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

# Document Control Page

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| **HISTORY:** | TIA Step 4 to Client for Submission to City – August 2, 2022 |

## 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 (11$^{th}$ 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

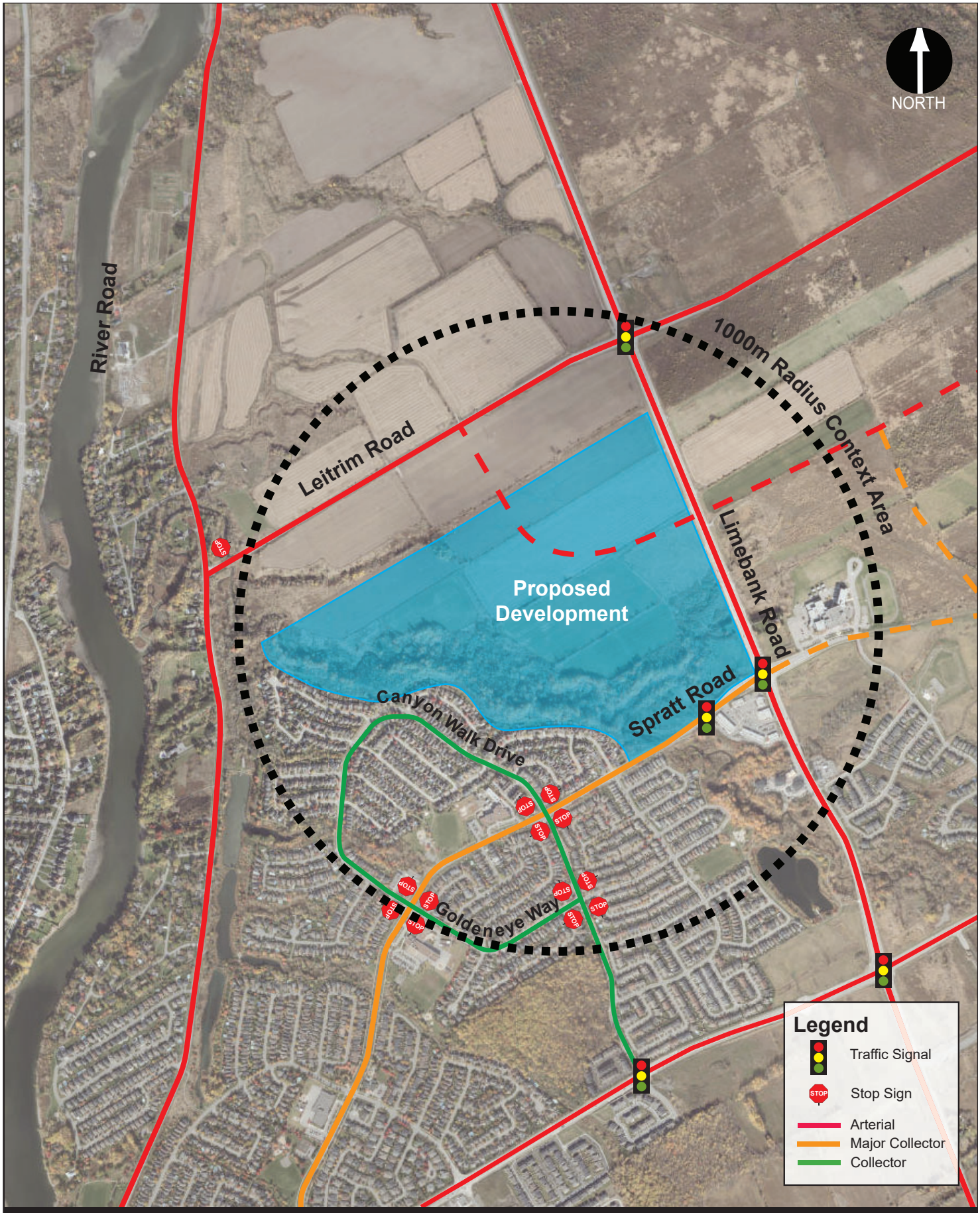
### 3.1.1 Site Location

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

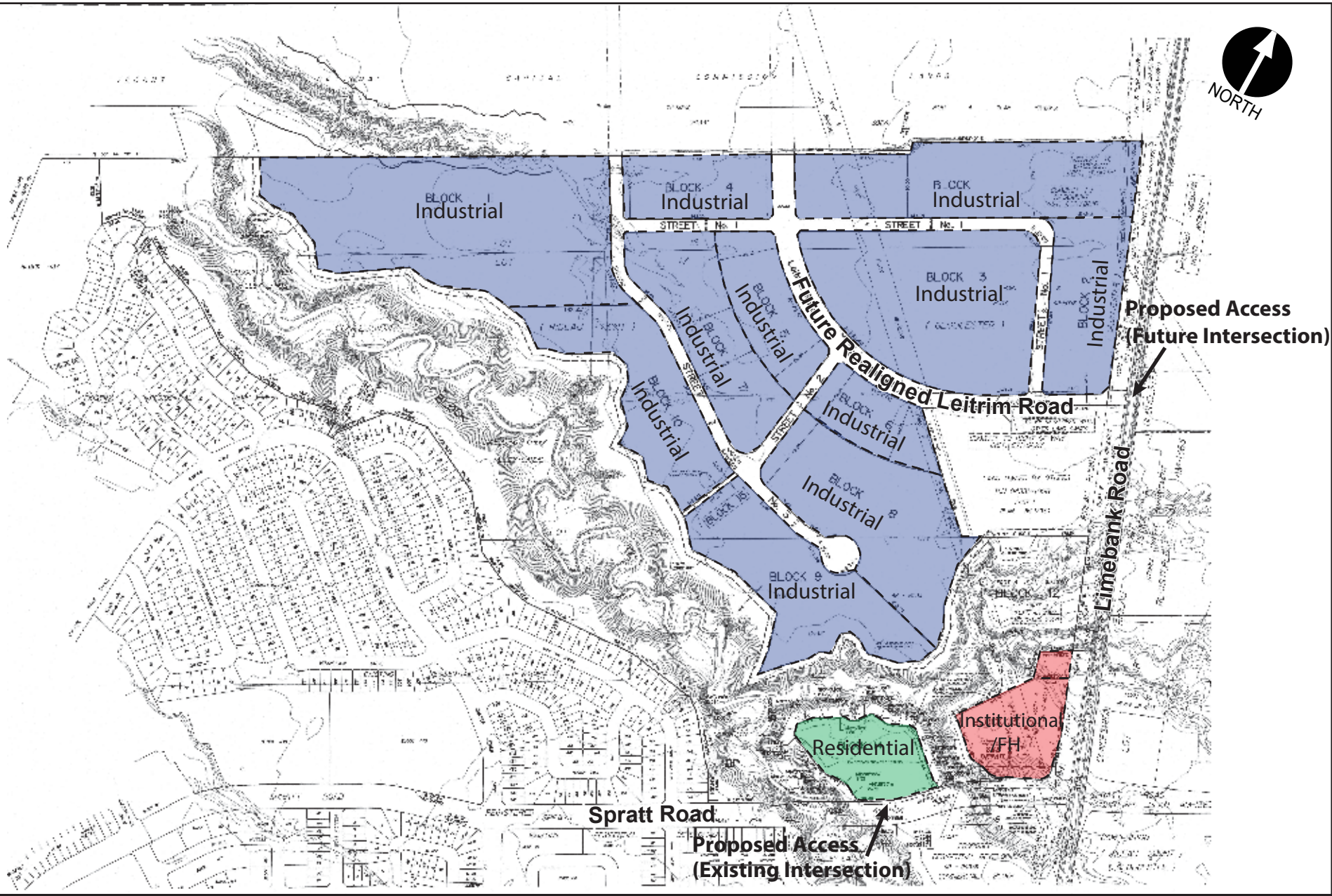
| BLOCK | LAND USE | AREA (HECTARES) | EMPLOYEES/ UNITS |
|---|---|---|---|
| 1 to 11 | Industrial Park | 42.257 | 2,113 employees |
| 12 | Mosquito Creek | 32.379 | N/A |
| 13 | Institutional/Fire Hall | 1.597 | 20 employees |
| 14 | Townhomes | 1.646 | 38 units |
| 15 | Multi-Use Path | 0.056 | N/A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

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.

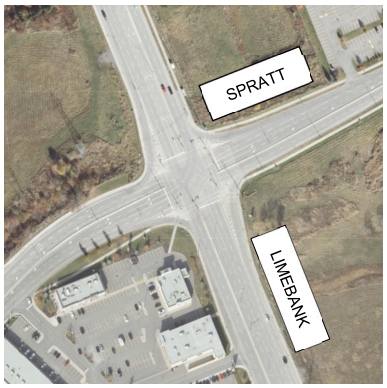
Table 2 - Existing Roadways

| 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 |

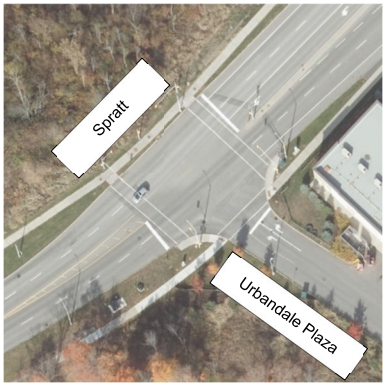
*Source: Table 1 – Road Right-of-Way Protection, Official Plan (2021)*

#### *3.2.1.2 Intersections*

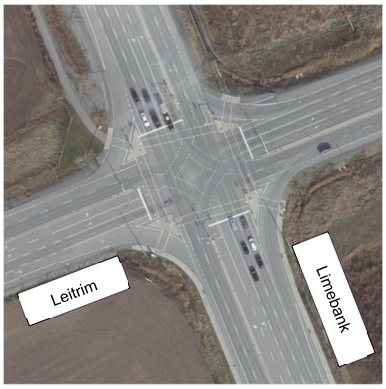
The following existing intersections have the greatest potential to be impacted by the proposed development:




- **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:

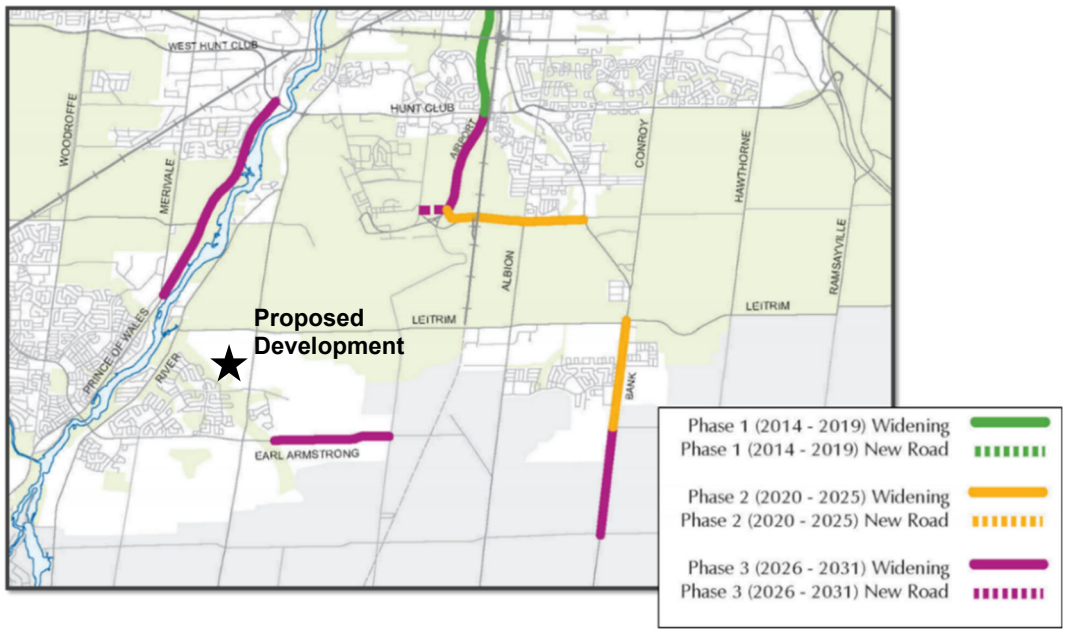
- **Earl Armstrong Road** – Planned widening from two to four lanes between Limebank Road and Bowesville Road (Phase 3: 2026-2031).

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.

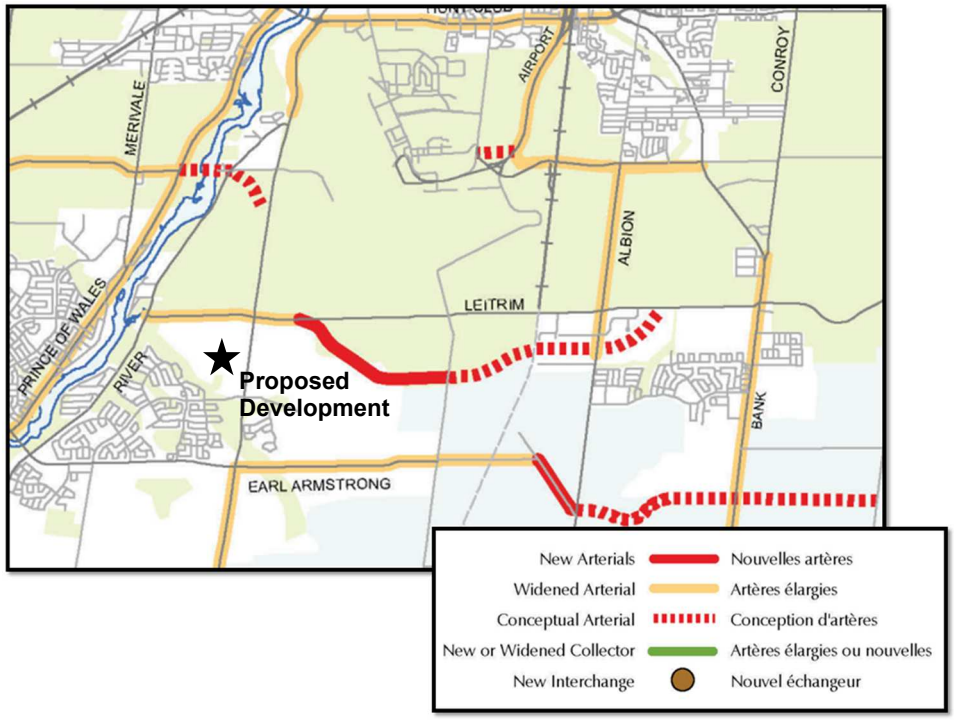
**Figure 1** and **Figure 2** below illustrates the planned changes to the arterial road network projects in the broader area, as per the TMP 2031 'Affordable Network' and 2031 'Network Concept', respectively.

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.

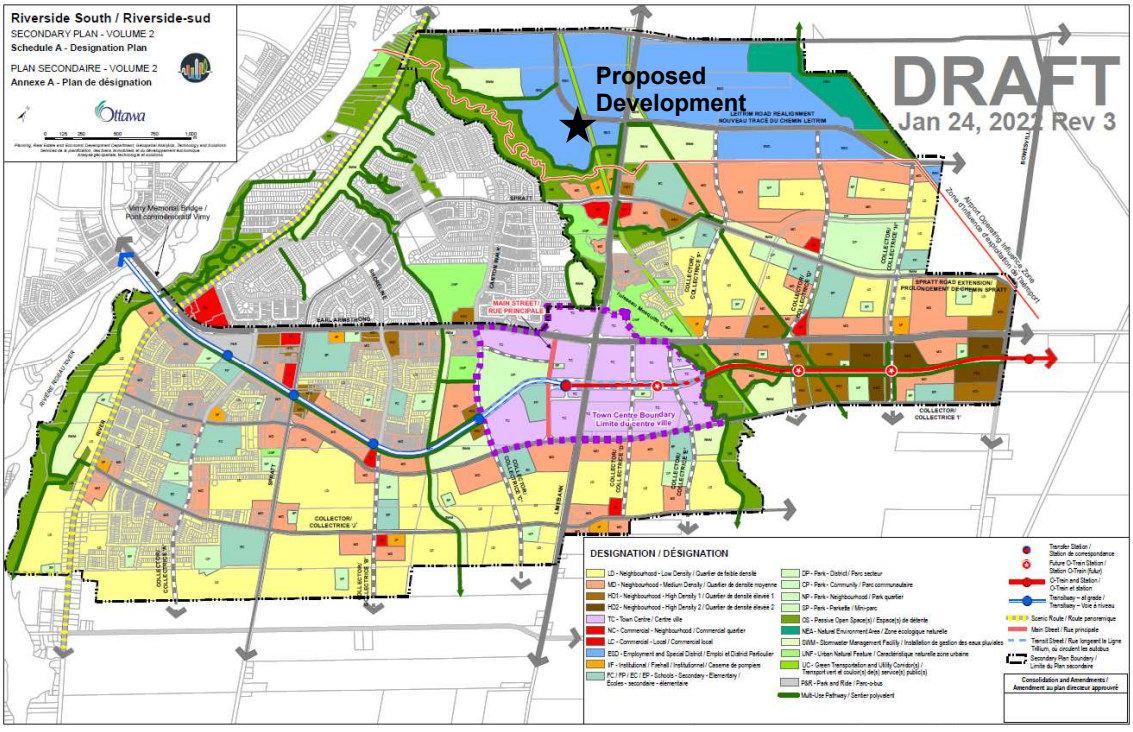
Riverside South CDP

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.

