AMENDMENT NUMBER 53

TO THE

OFFICIAL PLAN

OF THE

TOWNSHIP OF WEST LINCOLN

AMENDMENT NUMBER 53

TO THE

OFFICIAL PLAN

OF THE

TOWNSHIP OF WEST LINCOLN

AS AMENDED

PART 1 – THE PREAMBLE

1.1 TITLE

This Amendment when adopted by Council shall be known as Amendment Number 53 to the Official Plan of the Township of West Lincoln.

1.2 COMPONENTS

This Amendment consists of the explanatory text and the attached Schedule 'A'. The preamble does not constitute part of the actual amendment, but is included as background information.

1.3 PURPOSE

The purpose of this Amendment is to provide the best and most efficient use for the former St. Martin's School Site, located at 186 Margaret Street and the adjacent Township Owned Parcel.

1.4 BASIS OF THE AMENDMENT

The Township of West Lincoln is proposing to amend the Official Plan to re-designate the subject lands and provide for a site specific policy to permit for a maximum height of 6 storeys on the Township Owned Parcel.

PART 2 – THE AMENDMENT

2.1 PREAMBLE

All of this part of the document entitled PART 2 – THE AMENDMENT, consisting of the following text changes constitutes Amendment No. 53 to the Official Plan of the Township of West Lincoln.

2.2 DETAILS OF THE AMENDMENT

2.2.1 The text of the Township of West Lincoln Official Plan is hereby amended by adding in Section 6.11 Site Specific Policy Provisions, and renumbering the following sections accordingly, as follows:

6.11 Site Specific Policy Provisions

6.11.2 Township Owned Parcel

a) Building heights shall not exceed 6 storeys.

2.3 SCHEDULES OF THIS AMENDMENT

Schedule “A” of this amendment illustrates the location of this amendment.

Schedule “B” of this amendment includes the work done for this amendment such as the staff report, consultants reports, consultants power point and the transportation assessment.

2.4 IMPLEMENTATION

This amendment will be required to be adopted by Township Council and forwarded to Regional Council for approval. This amendment will be implemented through notification of the Regional Clerk’s department of decision to approve.

Should the final approval be delegated to the Township, this amendment will be implemented through notification of the Township Clerk’s department of decision to approve.

If no appeals are received within the appeal period, the amendment will be in full force and effect.

AMENDMENT NUMBER 53

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AS AMENDED

Official Plan Amendment Number 53 was adopted by the Council of the Corporation of the Township of West Lincoln by By-law No. 2020-XX in accordance with the provisions of Section 17 (22) of The Planning Act, R.S.O. 1990, amendments made thereto on the XX day of XX, 2020

_____ _____

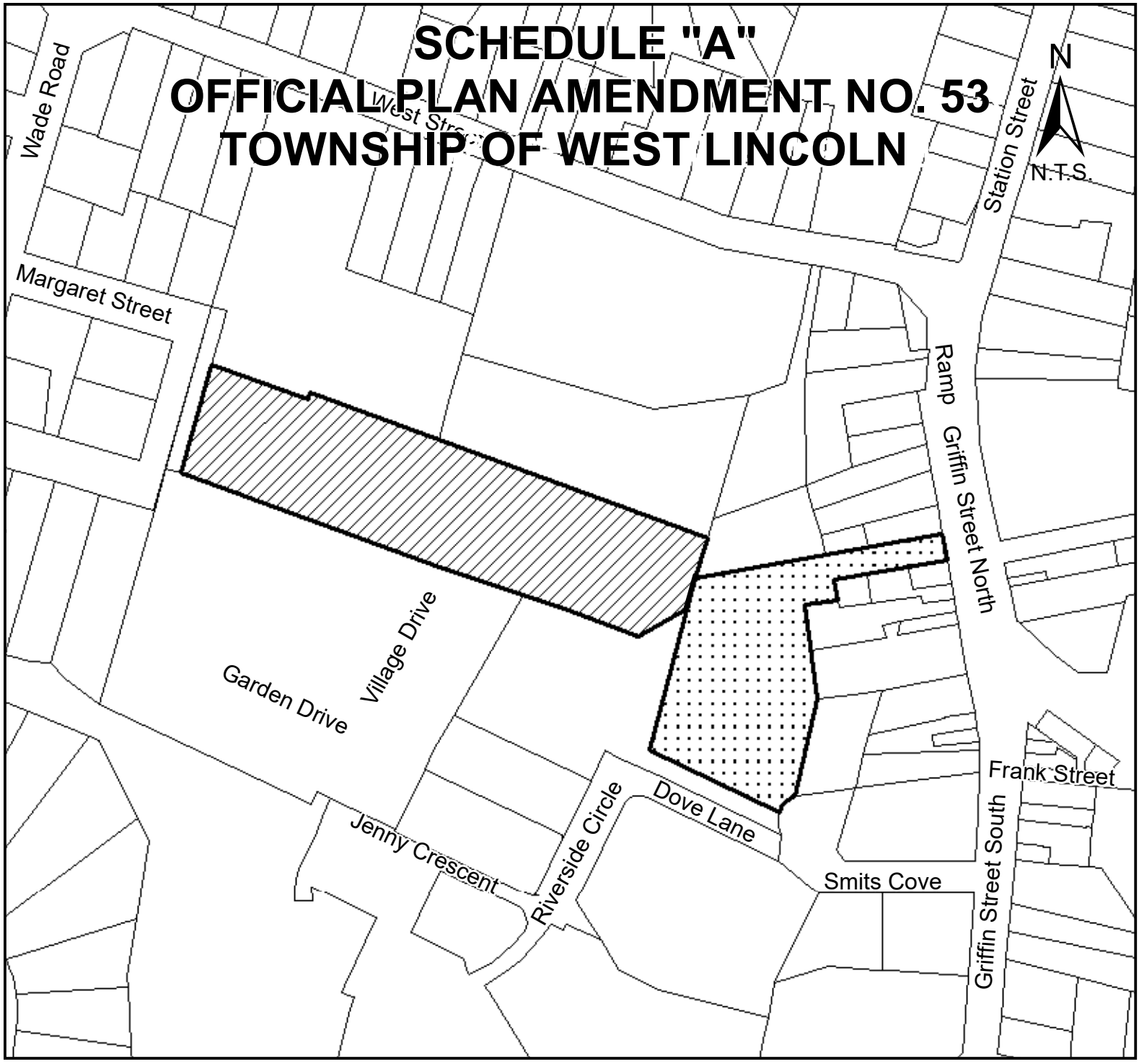
Joanne Scime, Clerk Mayor Dave Bylsma

I, Joanne Scime, the Clerk of the Corporation of the Township of West Lincoln, hereby certify that the requirements for the giving of Notice, and the holding of at least one Public Meeting as set out in Section 17(22) of the Planning Act, R.S.O. 1990 have been complied with for Official Plan Amendment Number 53.

