.81	0.90dr		0.33	0.02		0.43	0.31		0.11	0.83	
Control Delay	70.0	27.3		66.9	0.1		29.1	9.7		6.7	19.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	70.0	27.3		66.9	0.1		29.1	9.7		6.7	19.6	
LOS	E	C		E	A		C	A		A	B	
Approach Delay		51.8			57.0			11.3			19.2	
Approach LOS		D			E			B			B	
Queue Length 50th (m)	39.7	10.0		6.0	0.0		5.3	28.1		2.2	189.5	
Queue Length 95th (m)	#100.8	22.9		12.6	0.0		m13.3	39.3		m5.5	#270.7	
Internal Link Dist (m)		448.7			402.7			611.3			485.3	
Turn Bay Length (m)	90.0			125.0			90.0			90.0		
Base Capacity (vph)	397	853		141	973		138	2052		515	2122	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.81	0.28		0.33	0.01		0.43	0.31		0.11	0.83	

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 130			
Offset: 20 (15%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 120			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 24.0		Intersection LOS: C	
Intersection Capacity Utilization 85.8%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			
dr Defacto Right Lane. Recode with 1 though lane as a right lane.			

Splits and Phases: 4: Limebank Road & Realigned Leitrim Road