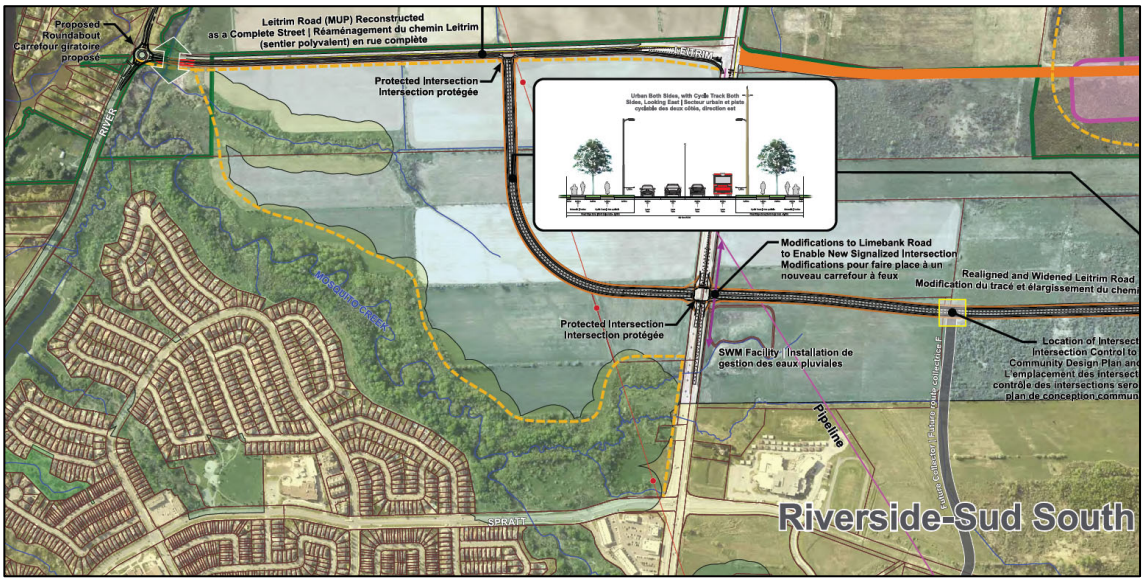
Based on the functional design plan developed as part of the ESR, within the context area the realigned Leitrim Road may ultimately have a four-lane urban undivided cross-section with 3.0m wide boulevards, 1.8m wide cycle tracks and 2.0m wide sidewalks on both sides of the road.

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.

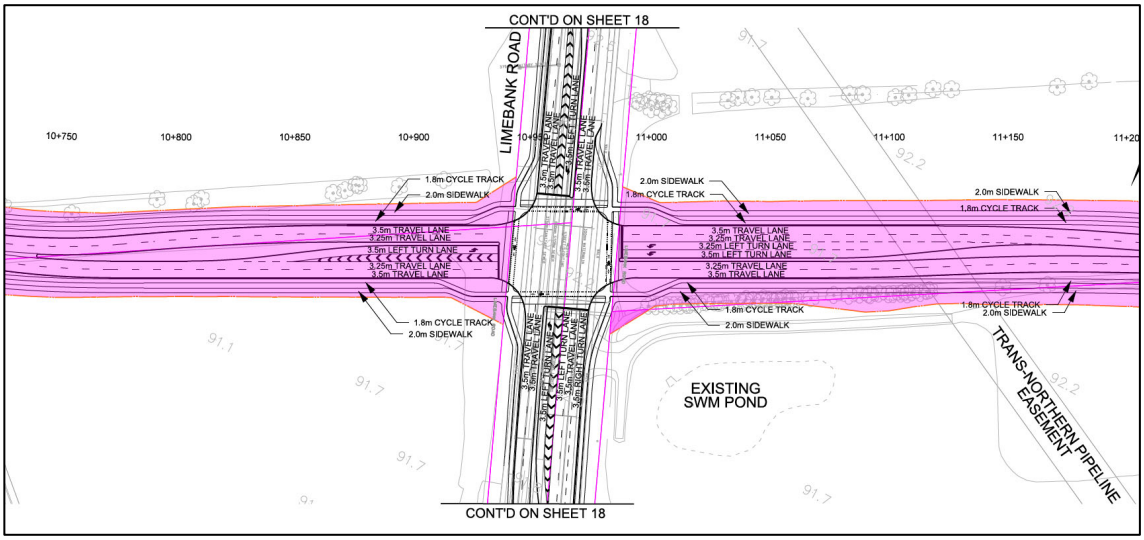
**Figure 4** and **Figure 5** show the planned realignment of Leitrim Road as well as the configuration of the new intersection where the realigned Leitrim Road meets Limebank Road.

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*

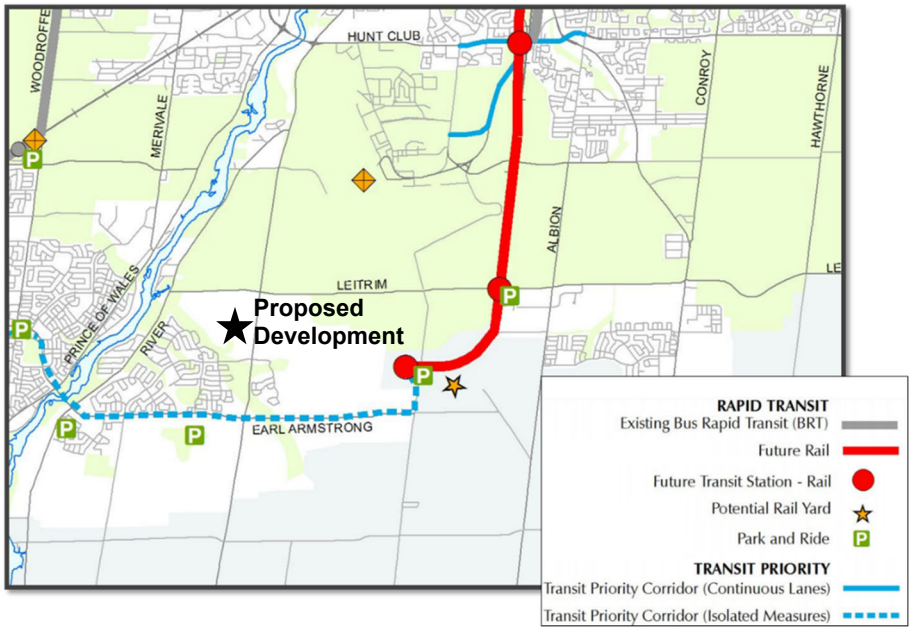
The 2013 TMP outlines the future rapid transit and transit priority (RTTP) network. The following projects were noted in the 'Affordable RTTP Network' that may have a future impact on study area traffic:

- **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**.

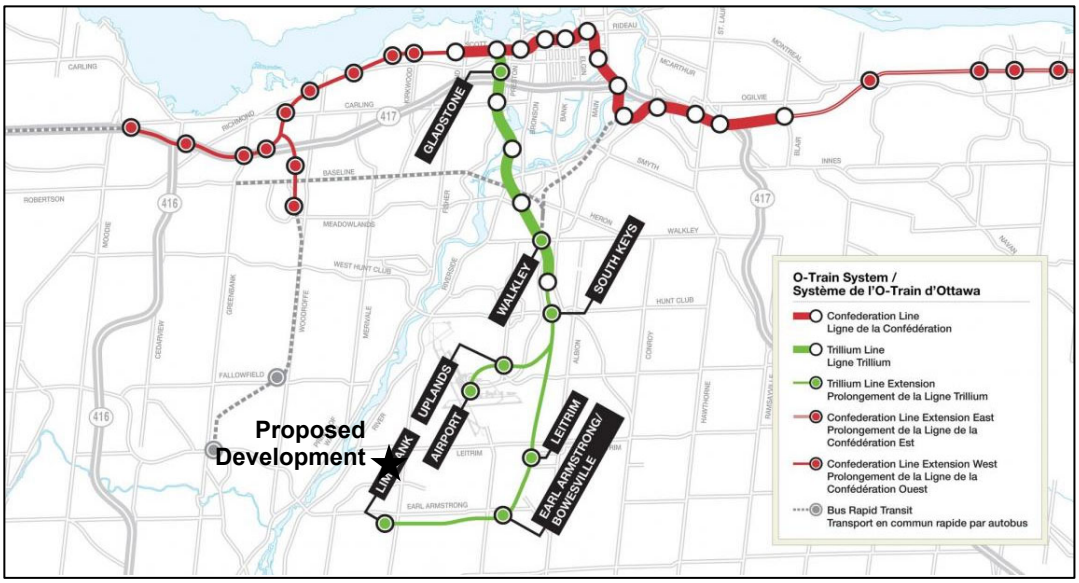
As shown previously in **Figure 3**, the Riverside South CDP identifies the eventual construction of a BRT corridor extending west from the terminus of the Trillium Line Extension, connecting the Riverside Park and Ride with the future O-Train terminus at Limebank Road. The implementation of this corridor, 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*

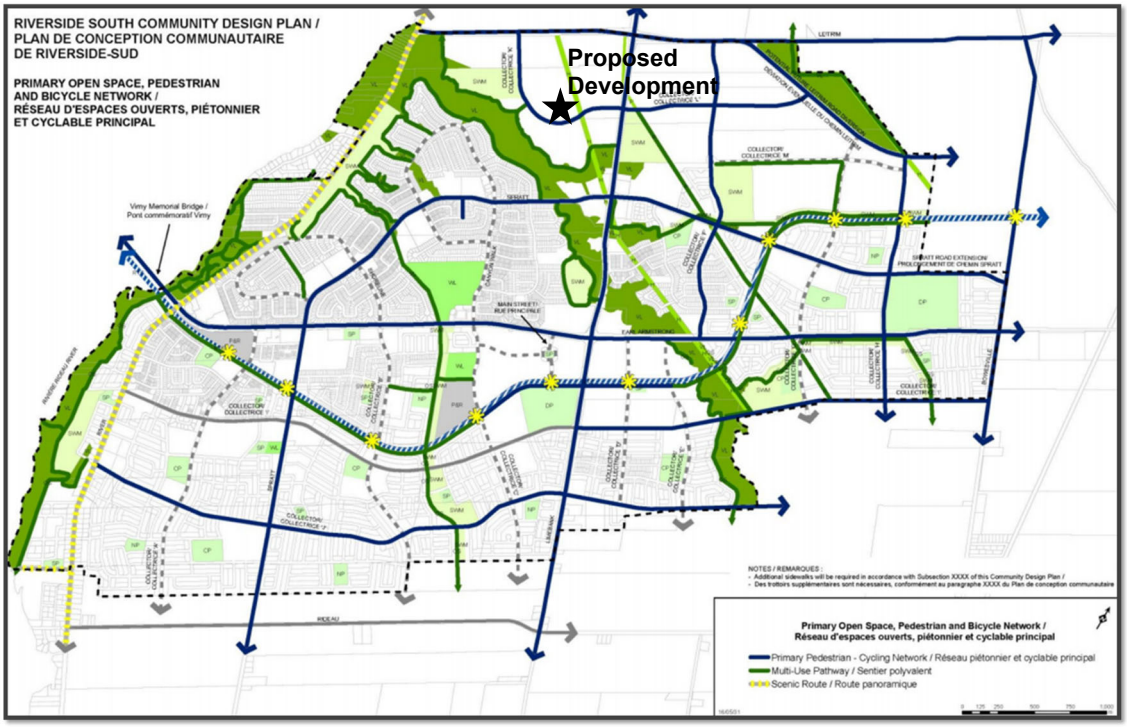
### *3.3.1.3 Future Cycling and Pedestrian Facilities*