_____

Joanne Scime, Clerk

SCHEDULE "A"
OFFICIAL PLAN AMENDMENT NO. 53
TOWNSHIP OF WEST LINCOLN



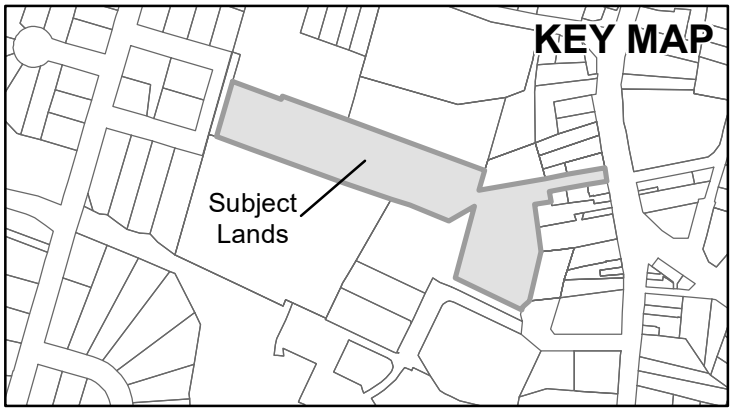
Legend

Property Lines

Designation Changes

Institutional to High Density Residential

High Density Residential to High Density Residential with Special Policy 6.11.2



This is Schedule 'A' to OPA #53 (As implemented by By-law 2020-___ passed on this 27th day of July, 2020).

X:\wl-GIS\6. OFFICIAL PLAN MAPPING\OPA Schedule Maps\OPA XX - St. Martins\OPA 53 - St. Martins SP.mxd ***July 2020***

Schedule "B" to
Official Plan Amendment No. 53
Township of West Lincoln

West Lincoln
Your Future Naturally

REPORT

TOWNSHIP
PLANNING/BUILDING/ENVIRONMENTAL
COMMITTEE

DATE: February 10th, 2020

REPORT NO: PD-033-20

SUBJECT: **Information Report**
Consultants Presentation for Two Former School Sites being 186 Margaret Street and 132 College Street, Smithville
Future Redevelopment and Intensification

CONTACT: Brian Treble, Director of Planning and Building

OVERVIEW:

- **On September 2nd, 2019, MHBC Planning was hired to commence land use planning work for both former school sites that are situated in proximity to the downtown core.**
- **On November 12th, 2019 a public information center/design charrette was held for each site at which time approximately 20 members of the public attended the session.**
- **Infill and Intensification within the core area of Smithville is an important part of land use planning for future growth and development of the Township of West Lincoln, urban area of Smithville.**
- **Within the Built Boundary, the limit of development as it existed on June 16th 2006 (as shown in the Township Official Plan) infill and intensification of a specific number of units at an appropriate mix and density is important, as our community matures and develops.**
- **In accordance with policy, growth onto agricultural lands (greenfield development) can only occur as a secondary growth component after infill and intensification. Detailed plans of how this should occur are being fully developed through the Master Community Plan process and these "Secondary" plan processes as well.**
- **The Master Community Plan process and issues such as infill and intensification and affordability are all being studied by our consultant teams and will be the topic of multiple future reports to Committee and Council.**
- **The consultants for our two school sites are scheduled to present their findings on February 10th, 2020. Once a supportive transportation component is received in support of these concepts, then a formal public meeting will be scheduled for a future Planning, Building, Environmental Committee Meeting (expected to be April, 2020).**

RECOMMENDATION

1. That, report PD-033-20, regarding "Information Report, Consultants Presentation for Two Former School Sites being 186 Margaret Street and 132 College Street, Smithville, Future Redevelopment and Intensification", dated February 10, 2020 be received for INFORMATION PURPOSES.

ALIGNMENT TO STRATEGIC PLAN

- Theme
    - Strategic, Responsible Growth

BACKGROUND

In 2019, Township planning staff along with Committee and Council had previously agreed to lead a planning process for the school site's located at 186 Margaret Street and 123 College Street. The Township is nearing the completion of this land use planning process for each of these sites with the help of a consulting team.

In order to ensure that this occurs, Township Council passed an interim control by-law (By-law 2019-57) on June 24th, 2019. Prior to repeal (or expiry) of the interim control by-law, an official plan amendment and rezoning is required in order to implement new land use plans and permit future development of each site.

CURRENT SITUATION

As outlined above, new land use designations and zonings should be approved to replace the current institutional designation and zoning that exists on both of the subject school sites. Our planning consultants are now nearing the completion of their planning review. We are also currently preparing for a future public meeting process.

A number of principals have to be considered as part of the planning exercise for these properties.

- Infill and Intensification must achieve a minimum number of units per hectare at appropriate densities to suit the community (policy 2.2.2).
- A minimum percent of all new development must occur within the built boundary in order to meet provincial standards. Our target was 15% under the 2031 growth targets. The 2041 target will be set as part of the current Municipal Community Planning process (policy 4.C).
- Growth beyond the current urban boundary can only occur once infill and intensification plans are determined (policy 4.D).
- Development on vacant lots is most likely to be the cheapest development which can generally take advantage of existing sewage, water and transportation services (policy 4.C).

This report includes the consultant's report for each school property for information purposes in advance of a required public meeting.

FINANCIAL IMPLICATIONS
These planning projects are proceeding in accordance with the budget allocation established in the 2019 budget.

The additional work of a transportation study by a transportation consultant is over and above the commissioned work and will be charged to the consultant line of the planning operating budget.

INTER-DEPARTMENTAL/PUBLIC COMMENTS
Not applicable at this time.

CONCLUSION
This report is provided for information purposes and is provided in advance of a presentation of our planning consultants for each school site. A planning report from MHBC for each property is attached.