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

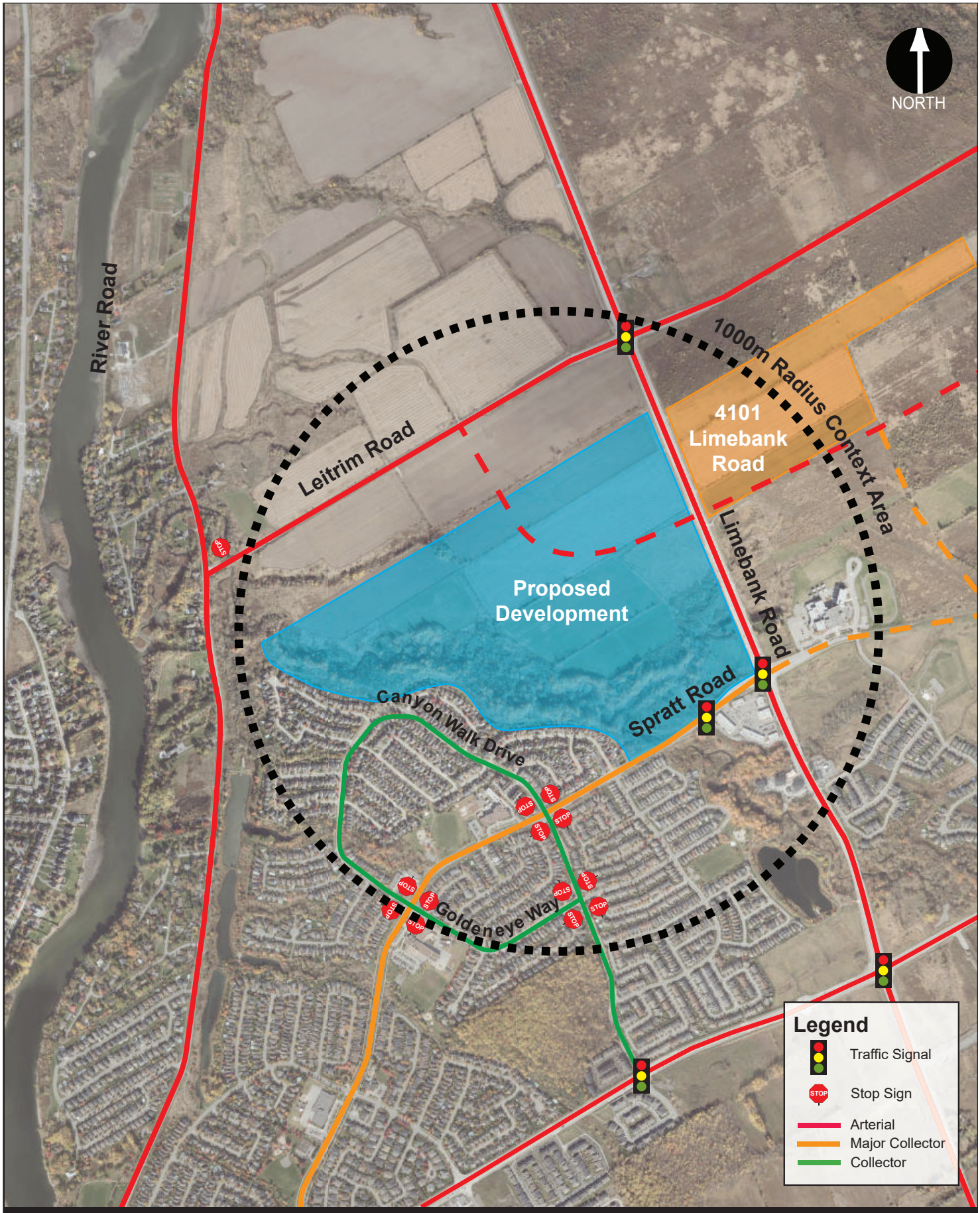



*Source: Riverside South Community Design Plan*

### 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.

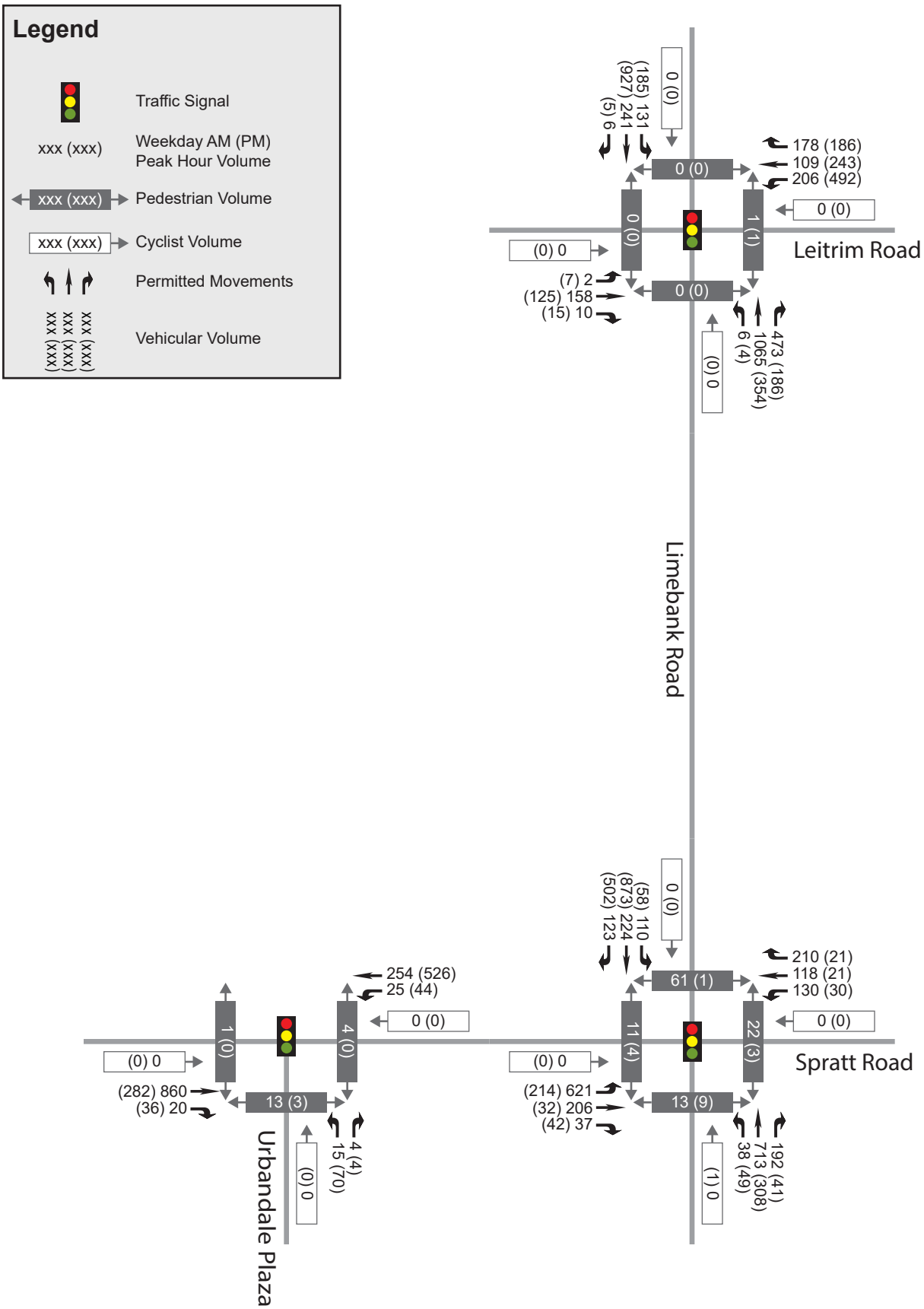
Peak hour traffic volumes representative of typical conditions are shown in **Exhibit 4**. The traffic count data is provided in **Appendix E**. The lane configurations and intersection controls for the study area intersections are illustrated in **Exhibit 5**.

## 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.

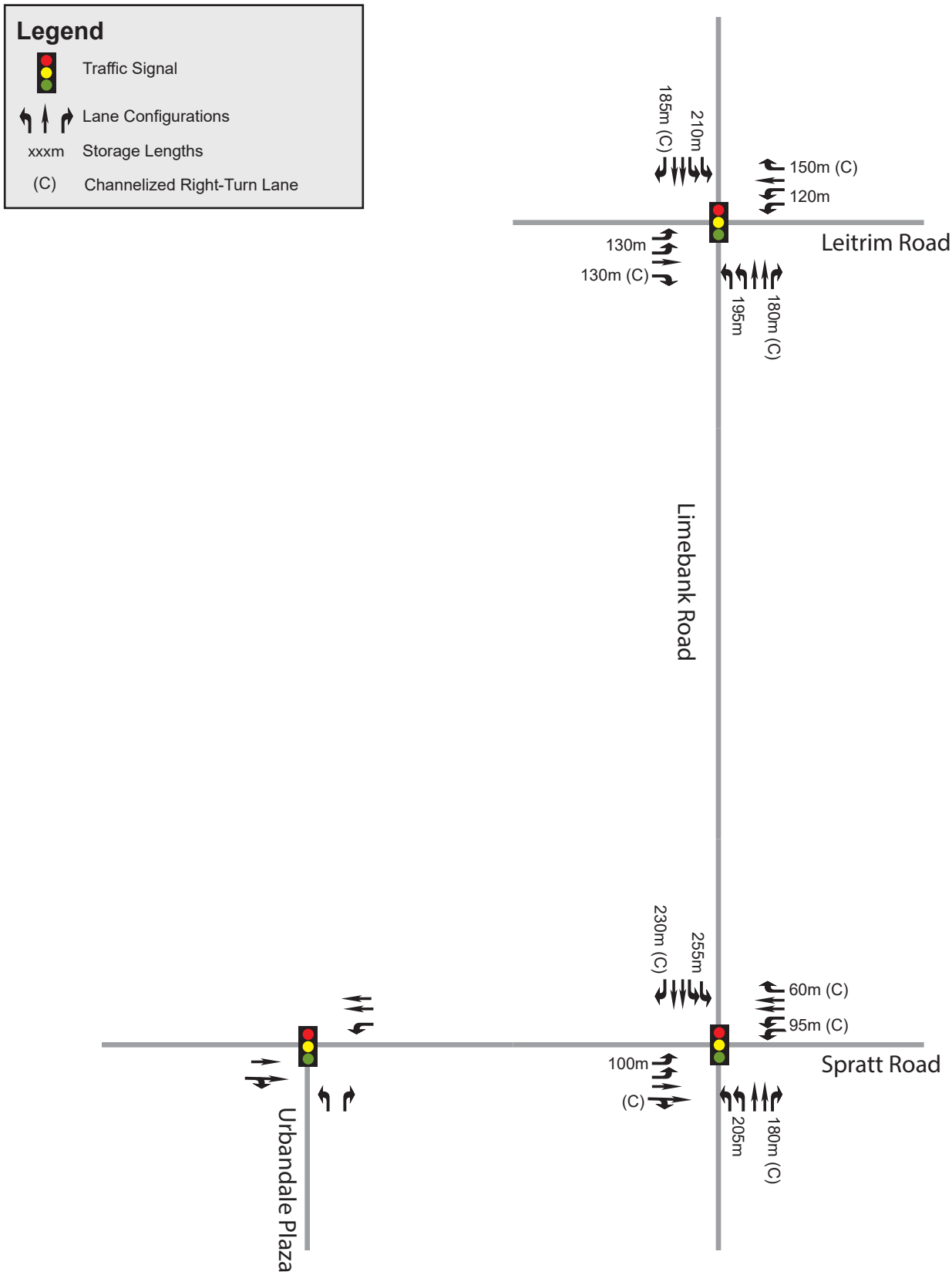



Riverside South Employment Lands & Blocks 13,14
Transportation Impact Accessment

Exhibit 4:
Existing Traffic

PROJECT No. 136974

SCALE: N.T.S.


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.

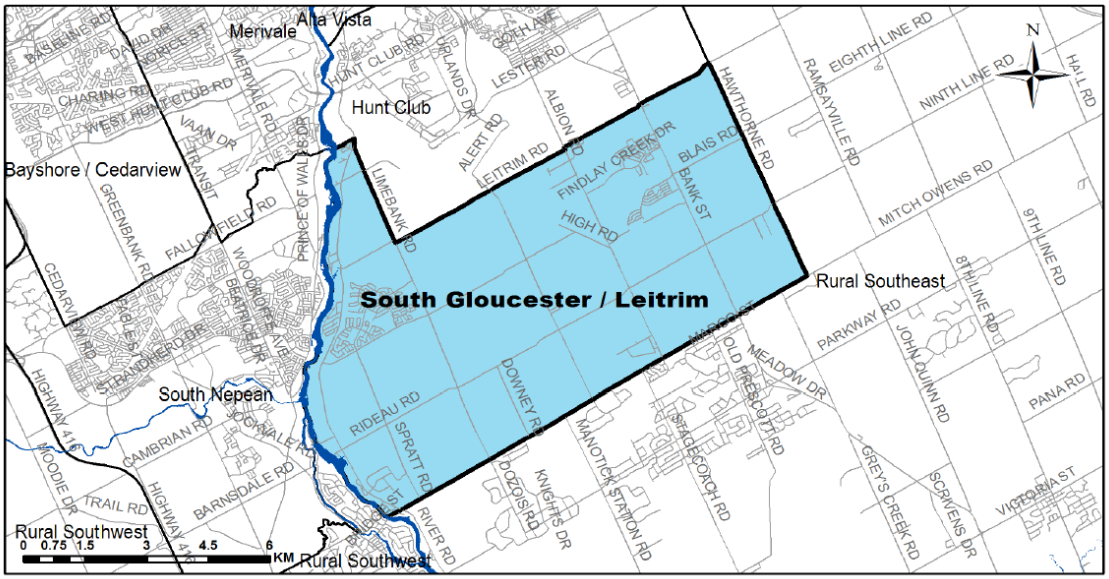
### 4.2.1 Industrial Trip Generation Methodology (Blocks 1-11)

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

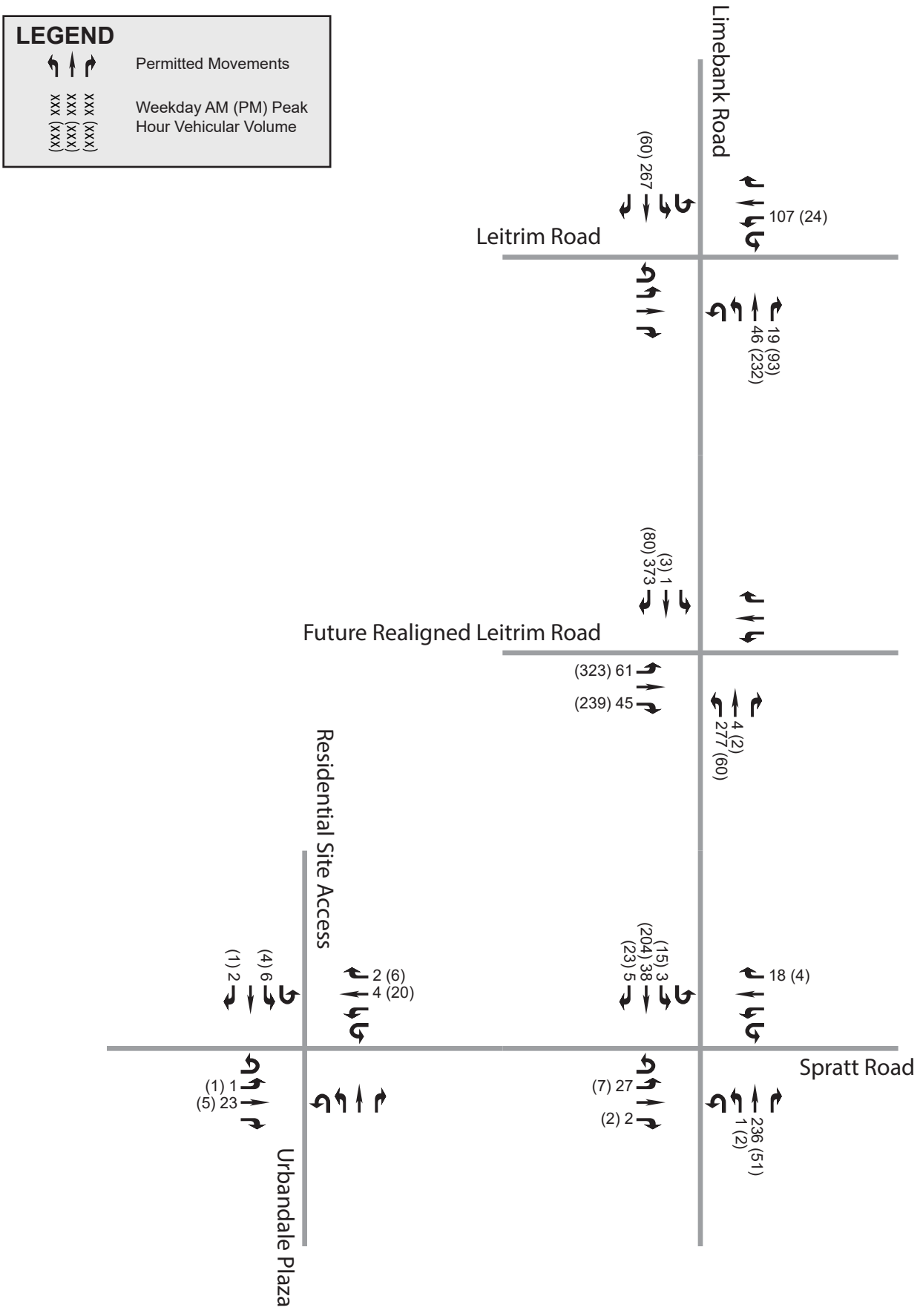
#### *4.2.3.2 Residential Trip Distribution*

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.