ATTACHMENTS
1. 186 Margaret Street – Future Redevelopment and Intensification
2. 132 College Street – Future Redevelopment and Intensification

Prepared by:

Brian Treble, RPP, MCIP
Director of Planning and Building

Bev Hendry, CAO

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SMITHVILLE

NIAGARA REGION, ONTARIO

Schedule "B" to
Official Plan Amendment No. 53
Township of West Lincoln

186 MARGARET STREET

Future Redevelopment & Intensification

February 2020

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

Contents

Schedule "B" to
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Township of West Lincoln

INTRODUCTION

Two properties located within the downtown area of Smithville with the potential for future redevelopment and intensification opportunities has been deemed available by the Niagara Catholic District School Board and the Township of West Lincoln. The Township, in advance of any future development applications for the two sites, has embarked on a project to guide potential developers with the future design of the properties. The first site is located at 186 Margaret Street and was formerly known as the St. Martin's Catholic Elementary School. The second site is an undeveloped parcel of land owned by the Township of West Lincoln and located immediately east of the former Margaret Street school site, between McMurchie Lane and Smits Cove.

The Township retained MHBC Planning to evaluate the development potential of the two properties and to consult with the Smithville community on their vision for the sites future uses. MHBC Planning prepared a variety of development concepts that were presented and reviewed in consultation with members of the community including the general public and stakeholders. The input received from members of the public in attendance at the consultation event held in late 2019 was taken into consideration and assisted in the preparation of a Demonstration Plan that exhibits the type of development that can and should be achieved on the two properties.

The purpose of this document is to act as a guide for the future redevelopment of the two properties. This is achieved through the preparation of a Demonstration Plan for the two sites that presents an overall vision of the type of development and density that can be accommodated. The Demonstration Plan prepared and included within this document achieves the Regional and Township goals for intensification within the downtown, and demonstrates how the sites can be redeveloped while providing a balance between existing and future built form in the area.

The design guidelines detailed in this document provide direction on design considerations such as site layout, building orientation, massing, landscaping, public realm elements, connectivity and site circulation. It is intended that the design guidelines will assist in the evaluation of proposals for redevelopment/intensification of the two sites. This document also recommends planning approvals that should be undertaken for the sites to facilitate their future development.

The Demonstration Plan provided within this document does not represent the final development options for the two sites. This document is meant to guide future development in a manner that will help achieve the Township's vision for the properties.

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SITE CONTEXT

The former school site located at 186 Margaret Street is situated east of Margaret Street, south of West Street, west of Griffin Street North and north of Garden Drive. The site has an approximate area of 3.12 acres. The existing school building, now vacant, is located on the western half of the property with frontage onto Margaret Street. The eastern half of the site is undeveloped.

Immediately east of the former Margaret Street school site is an undeveloped parcel of land owned by the Township of West Lincoln. As part of the review completed for the Margaret Street school property, the adjacent Township owned parcel was also included as a potential site for future intensification and redevelopment. The Township owned parcel has a total area of 1.78 acres and contains frontage onto Smits Cove and McMurchie Lane.

The sites present an opportunity for residential development by establishing a policy framework that permits a range of building types and higher forms of density. The Margaret Street school site and the adjacent Township owned parcel are identified as being within a designated Intensification Area based on its location, access to transportation corridors, access to existing municipal services, proximity to community services and commercial uses, and the ability to be compatible with the surrounding land uses.

The following describes the surrounding lands:

North: The lands immediately adjacent to the north are occupied by the Saint Martin of Tours Roman Catholic Church and the Smithville United Church. A large cemetery currently occupies the majority of the land north of the subject property. Four residential properties are located between the two churches. The residential dwellings front onto West Street and are comprised of single detached dwellings. The West Lincoln Arena Complex is located to the north west of the former school site.

East: The lands immediately east of the former school site consists of a 1.78 acre undeveloped parcel of land, which is situated to the rear of the commercial properties that front onto Griffin Street North. This parcel of land is owned by the Township of West Lincoln and is designated High Density Residential and zoned Medium Density Residential. The properties along Griffin Street North are comprised of low-density mixed use (commercial/residential) buildings. These buildings are identified as being within Smithville's Intensification Area and downtown core.

South: The lands immediately south of the subject property are developed with residential townhouse condominiums. The townhouse condominiums form part of a private residential community.

West: The lands to the west of the subject property consist of a residential neighbourhood comprised largely of single detached dwellings.