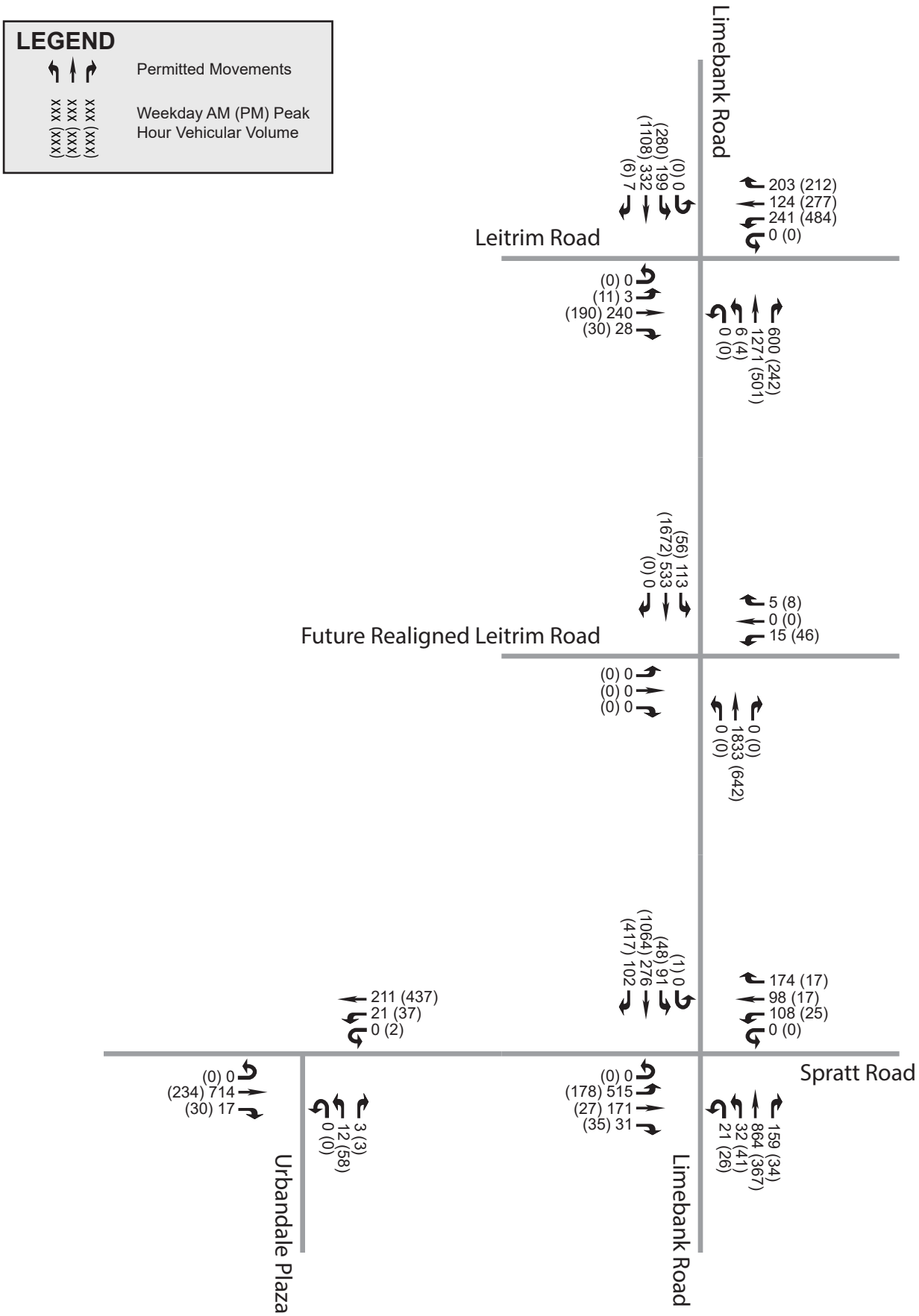
## 4.4 Traffic Volume Summary

### 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.

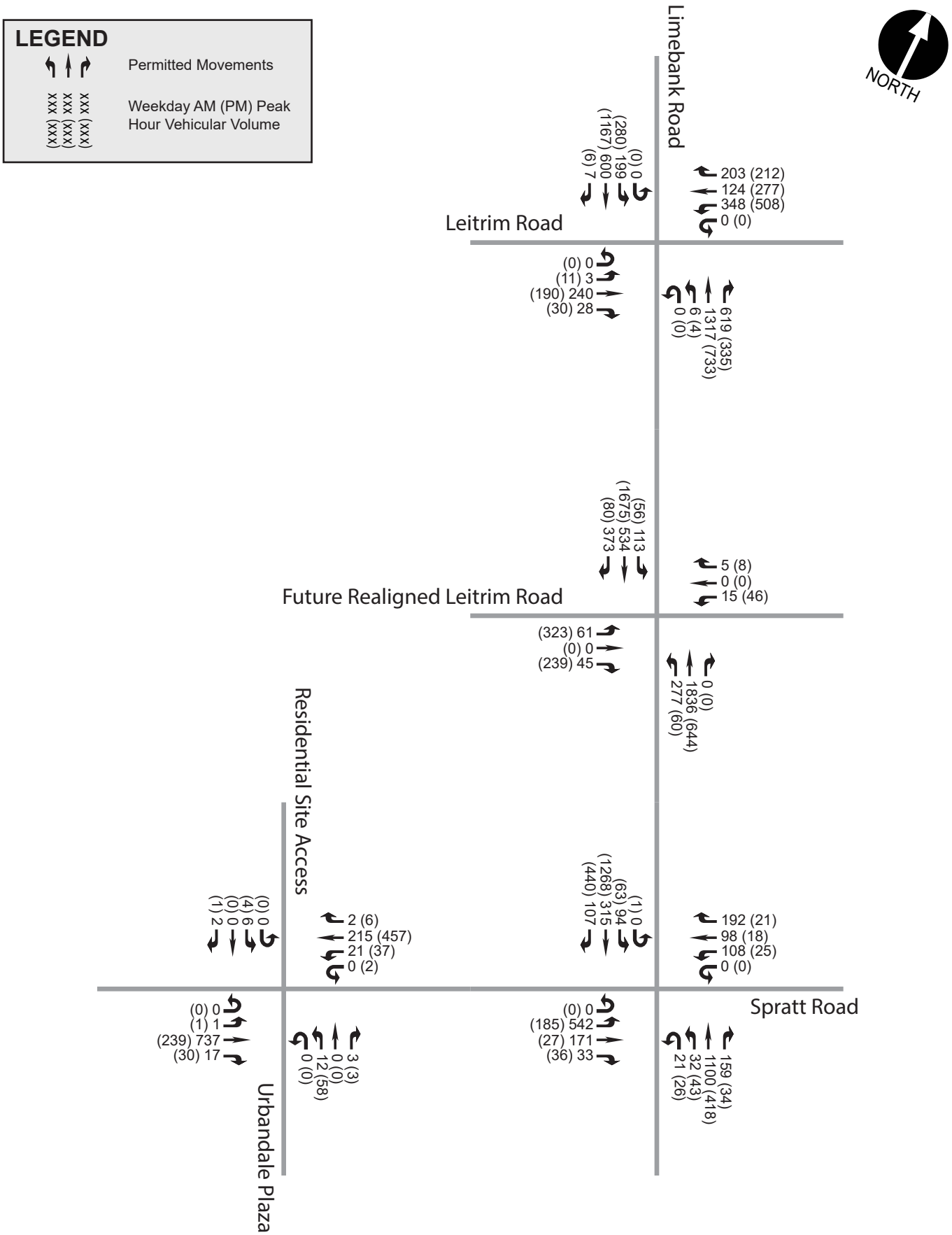



Riverside South Employment Lands & Blocks 13, 14
Transportation Impact Assessment

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

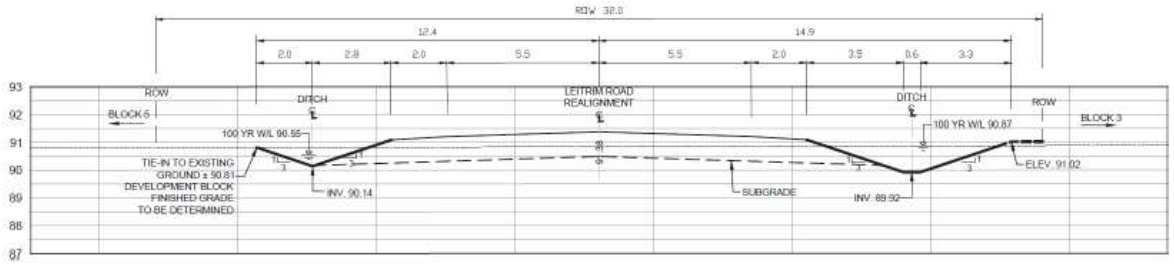
The road network within the proposed development includes the future realigned Leitrim Road as well as Street #1, Street #2, and Street #3. The alignment of the internal roadways has been designed to ensure that the on-site road network follows the form of a modified grid pattern with relatively short 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 95$^{th}$ 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<br>**Final** Meeting Notes – April 7, 2015 | File/N° de fichier:<br>PC 2014-0201<br>Part of 3700 Twin Falls Place<br>Now 4020 Spratt Road |
| From / Expéditeur | Cathlyn Kaufman<br>Development Review – Suburban - Southeast<br>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).

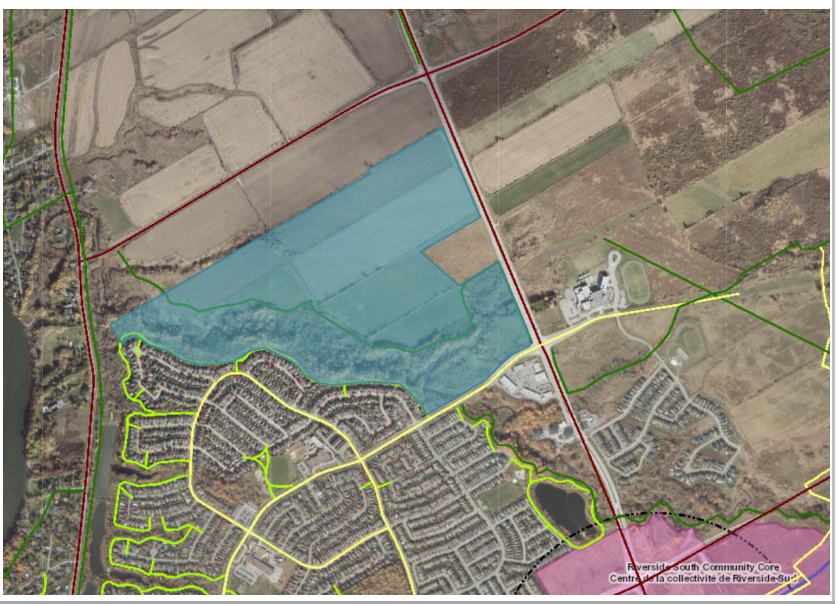
2. I have rec'd confirmation from Chris Hamilton in Drinking Water Services Division (see separate e-mail) that the existing 350 HDPE pipe in Spratt Rd will remain in service and this project must connect to the 350 pipe in Spratt Rd.

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

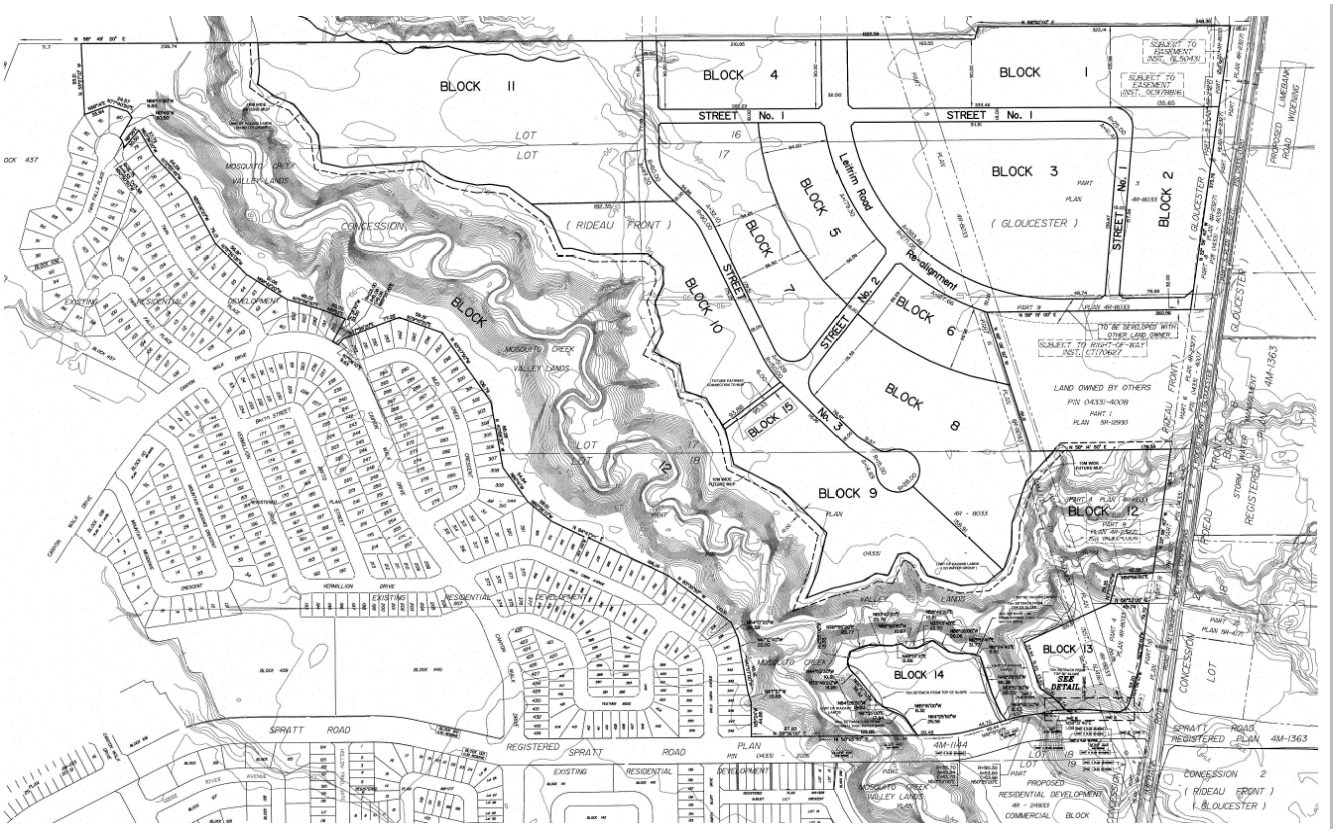
# Appendix B – Screening Form

# 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.<br>  |
| 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.**

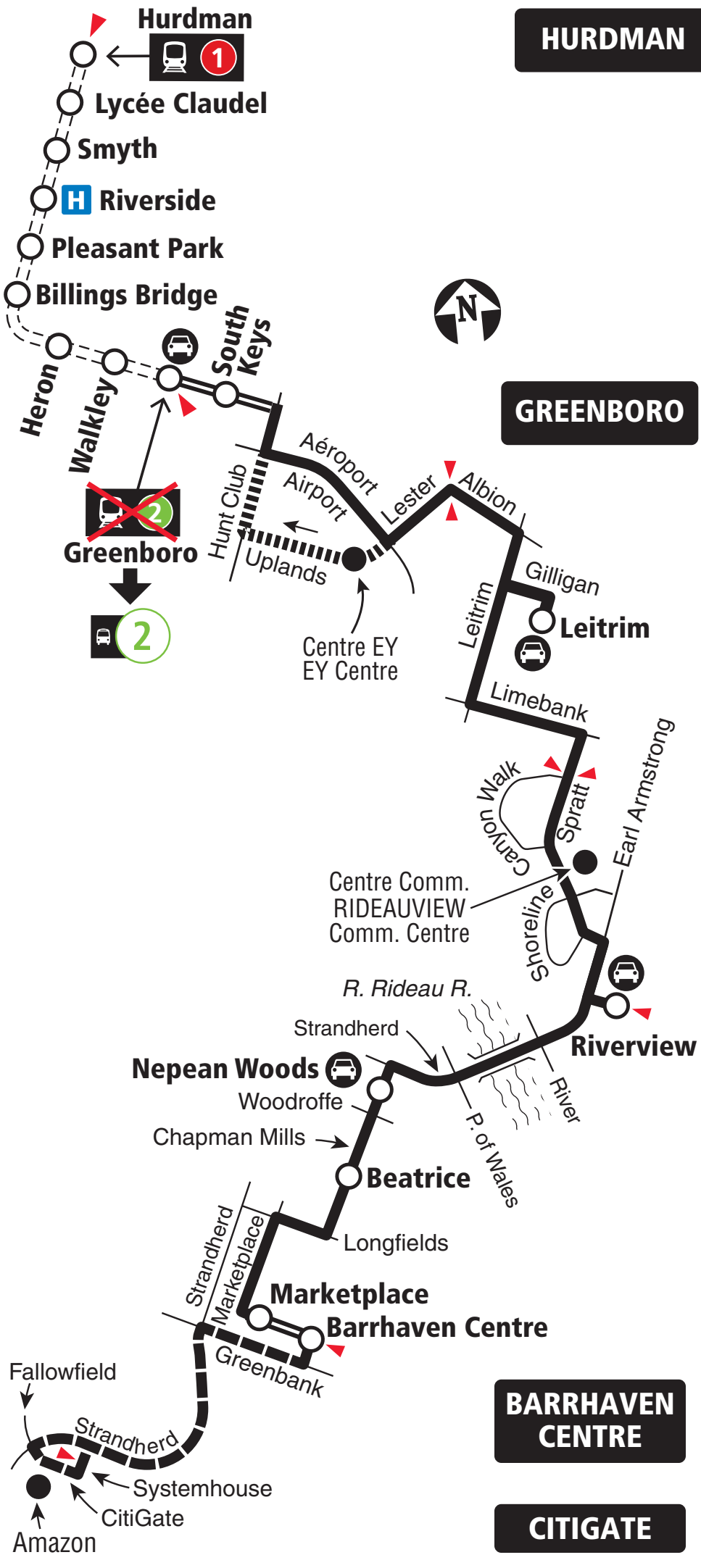
# Appendix C – OC Transpo Routes

# 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**

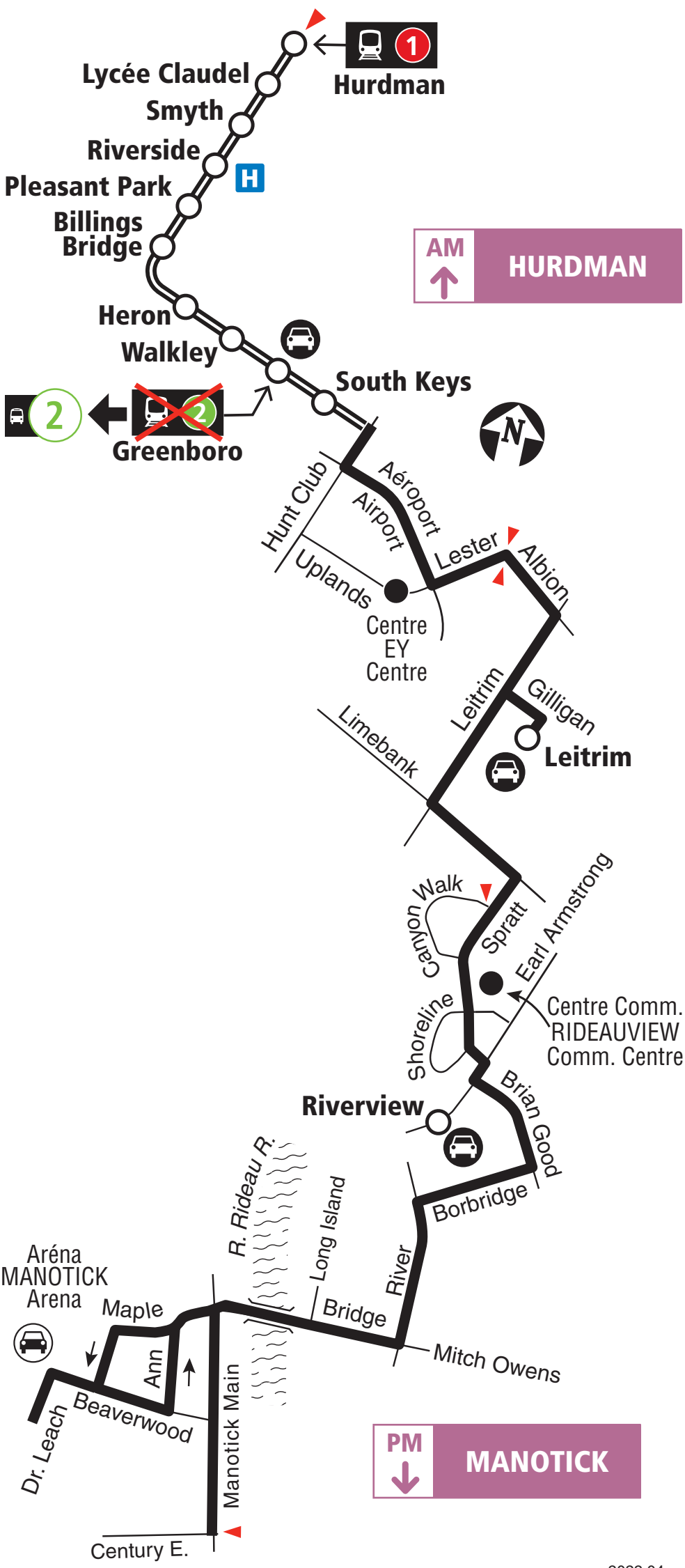
# 299 MANOTICK / HURDMAN

## 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**

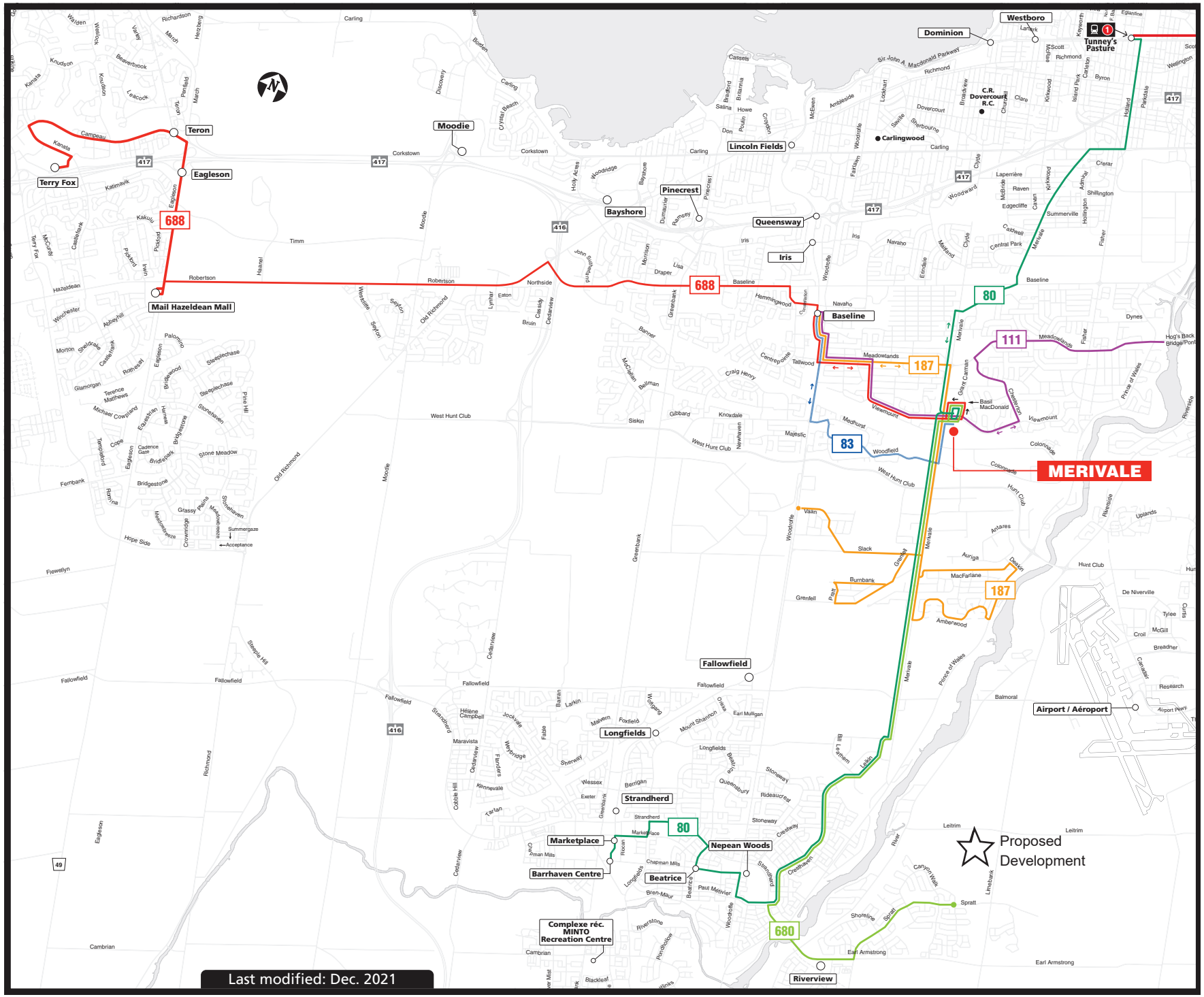
Security / Sécurité ..... **613-741-2478**

**Effective April 24, 2022**

**En vigueur 24 avril 2022**

OC Transpo

**INFO 613-560-5000**
**octranspo.com**


Teron
Terry Fox
Eagleson
688
Mail Hazeldean Mall
Moodie
Bayshore
Pinecrest
Lincoln Fields
Queensway
Iris
Baseline
Navaho
Dominion
Westboro
Tunney's Pasture
C.R. Dovercourt R.C.
Carlingwood
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

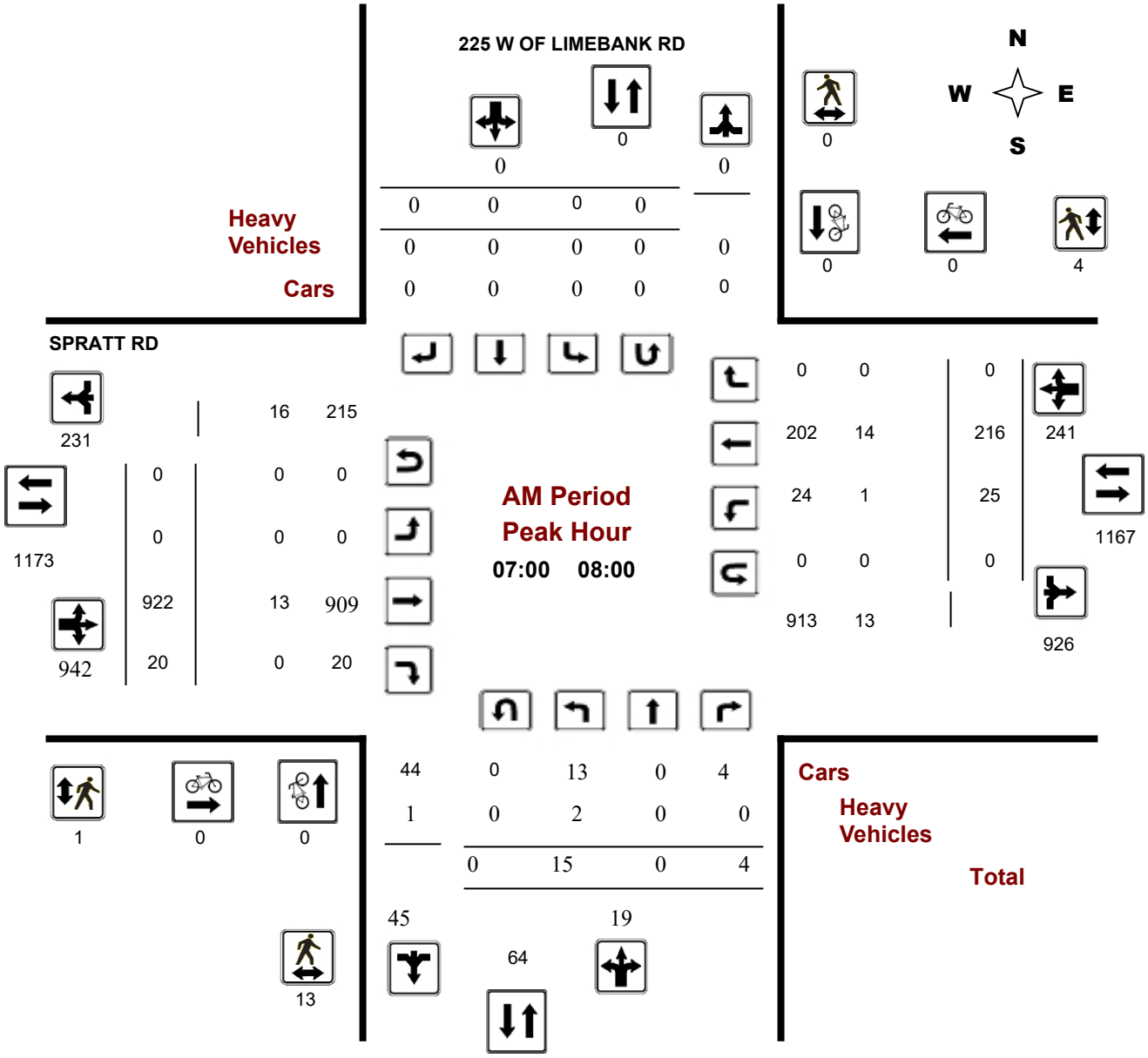
# Transportation Services - Traffic Services

## 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**

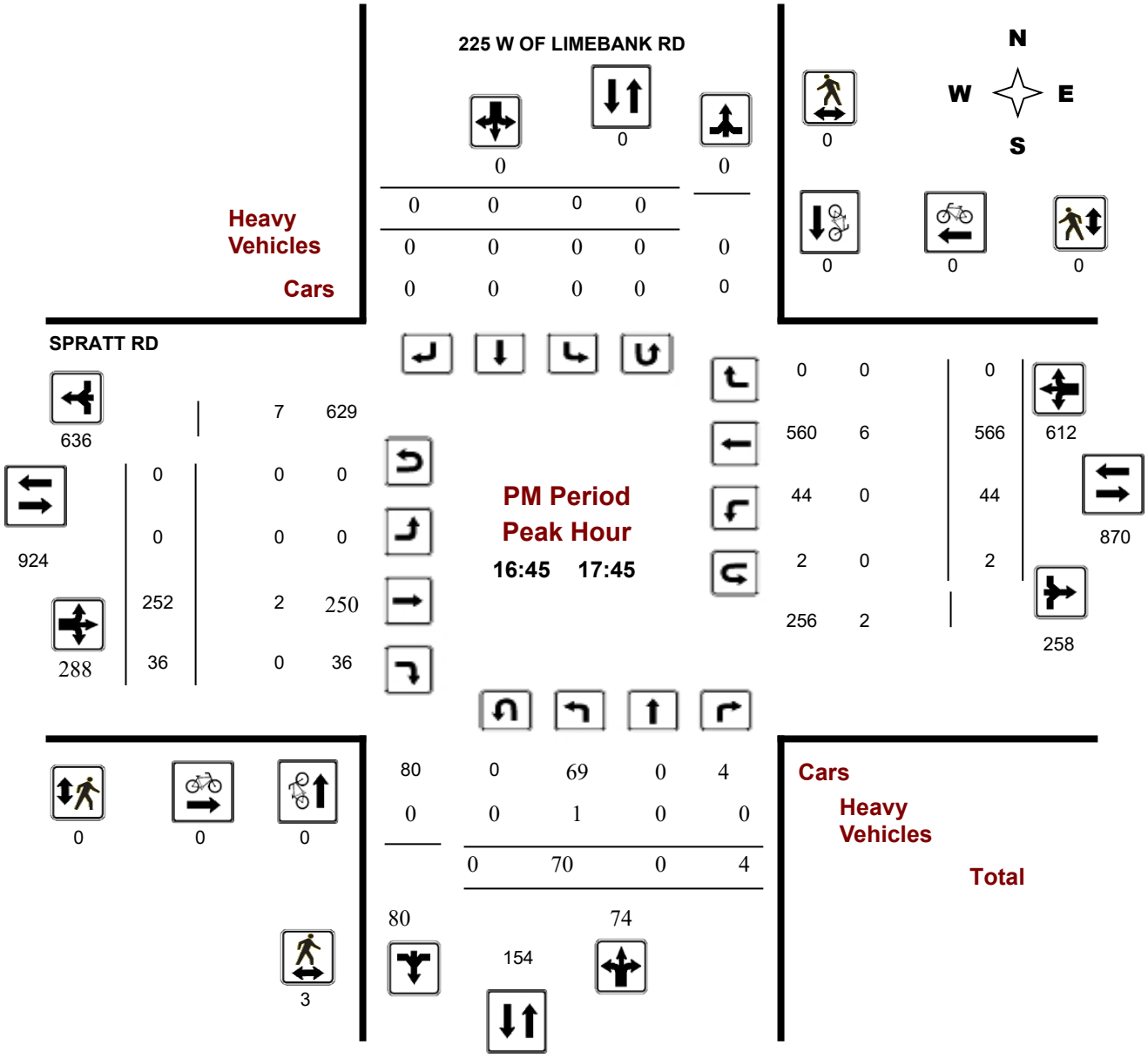
# Transportation Services - Traffic Services

## 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**

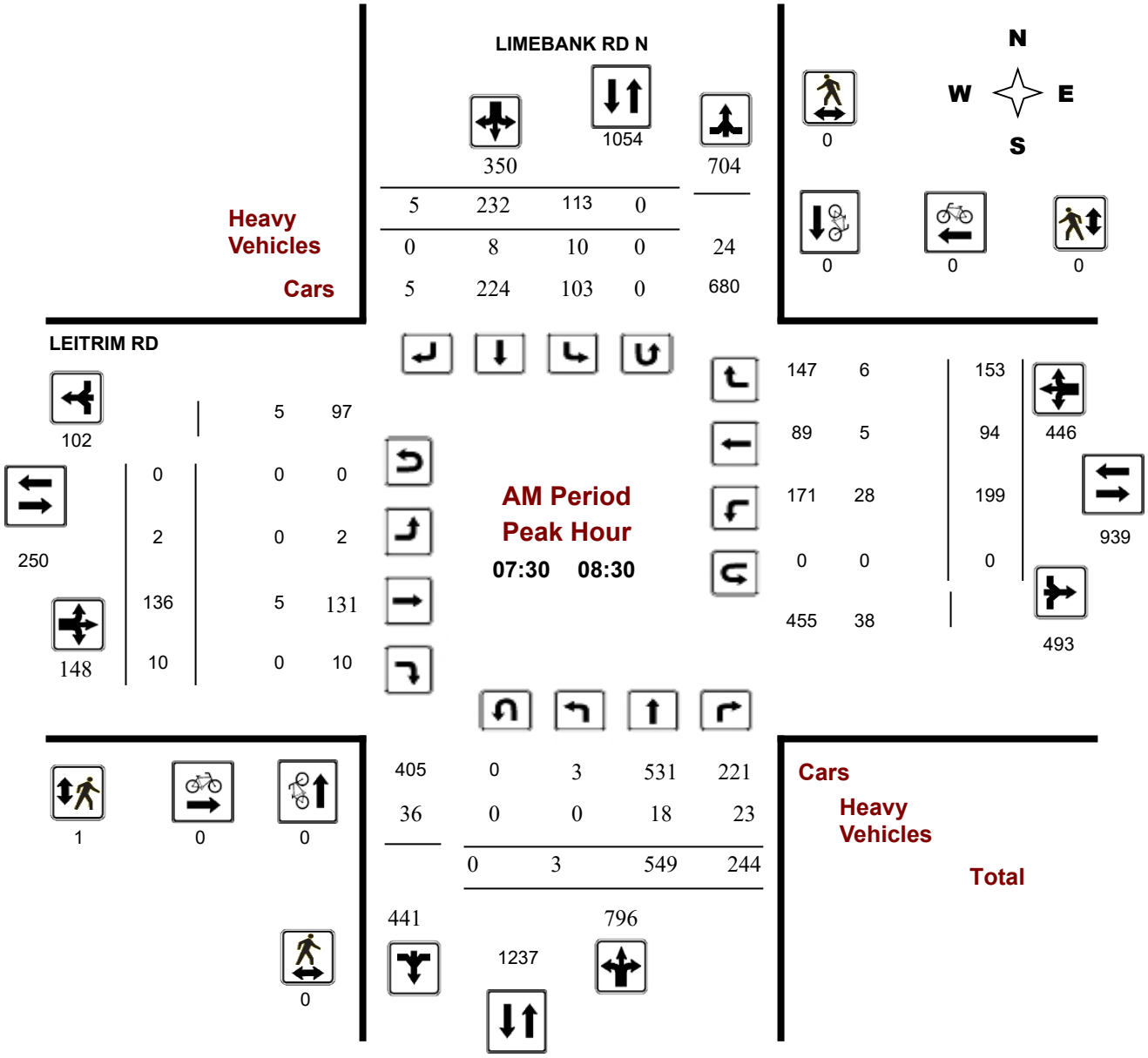
# Transportation Services - Traffic Services