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Township of West Lincoln

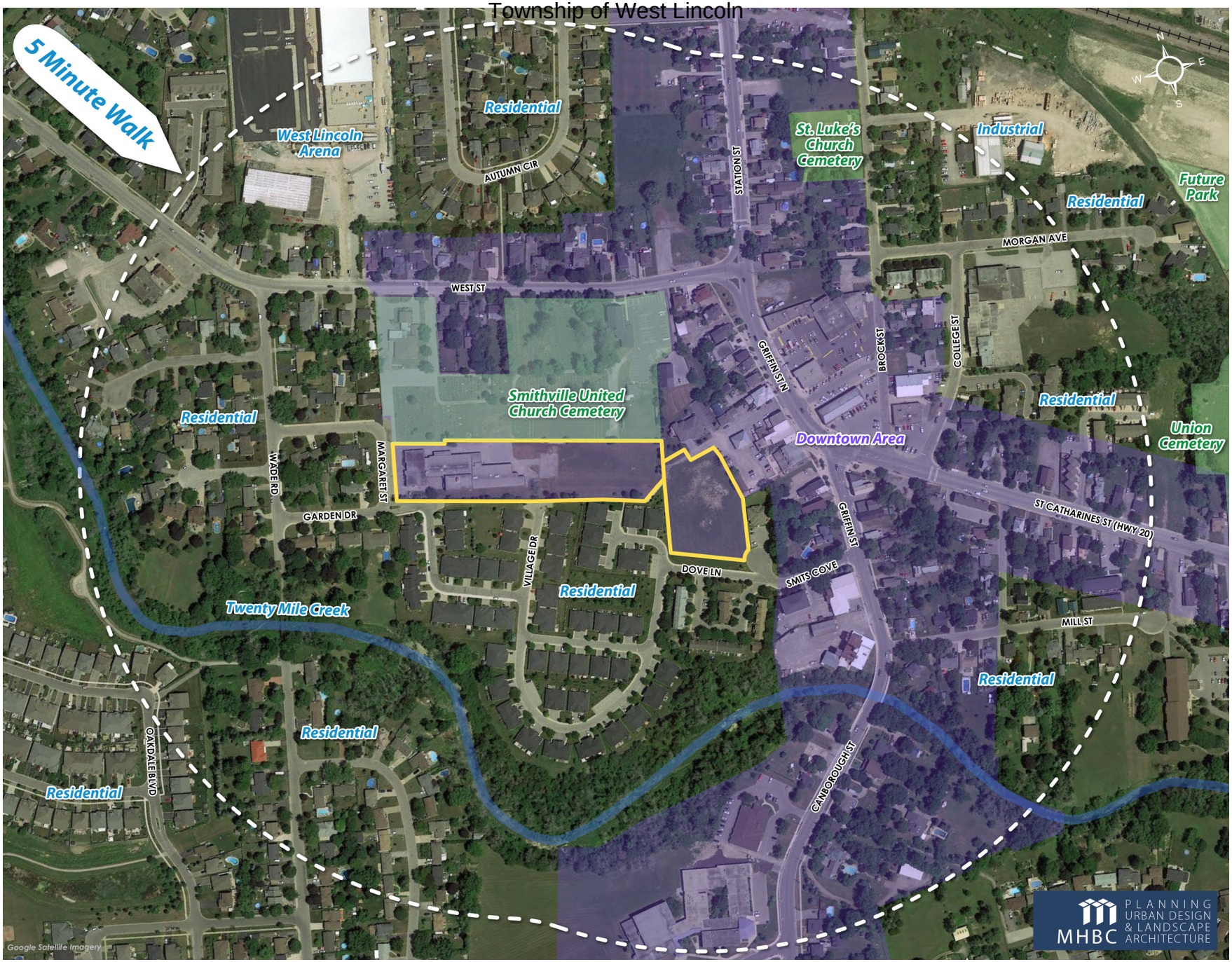

Figure 1 Site Context

VISION & DESIGN GOALS

*The design vision for the two sites is a **high quality, contemporary infill residential development**, which will establish a new built form and density within an existing urban community and will be **compatible** with the existing surrounding development to create a **diverse and vibrant downtown**. The two properties will accommodate new residential development that will allow more people to live in Downtown Smithville, supporting a **growing consumer base** for Downtown businesses and promoting a **pedestrian oriented community**.*

Design Goals

The following design goals provided direction to the proposed Demonstration Plan:

- Introduce *additional residential density* within the downtown in a manner that is compatible with existing adjacent properties;
- Design a site that is safe and accessible;
- To achieve high quality design in the private and public realm;
- To achieve a built form that contributes to a mix and range of residential unit types;
- Design a well-connected site that promotes walkability and active transportation;
- Provide an attractive built form with high quality architectural detailing, contemporary design and neighbourhood amenity areas that enhances the pedestrian experience for future residents and visitors travelling between the site and the downtown commercial core; and,
- Design a site with consideration for the pedestrian scale.

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SITE DESIGN

The proposed redevelopment and intensification scenario for the former Margaret Street school site and adjacent Township owned parcel has been prepared based on investigation of the site and surrounding area, input from a public consultation event with members of the community and stakeholders, as well as discussion with the Township of West Lincoln.

The proposed Demonstration Plan shown as Figure 2 is a representation of the type of redevelopment project that could and should be achieved on the sites. This concept is meant to depict the Townships vision for the redevelopment of the sites.

The two downtown sites are appropriate for residential intensification given their location, access to transportation corridors, access to municipal services, proximity to community services and commercial uses, and ability to accommodate intensification while maintaining the character of the community.

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Figure 2 Demonstration Plan

DESIGN PRINCIPLES

As part of the development of the Demonstration Plan, a number of design principles were established to guide future development on the sites and to better focus design guidelines that can be applied to future development applications. Any future development of the sites should be consistent with the following design principles:

1 *Connectivity and Active Transportation*

The sites should be redeveloped in a manner that promotes a pedestrian oriented community by providing connections to existing neighbourhoods and local amenities through the careful layout of streets, sidewalks and multi-use pedestrian paths.

2 *Density and Built Form*

The sites should be redeveloped to accommodate a higher density than the existing residential neigbourhoods in the surrounding area, given the limited high density properties within the Smithville Urban Area and the proximity of these sites to the downtown core.

3 *Variety*

The redevelopment of the sites should contribute to a mix and range of housing types within the Smithville Urban Area. They should provide spacious amenity areas and community focal points and a range and variation of building facades.

4 *Parks and Amenity Spaces*

The sites should be planned to accommodate a park or amenity space for residents and/or visitors. Parks and amenity spaces are to be designed with active transportation connections to destinations within and outside of the site.

5 *Safety and Health*

The sites should implement design practices that contribute to neighbourhood safety by creating a strong pedestrian oriented site that minimizes conflict between pedestrians and vehicles and incorporates "eyes on the street" and "eyes on open spaces" concepts. The pedestrian environment should be designed to make safe and enjoyable experiences for all pedestrians to ensure convenient access to businesses, activities and services.

DESIGN GUIDELINES

The Urban Design Guidelines contained within this document are primarily intended to provide the Township with detailed design direction for the purpose of evaluating proposals for the redevelopment and intensification of the former Margaret Street school site and adjacent Township owned land. These guidelines were prepared with consideration of the input received from both the Township and the community who participated at the Open House Event hosted in November, 2019.

The guidelines focus on building design; the public realm (streetscape, landscaping and amenity areas); pedestrian connections and movement; vehicular access and site circulation; and safety.

It is important to note that while this document provides detailed design direction for the evaluation of future development proposals, the Official Plan and Zoning By-law remain the primary planning documents regulating land use within the Township. Therefore, should a conflict arise between these guidelines and the Official Plan policies and/or Zoning By-law provisions, the Official Plan and Zoning By-law will take precedence.

BUILT FORM

Massing refers to a building's size and shape. It includes building height, scale and depth. The placement of buildings on a site refers to the location of buildings relative to one another, as well as their setbacks from the site's boundaries. New buildings should be designed to reflect the existing and intended character of the surrounding area.

The layout of the site is typically influenced by the characteristics of the site itself including topography, existing pedestrian routes, parks and open spaces, natural features and site access. The goal is to integrate new development with the surrounding built form and public realm.