## 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**

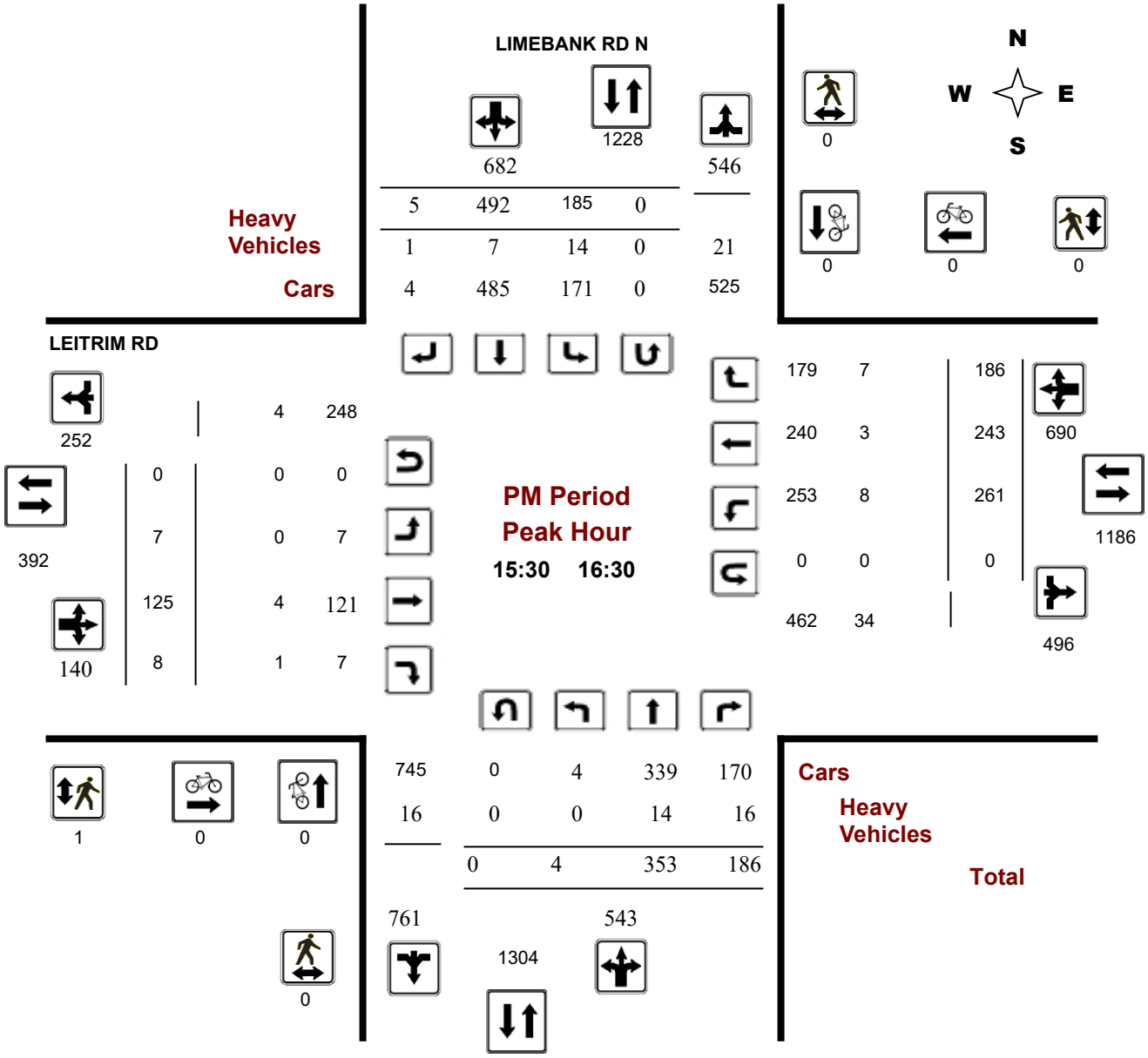
# Transportation Services - Traffic Services

## 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**

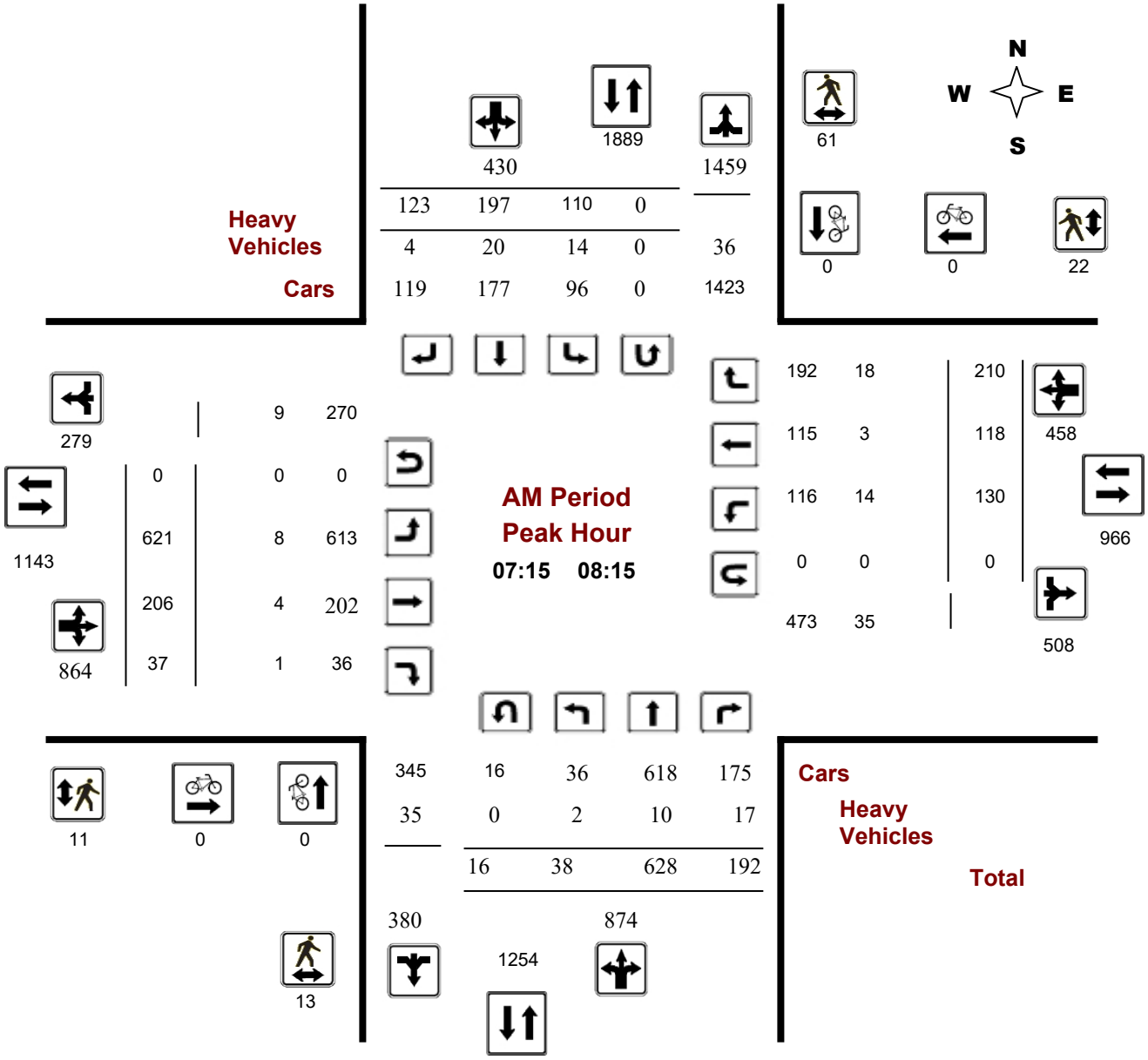
# Transportation Services - Traffic Services

## 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

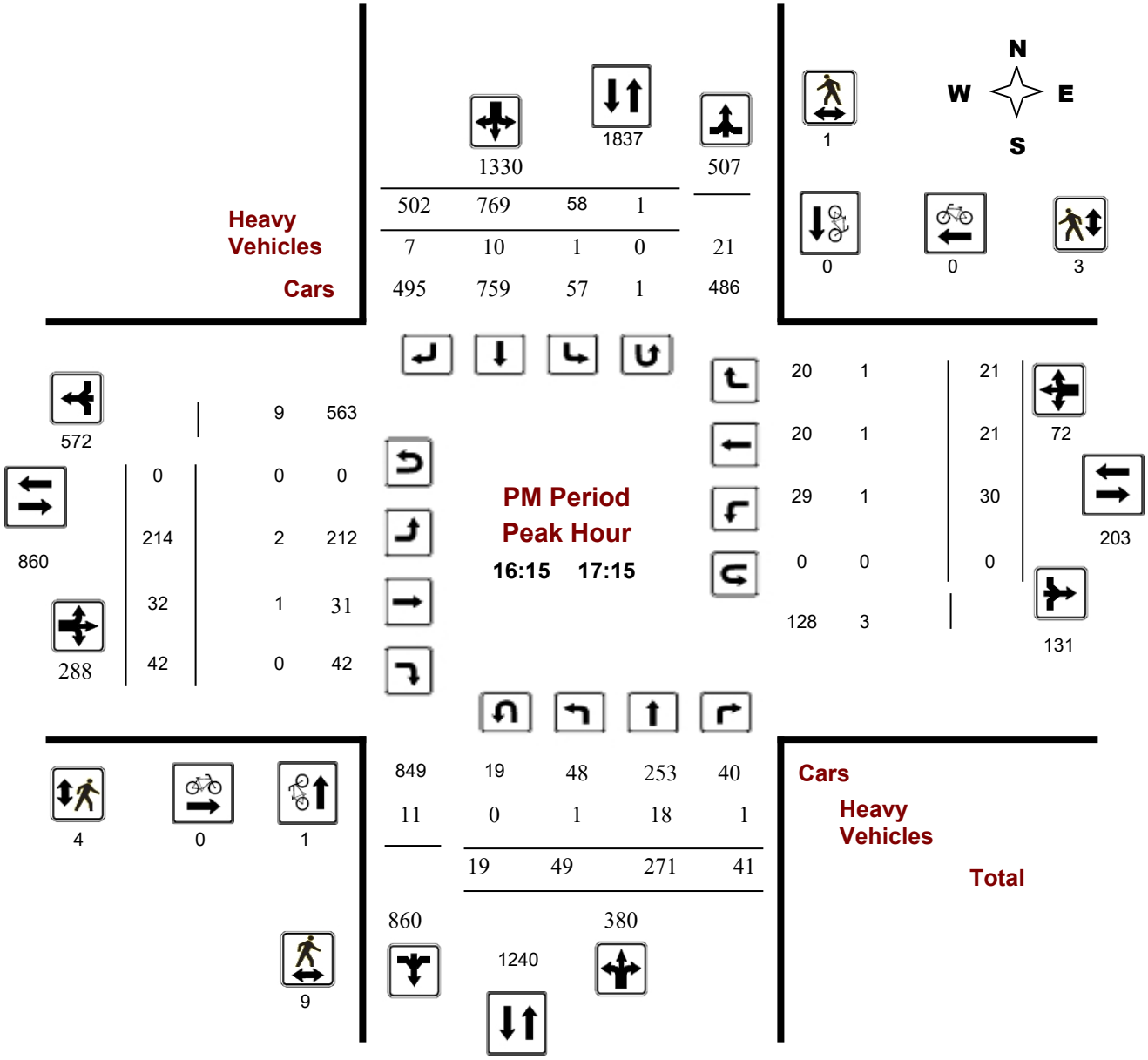
# Transportation Services - Traffic Services

## 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

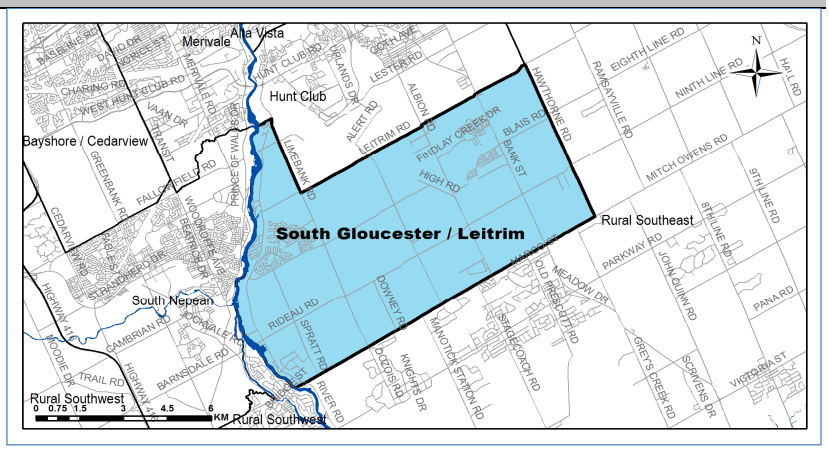
# South Gloucester / Leitrim

## 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 |



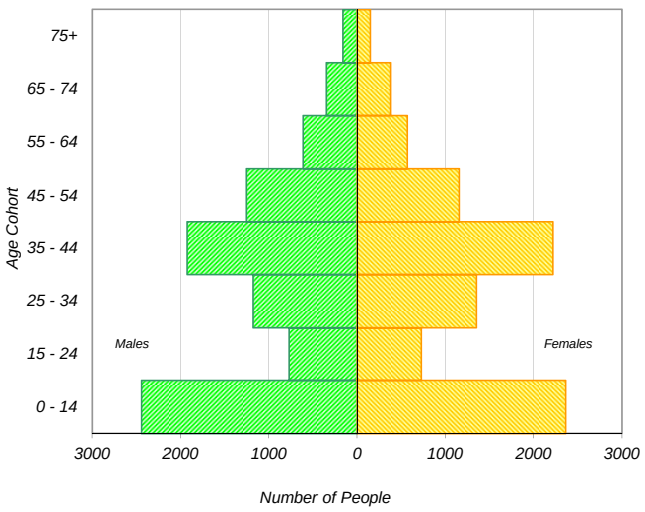

| Household Size | | |
|---|---|---|
| 1 person | 880 | 14% |
| 2 persons | 1,870 | 30% |
| 3 persons | 1,170 | 19% |
| 4 persons | 1,630 | 26% |
| 5+ persons | 690 | 11% |
| Total: | 6,240 | 100% |

| 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% |

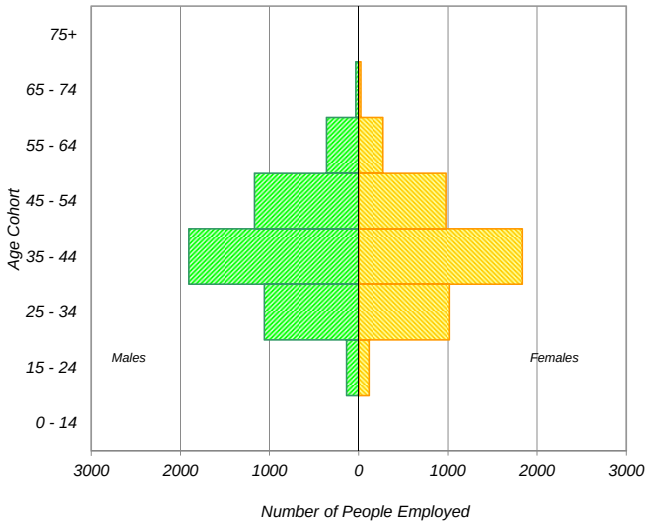
| Selected Indicators | |
|---|---|
| Daily Trips per Person (age 5+) | 2.87 |
| Vehicles per Person | 0.63 |
| Number of Persons per Household | 2.82 |
| Daily Trips per Household | 7.25 |
| Vehicles per Household | 1.78 |
| Workers per Household | 1.43 |
| Population Density (Pop/km2) | 220 |

| 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*

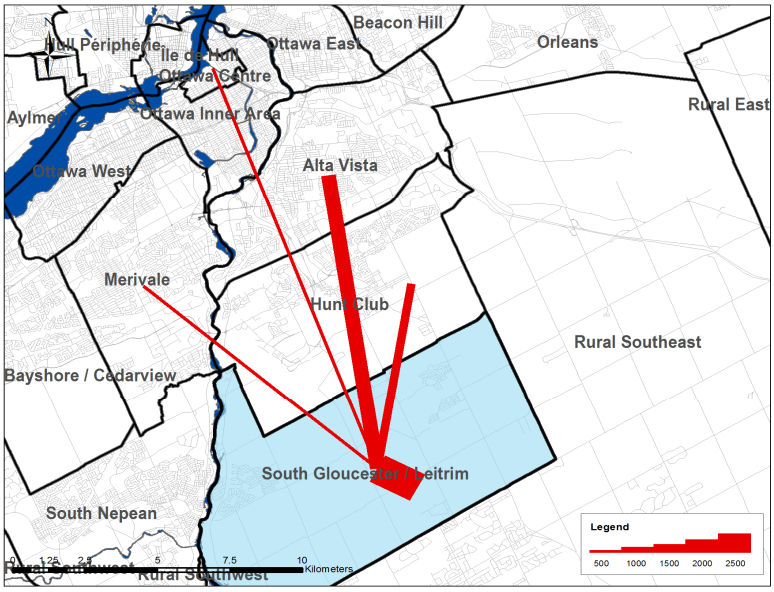



* In 2005 data was only collected for household members aged 11+ therefore these results cannot be compared to the 2011 data.