Massing

Site Density

- The density of the Margaret Street school site should be aligned with the permissions of the High Density Residential Area designation, given that the site is located within the identified 'Intensification Area' of the Official Plan and is in proximity to the downtown commercial core and centre of Smithville.
- The adjacent Township owned parcel of land is also identified as being located within the 'Intensification Area'. Given the location of the two sites in proximity to the commercial core of Smithville, it is encouraged that a higher form of density be permitted on these properties.
- The individual gross densities of the two sites are encouraged to exceed 40 units per hectare. The Demonstration Plan accommodates densities between 70 and 80 units per hectare.

Building Location

- Buildings should be located close to the street, while allowing adequate room for street trees, landscaping, street furniture, and pedestrian movement.
- New multiple unit residential development should be designed such that adjacent properties maintain sunlight exposure, visual privacy and should reduce potential negative impacts from lighting, noise and traffic.

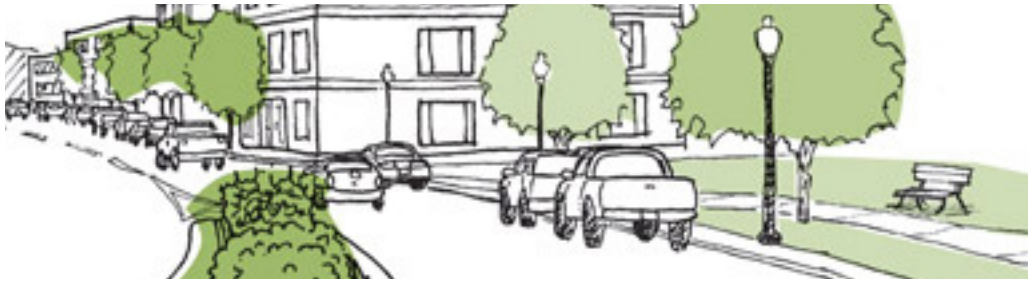
Building Height

- Building heights should be comparable to surrounding buildings to frame the street and create consistency. A minimum building height of 2 storeys and a maximum building height of 4 storeys should be encouraged on the former school site.
- The adjacent Township owned parcel of land should be developed at a height of 6 storeys.

Public & Private Realm

Landscaping

- Landscaping should be used to provide a buffer between driveways, driving aisles, parking areas and side and rear property lines to improve their visual appearance. Landscaped areas should be designed to complement existing or proposed landscaping on adjacent properties.
- Pedestrian seating and gathering areas should be provided within proposed amenity areas.
- Road side tree planting should be continuous along the length of the street and should generally be comprised of high branching, native deciduous tree varieties that will provide a continuous shade canopy.
- Hard and soft landscaping treatments should be used to provide a distinction between public and private amenity areas.
- Ensure that plant material provides for seasonal variation in form, colour and texture by using a variety of species.



Outdoor Amenity Areas

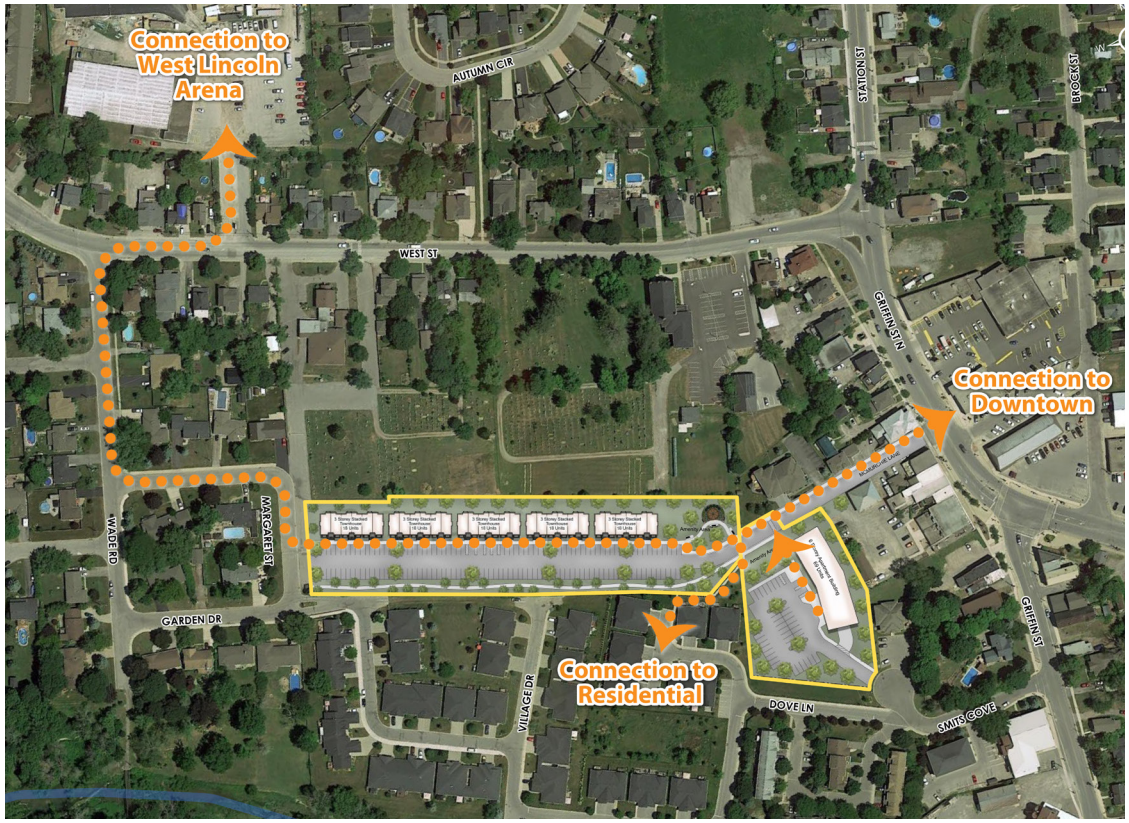
- Outdoor amenity areas should be designed for use by all residents and visitors and should be located in an area that is both visually and physically accessible. Amenity areas are encouraged to be located with good natural surveillance from residential units and the street. Landscaping should ensure that sight lines into the public amenity areas are maintained.
- Substantial screening should be provided from the parking area and drive aisles in the form of landscaping and architectural elements.

Streetscape

- Human scaled lighting should be provided along the private roadway to minimize light pollution and overflowing onto neighbouring properties.
- Pedestrians and cyclists travelling through the site should be prioritized. Conflict between pedestrians and vehicles should be minimized.
- Sidewalks/walkways should be provided on either side of the street and should be wide enough to accommodate a variety of users. The use of landscaping should be used as a buffer between sidewalks/walkways and the street.
- Avoid site design that results in the creation of entrapment areas and/or confined spaces.
- Appropriate screening and buffering should be provided between multiple unit residential uses and adjacent development.

The following guidelines apply to pedestrian connections and movement through the former school site and surrounding areas.

- A continuous pedestrian walkway access should be provided between Margaret Street and Griffin Street North, using existing pedestrian infrastructure and McMurchie Lane as a connection point.
- Pedestrian connections/walkways that allow for the safe and convenient movement of pedestrians into, within and out of the site shall be provided.
- Sidewalks and/or walkways should be provided on either side of the street and be buffered from the travelled portion of the roadway.



Pedestrian Connections and Movement

- Clearly delineated pedestrian connections should link main building entrances, parking areas, on-site amenity areas and any adjacent trails and/or public sidewalks.
- Sidewalks and walkways will be adequately setback from the public and internal road and driveway network and should be wide enough to allow two persons to walk side by side. Trails and walkways are encouraged to be designed to accommodate multiple forms of active transportation.
- Where the pedestrian system must cross driveways and parking areas, visual priority will be provided to the pedestrian system through the use of cross-walks or the continuation of the walkway material across the driveway or parking areas.
- Pedestrian connections/walkways should be of a different material and appearance than the roadways and should be landscaped and lighted to promote the safety and comfort of pedestrians.

Safety

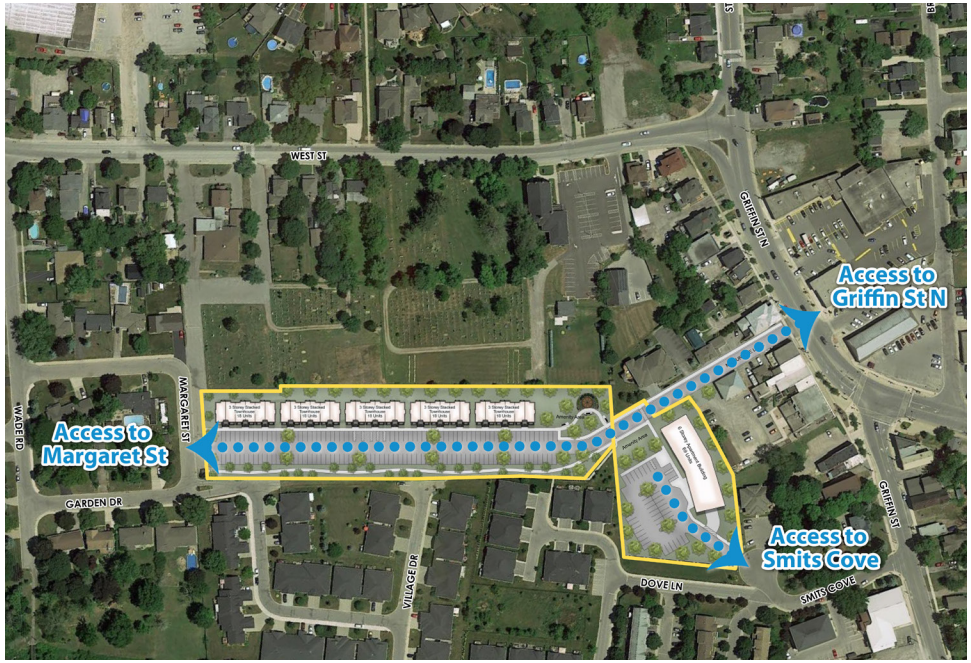
The following guidelines apply to the safety of residents and visitors while on the site:

- The design of the future site and buildings should take into consideration Crime Prevention Through Environmental Design (CPTED) principles. This can include designing a site and buildings to promote a sense of security and by allowing the natural surveillance of public spaces.
- Provide clear and highly visible pedestrian circulation that connects building entrances, parking areas, and shared spaces.
- Avoid site design that creates the potential for entrapment areas and hidden areas within the site.
- Pedestrian scaled street lighting should be provided to illuminate pedestrian sidewalks and walkways, parking areas, and amenity spaces to ensure a safe, comfortable and attractive experience for pedestrians.
- Traffic calming measures are encouraged where practical. Street features that may assist with traffic calming include narrowed and clearly defined pedestrian crossing points and the creation of a strong, pedestrian oriented streetscape will serve as visual signals that will assist in slowing traffic.

Vehicular Access and Site Circulation

The following guidelines apply to parking areas and circulation through the sites:

- A minimum of two accesses is encouraged for the site to allow for adequate and safe vehicular access.
- Minimize the visual presence of parking by ensuring the area is screened with landscaping and architectural elements, and providing the greatest possible buffer between it and surrounding property lines.
- Avoid a site design that creates a potential entrapment area and conflicts between vehicles and pedestrians.
- Long stretches of parking should be interrupted by sidewalk bump outs to provide narrower pedestrian crossing points, to help slow traffic and provide a greater opportunity for street trees, pedestrian amenities and landscaping.



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IMPLEMENTATION

In order to achieve residential development on the two shown sites that is similar to the built form and site design prepared and shown on the Demonstration Plan included as Figure 2 of this document, the Township will be required to prepare and approve amendments to the existing municipal policy framework applicable to the properties.

The future redevelopment and intensification of the two sites for residential uses is consistent with the Provincial Policy Statement (2014), and conforms to the policy framework of the Growth Plan for the Greater Golden Horseshoe (2019) by contributing to the intensification targets for the Built-Up Area. Future redevelopment and intensification of the sites is also consistent with the policies of the Regional and Township Official Plans with respect to infill development.

The following provides a summary of the required planning approvals necessary to achieve residential development on the two sites:

Former Margaret Street School Site

The former Margaret Street school site is presently designated "Institutional" in the Township of West Lincoln Official Plan and zoned "Institutional" in the Township's Zoning By-law No. 2017-70. The current policy framework applicable to the site does not permit residential development. In order to proceed with residential development on both sites, an Official Plan Amendment and a Zoning By-law Amendment is needed.

1. Official Plan Amendment

The "High Density Residential Area (Smithville)" designation is considered the most appropriate designation for the lands, given the site's location within downtown, the Official Plan's identification of the site as being within Smithville's Intensification Area, and its proximity to a range of amenities and services. The adjacent Township owned parcel of land is currently designated as "High Density Residential Area (Smithville)" . As such, the re-designation of the former school site would be compatible with existing designations in proximity to the Downtown.