## 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% |

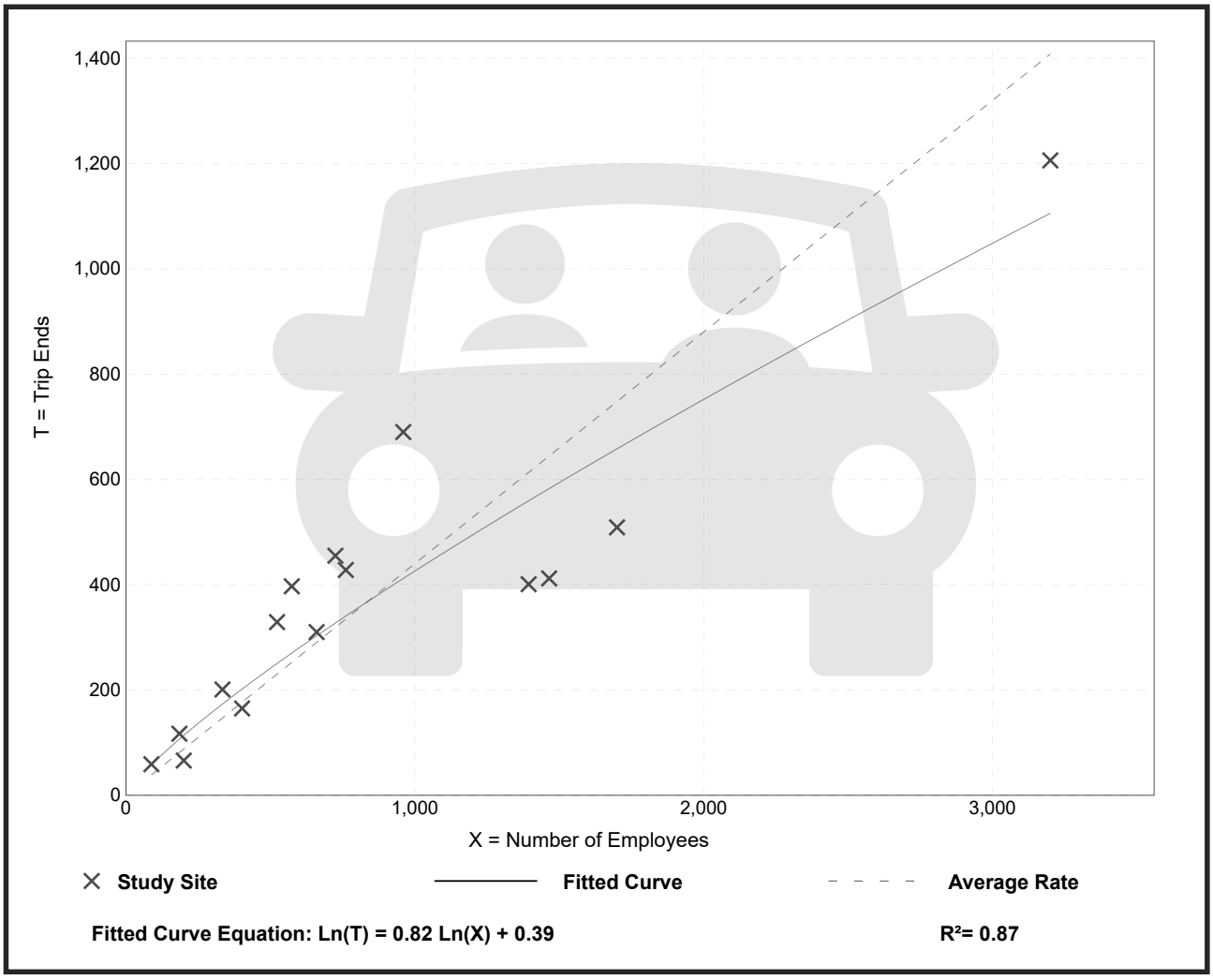
# Industrial Park
(130)

**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

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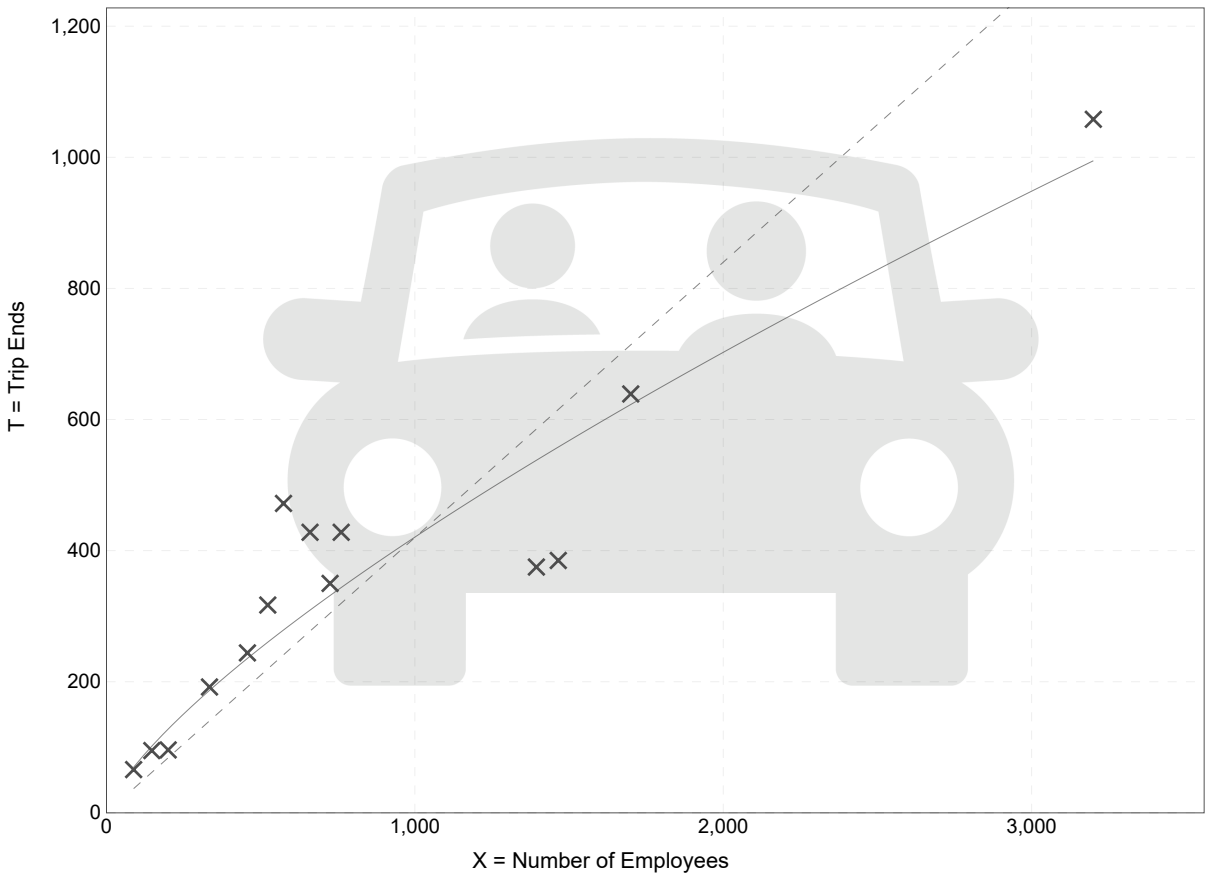
# Industrial Park
(130)

**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

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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<br>Boulevard Width | - | ≥ 2 m<br>0.5 - 2 m | | |
| | Avg Daily Curb Lane Traffic Volume | | ≤ 3000 | | |
| | Operating Speed<br>On-Street Parking | | > 60 km/h<br>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<br>Boulevard Width | - | ≥ 2 m<br>0.5 - 2 m | ≥ 2 m<br>> 2 m | |
| | Avg Daily Curb Lane Traffic Volume | | ≤ 3000 | ≤ 3000 | |
| | Operating Speed<br>On-Street Parking | | > 60 km/h<br>no | > 60 km/h<br>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<br>Boulevard Width | **-** | no sidewalk<br>n/a | | |
| | Avg Daily Curb Lane Traffic Volume | | > 3000 | | |
| | Operating Speed<br>On-Street Parking | | > 60 km/h<br>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<br>100% | 1249<br>100% | 1249<br>100% | 1249<br>100% | 2424<br>100% | 1212<br>100% | 1212<br>100% | 1212<br>100% | 100% |
| B. Vehicle volume along minor roads | 120 | 170 | **216** | 306 | 20<br>9% | 10<br>5% | 10<br>5% | 10<br>5% | 54<br>25% | 27<br>12% | 27<br>12% | 27<br>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<br>100% | 1239<br>100% | 1239<br>100% | 1239<br>100% | 2371<br>100% | 1185<br>100% | 1185<br>100% | 1185<br>100% | 100% |
| B. Combined vehicle and pedestrian volume crossing artery from minor roads | 50 | 70 | **60** | 84 | 15<br>25% | 7<br>12% | 7<br>12% | 7<br>12% | 46<br>77% | 23<br>38% | 23<br>38% | 23<br>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 | |

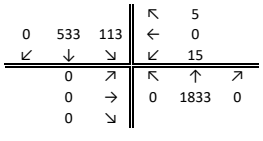
## Justification 7 - Projected Volumes

| 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% | |

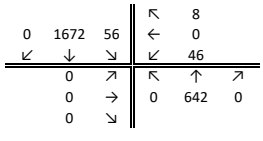
**Projected Traffic Volumes:**

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

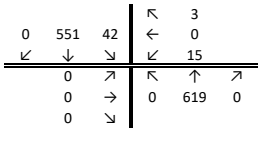
AM Peak Hour Volumes




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<br>100% | 1630<br>100% | 1630<br>100% | 1630<br>100% | 3132<br>100% | 1566<br>100% | 1566<br>100% | 1566<br>100% | 100% |
| B. Vehicle volume along minor roads | 120 | 170 | **144** | 204 | 126<br>87% | 63<br>44% | 63<br>44% | 63<br>44% | 616<br>100% | 308<br>100% | 308<br>100% | 308<br>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<br>100% | 1567<br>100% | 1567<br>100% | 1567<br>100% | 2516<br>100% | 1258<br>100% | 1258<br>100% | 1258<br>100% | 100% |
| B. Combined vehicle and pedestrian volume crossing artery from minor roads | 50 | 70 | **60** | 84 | 196<br>100% | 42<br>70% | 42<br>70% | 42<br>70% | 415<br>100% | 207<br>100% | 207<br>100% | 207<br>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 | 534 | 113 | 5 | 0 | 15 |
| ↙ | ↓ | ↘ | | | |
| | 70 | ↗ | ↖ | ↑ | ↗ |
| | 0 | → | 224 | 1836 | 0 |
| | 36 | ↘ | | | |

PM Peak Hour Volumes

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

Average Hourly Volumes (AHV)

| | | | | | |
|---|---|---|---|---|---|
| | | | ↖ | ← | ↙ |
| 130 | 552 | 42 | 3 | 0 | 15 |
| ↙ | ↓ | ↘ | | | |
| | 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:<br>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?<br>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?<br>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

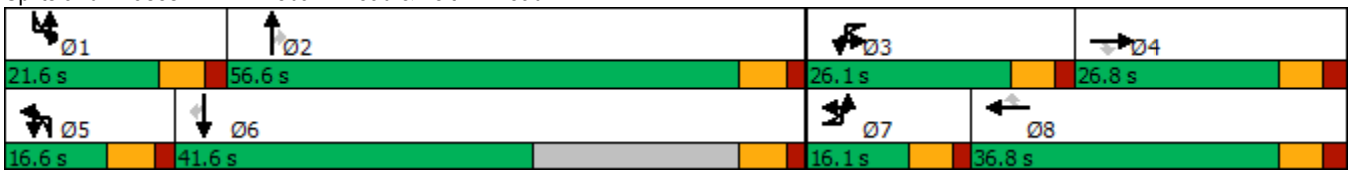
# Existing (2022) Traffic

| 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



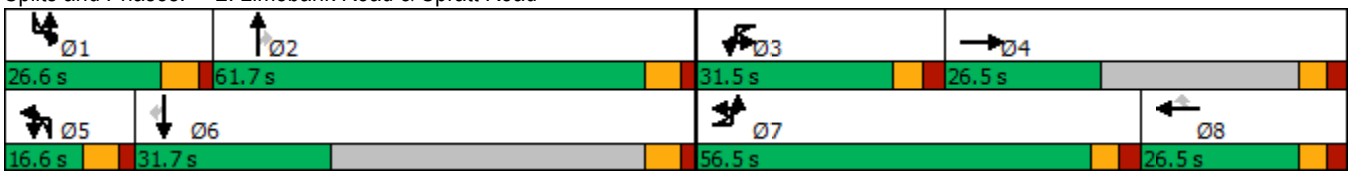
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBU | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 621 | 206 | 37 | 130 | 118 | 210 | 18 | 38 | 713 | 192 | 110 | 224 |
| Future Volume (vph) | 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 | | | |

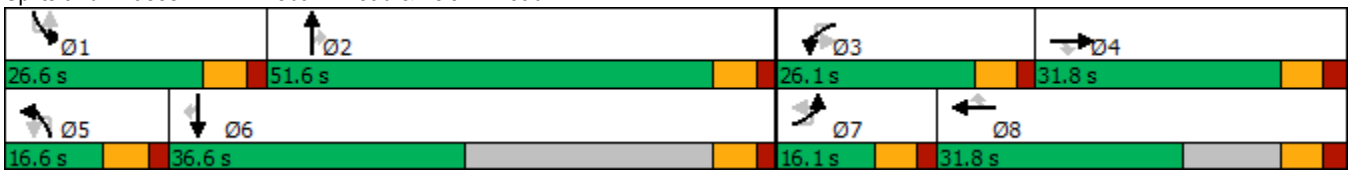
Splits and Phases: 3: Urbandale Plaza & Spratt Road

| 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



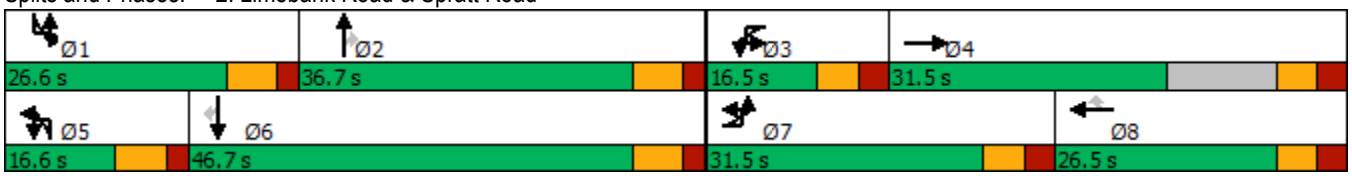
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBU | NBL | NBT | NBR | SBU | SBL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 214 | 32 | 42 | 30 | 21 | 21 | 22 | 49 | 308 | 41 | 1 | 58 |
| Future Volume (vph) | 214 | 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

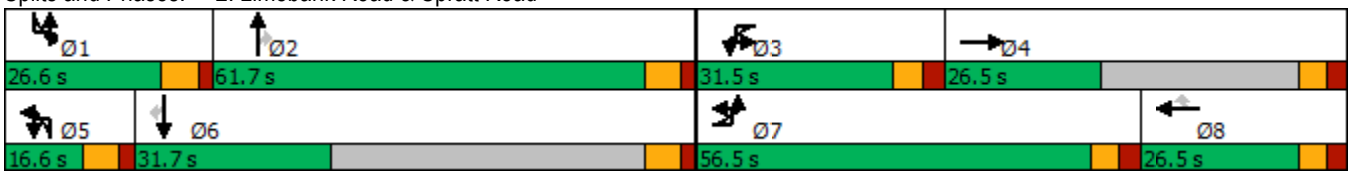
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBU | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 515 | 171 | 31 | 108 | 98 | 174 | 21 | 32 | 864 | 159 | 91 | 276 |
| Future Volume (vph) | 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 |

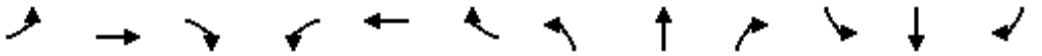
| Intersection Summary |
|---|

| 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

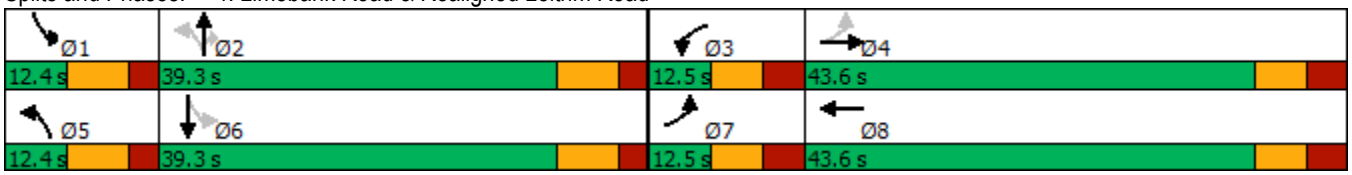


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 0 | 0 | 0 | 15 | 0 | 5 | 0 | 1833 | 0 | 113 | 533 | 0 |
| Future Volume (vph) | 0 | 0 | 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

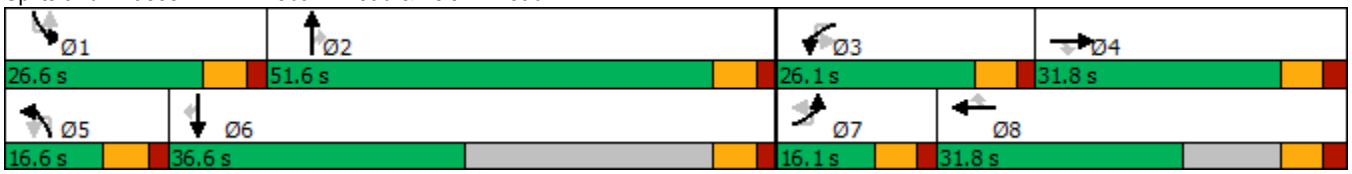


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 11 | 190 | 30 | 484 | 277 | 212 | 4 | 501 | 242 | 280 | 1108 | 6 |
| Future Volume (vph) | 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 |

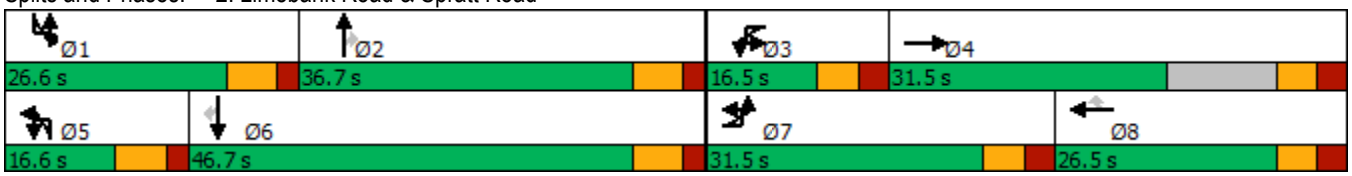
| Lane Group | SBT | SBR |
|---|---|---|
| Lane Configurations | | |
| Traffic Volume (vph) | 1064 | 417 |
| Future Volume (vph) | 1064 | 417 |
| Ideal Flow (vphpl) | 1800 | 1800 |
| Storage Length (m) | | 230.0 |
| Storage Lanes | | 1 |
| Taper Length (m) | | |
| Lane Util. Factor | 0.95 | 1.00 |
| 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 |

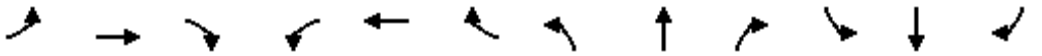
Intersection Summary

| 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

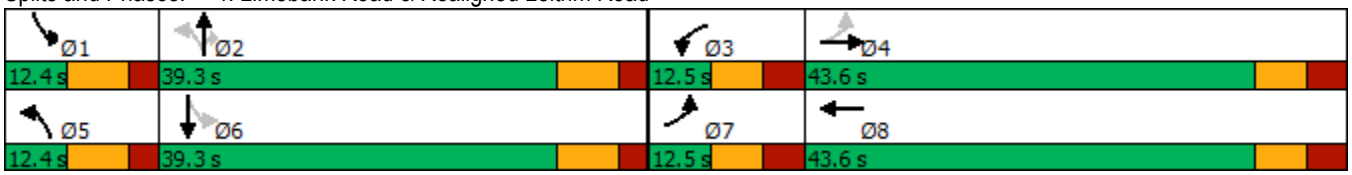


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 0 | 0 | 0 | 46 | 0 | 8 | 0 | 642 | 0 | 56 | 1672 | 0 |
| Future Volume (vph) | 0 | 0 | 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



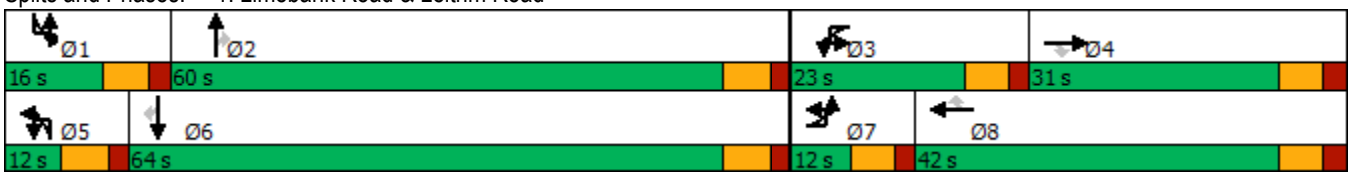
# Future (2031) Total Traffic

| 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



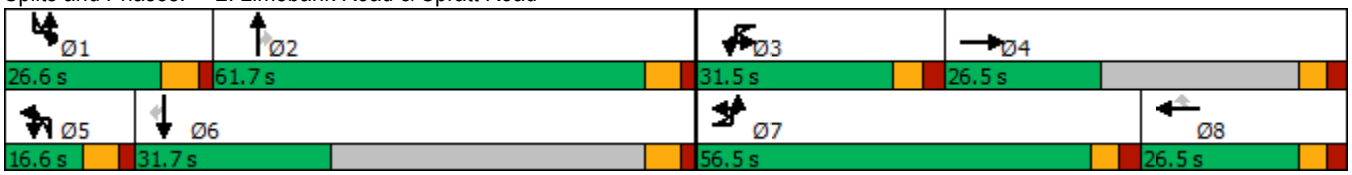
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBU | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 542 | 171 | 33 | 108 | 98 | 192 | 21 | 32 | 1100 | 159 | 94 | 315 |
| Future Volume (vph) | 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 |

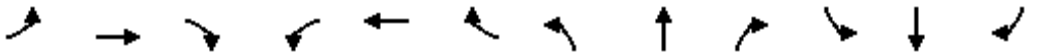
| Intersection Summary | | | |
|---|---|---|---|
| Area Type: | Other | | |
| Cycle Length: 171.3 | | | |
| Actuated Cycle Length: 126.7 | | | |
| Natural Cycle: 120 | | | |
| Control Type: Actuated-Uncoordinated | | | |
| Maximum v/c Ratio: 0.79 | | | |
| Intersection Signal Delay: 38.5 | | Intersection 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. | | | |

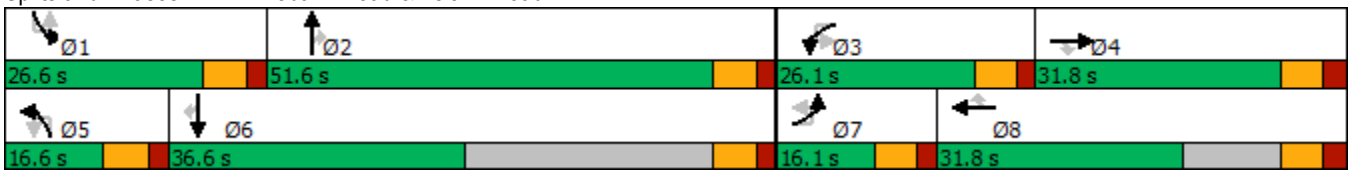
Splits and Phases: 4: Limebank Road & Realigned Leitrim Road

| 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 |

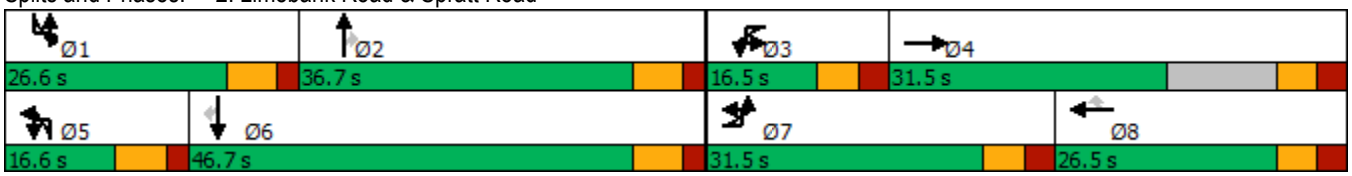
| Lane Group | SBT | SBR |
|---|---|---|
| Lane Configurations | | |
| Traffic Volume (vph) | 1268 | 440 |
| Future Volume (vph) | 1268 | 440 |
| Ideal Flow (vphpl) | 1800 | 1800 |
| Storage Length (m) | | 230.0 |
| Storage Lanes | | 1 |
| Taper Length (m) | | |
| Lane Util. Factor | 0.95 | 1.00 |
| 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 |

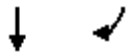
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBU | NBL | NBT | NBR | SBU | SBL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| v/c Ratio | 0.42 | 0.11 | | 0.10 | 0.05 | 0.05 | | 0.24 | 0.27 | 0.04 | | 0.23 |
| Control Delay | 40.3 | 18.4 | | 43.0 | 39.6 | 0.2 | | 42.7 | 16.7 | 0.1 | | 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 | |

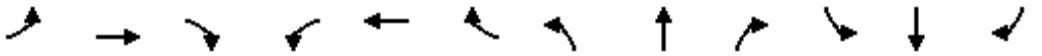
| Intersection Summary | | | |
|---|---|---|---|
| Area Type: | Other | | |
| Cycle Length: 130 | | | |
| Actuated Cycle Length: 99 | | | |
| Natural Cycle: 120 | | | |
| Control Type: Actuated-Uncoordinated | | | |
| Maximum v/c Ratio: 1.16 | | | |
| Intersection Signal Delay: 42.3 | | Intersection 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

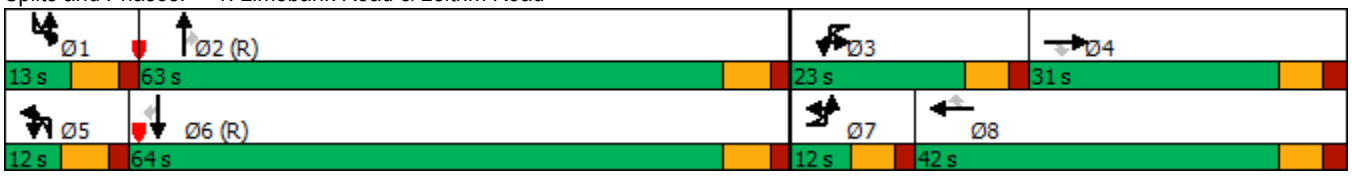
# Future (2031) Total Traffic (Coordinated)

| 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



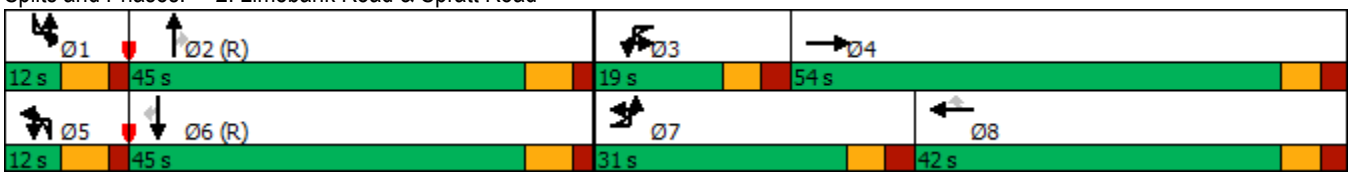
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBU | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 542 | 171 | 33 | 108 | 98 | 192 | 21 | 32 | 1100 | 159 | 94 | 315 |
| Future Volume (vph) | 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 |

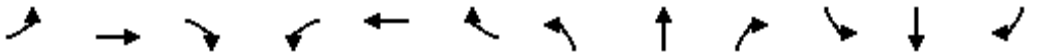
| Intersection Summary | | | |
|---|---|---|---|
| Area Type: | Other | | |
| Cycle Length: 130 | | | |
| Actuated Cycle Length: 130 | | | |
| Offset: 88 (68%), Referenced to phase 2:NBT and 6:SBT, Start of Green | | | |
| Natural Cycle: 120 | | | |
| Control Type: Actuated-Coordinated | | | |
| Maximum 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.

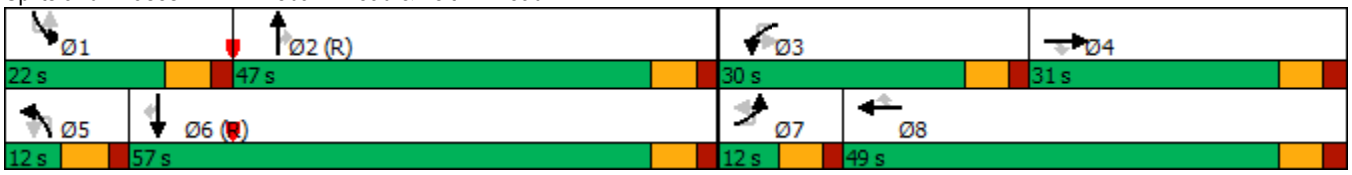
Splits and Phases: 4: Limebank Road & Realigned Leitrim Road

| 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 |

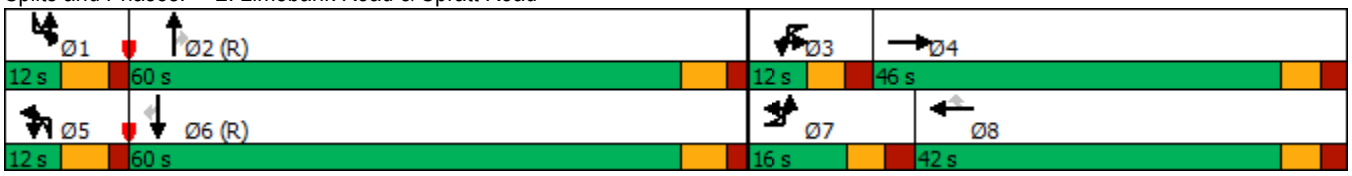
| Lane Group | SBT | SBR |
|---|---|---|
| Lane Configurations | | |
| Traffic Volume (vph) | 1268 | 440 |
| Future Volume (vph) | 1268 | 440 |
| Ideal Flow (vphpl) | 1800 | 1800 |
| Storage Length (m) | | 230.0 |
| Storage Lanes | | 1 |
| Taper Length (m) | | |
| Lane Util. Factor | 0.95 | 1.00 |
| 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 |

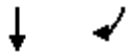
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBU | NBL | NBT | NBR | SBU | SBL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| v/c Ratio | 0.67 | 0.18 | | 0.17 | 0.07 | 0.09 | | 0.34 | 0.20 | 0.03 | | 0.32 |
| Control Delay | 69.9 | 28.1 | | 62.3 | 56.5 | 0.7 | | 62.3 | 11.5 | 0.1 | | 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