The "High Density Residential Area (Smithville)" designation permits a gross density exceeding 40 units per hectare and a built form that does not exceed 5 storeys. As proposed in the Demonstration Plan, a total gross density of 71.2 units per hectare could be achieved on the site at a height of 3 storeys. The built form as shown on the Demonstration Plan would comply with the maximum allowable height of 5 storeys.

The stacked townhouse built form considered on the Demonstration Plan would be compatible with the existing surrounding residential development, while providing for increased density within the Urban Area. Achieving a density similar to the Demonstration Plan would support Provincial and Regional goals to encourage infill development and greater density within Settlement Areas. The stacked townhouse units would be located on a private condominium roadway and are capable of being setback from the residential community to the south by implementing landscaping and a pedestrian pathway to act as a visual barrier. Higher development densities within the downtown area results in a range of benefits for the community including social, economic, transport and environmental benefits. Stacked townhomes are also efficient in terms of providing active street frontages, adding greater interest and vitality to the street.

2. Zoning By-law Amendment

In order to redevelop the site for residential uses, a Zoning By-law Amendment to rezone the site in its entirety from "Institutional (I)" to "Residential Medium Density (RM3)" would be required. The RM3 zone category provides the required permissions and performance standards necessary to achieve a similar built form and density as provided in the Demonstration Plan.

Township Owned Parcel of Land

The Township owned parcel of land located immediately adjacent to the Margaret Street school site to the east is presently designated "High Density Residential Area (Smithville)" and zoned "Residential Medium Density (RM2)". In order to achieve a residential development comparable to the development portrayed in the Demonstration Plan, an Official Plan Amendment and Zoning By-law Amendment application would be required to permit an increased height of 6 storeys.

1. Official Plan Amendment

An Official Plan Amendment would be required for the Township Owned parcel to introduce a special policy area for the site that would permit a height of 6 storeys. Presently, the "High Density Residential Area (Smithville)" designation permits a maximum height of 5 storeys. The vacant parcel is one of the few sites in the downtown that can accommodate higher densities due to its location, access to services and to transportation corridors. The orientation and configuration of the building and site can be designed in a manner that minimizes any adverse impacts on surrounding low rise residential by incorporating visual barriers and sufficient separation distances. The site is a prime location within central Smithville that can provide the necessary density to promote and encourage continued growth in the downtown.

2. Zoning By-law Amendment

In order to achieve a residential development consisting of a six-storey mid-rise apartment building, a Zoning By-law Amendment to rezone the site in its entirety from "Residential Medium Density (RM2)" to "Residential Medium Density (RM3)" would be required.

The current residential zone applied to the site does not permit an apartment dwelling use. Given the location of the site in proximity to the downtown and the site's location adjacent to the commercial core, a mid-rise apartment development on a site identified as being within the Intensification Area is compatible and necessary to accommodate future growth in Smithville. No changes to the performance standards would be necessary to achieve a development similar to the one shown on the Demonstration Plan, however, future proposals may require a site specific amendment, subject to the site design being proposed.

Future Development Applications

Future development applications submitted to the Township for the former Margaret Street school site and adjacent Township owned parcel of land will be reviewed by the Township through a pre-submission consultation meeting. During this consultation meeting, the design principles and design guidelines discussed in this document should be reviewed and applied to future proposals.

Figure 3 View from Margaret Street loking north east

MHBC
PLANNING
URBAN DESIGN
& LANDSCAPE
ARCHITECTURE

Smithville School Sites - Redevelopment Options

186 Margaret Street & 132 College Street, Smithville

Monday, February 10, 2020

Dan Currie
Partner

1. Purpose of the Documents
2. Site Context
3. Policy Framework
4. Public Consultation Review
5. Vision and Design Goals
6. Demonstration Plans
7. Design Principles
8. Implementation

SMITHVILLE

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& LANDSCAPE
ARCHITECTURE

Monday, February 10, 2020

Smithville, West Lincoln

186 Margaret Street & 132 College Street

Purpose of the Documents

What is the purpose of these documents?

- Act as a guide for future developers of the sites;
- Demonstrate how a balance between existing and future development can be achieved;
- Intensification on prime downtown properties;
- Compatibility with surrounding lands; and,
- Provide design guidelines that new development should follow.

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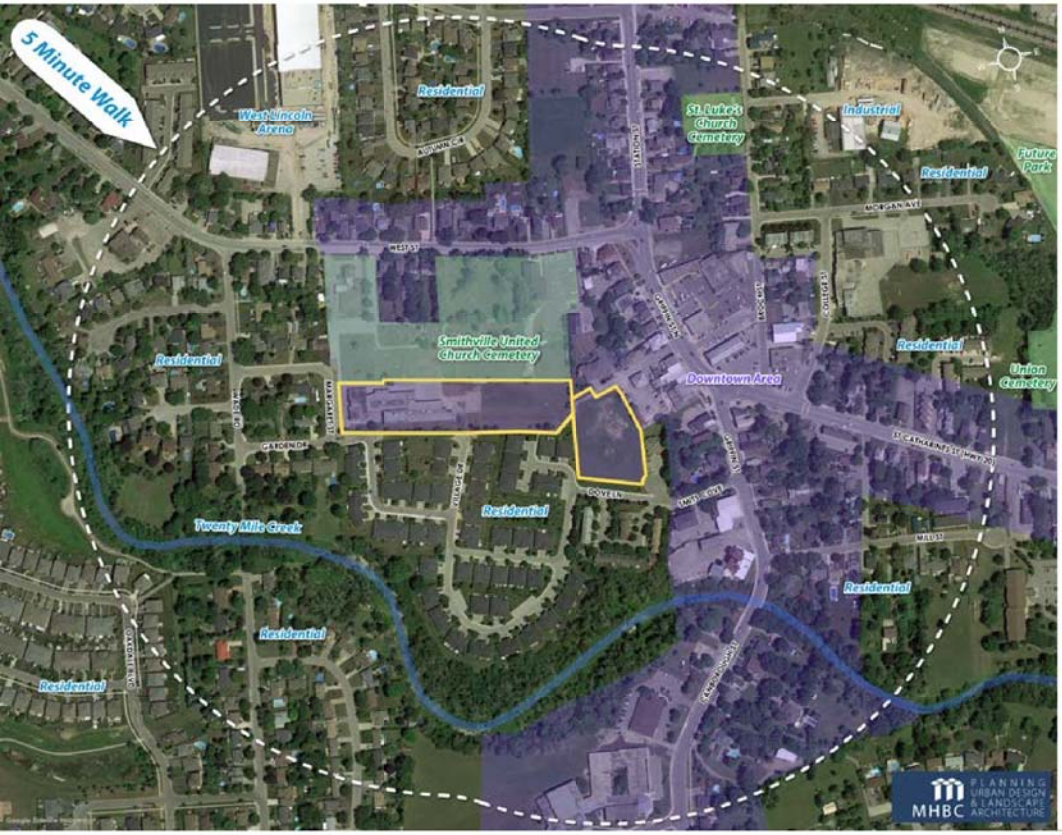
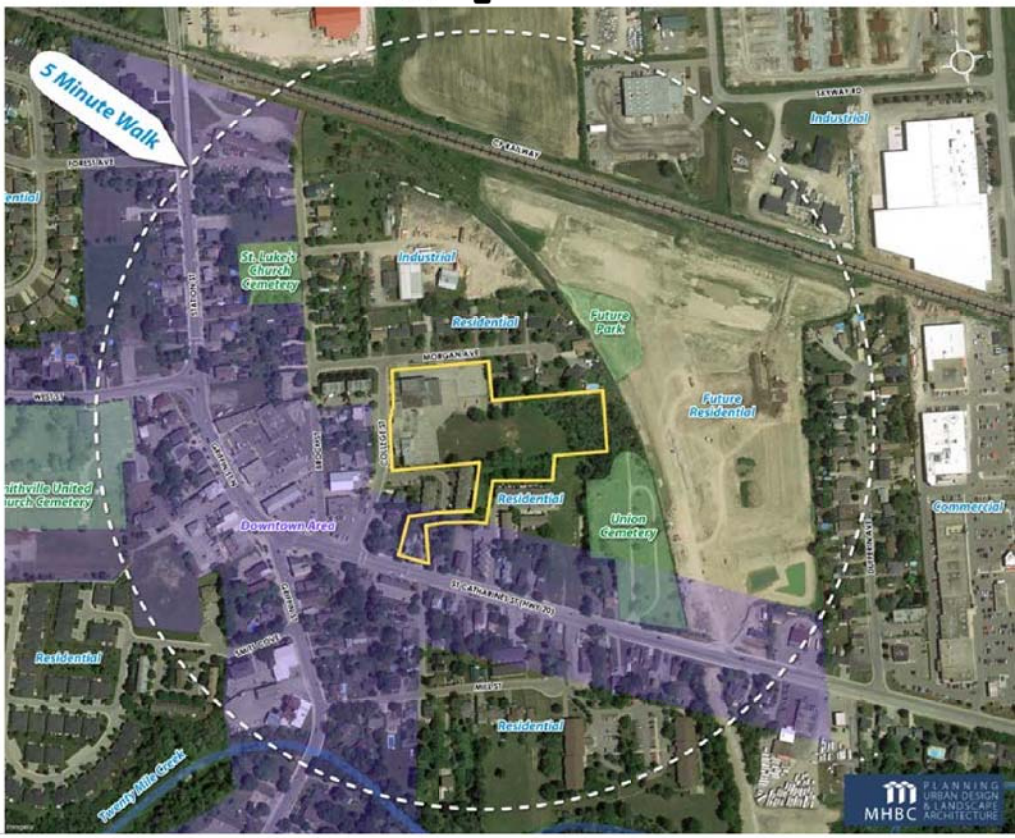
Site Context

Margaret Street



College Street



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Smithville, West Lincoln

186 Margaret Street & 132 College Street

Applicable Policy Framework

Provincial Policy Statement (2014)

- Encourages residential intensification in Urban Settlement Areas.
- Required to provide a range of densities and a mix of housing types.

A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2019)

- Direct a majority of future growth to existing built-up area to optimize existing urban land supply.

Region of Niagara Official Plan (2014)

- Both sites are identified as being within the Built-Up Area.
- Policy 4.C.4.2 requires that a minimum of 15 percent of residential development in West Lincoln occur within the Built-Up Area.

Township of West Lincoln Official Plan (2014)

- Schedule B-5 (Urban Structure Map) identifies Margaret Street and adjacent Township owned property as being within the Intensification Area.
  - Higher density encouraged given its location and access to municipal services, transportation corridors and services.

Public Consultation

- Open House Event was held on November 12, 2019.
- Design Charette: to allow the public to share their vision and concerns about redevelopment.

What we heard:

1. Concern with taller buildings and their interface with existing low-rise residential development;
2. Concern with future increased traffic around and through the sites;
3. Should incorporate pedestrian trail connections and linkages to surrounding downtown destinations;
4. Provide for a high quality built environment and streetscape to ensure a safe, comfortable and attractive experience for pedestrians; and,
5. Promote the need for affordable rental housing for seniors and others.

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Vision for the Sites

"The design vision for the two sites is a **high quality, contemporary infill residential development**, which will establish a new built form and density within an existing urban community and will be **compatible** with the existing surrounding development to create a **diverse and vibrant downtown**. The two properties will accommodate new residential development that will allow more people to live in Downton Smithville, supporting a **growing consumer base** for Downtown businesses and promoting a **pedestrian oriented community**."

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Smithville, West Lincoln

186 Margaret Street & 132 College Street

Design Goals

1. Introduce **additional residential density** within the downtown in a manner that is compatible with existing adjacent properties;
2. Design a site that is **safe and accessible**;
3. To achieve **high quality design** in the private and public realm;
4. To achieve a built form that contributes to a **mix and range of residential unit types**;
5. Design a well-connected site that **promotes walkability and active transportation**;
6. Provide an attractive built form with high quality architectural detailing, contemporary design and neighbourhood amenity areas that **enhances the pedestrian experience** for future residents and visitors; and,
7. Design a site with consideration for the **pedestrian scale**.

Schedule "B" to
Official Plan Amendment No. 53
Township of West Lincoln

SCHEDULE "A" TO THE FEBRUARY 10, 2020 PLANNING MINUTES

Margaret Street Demonstration Plan

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Smithville, West Lincoln

186 Margaret Street & 132 College Street

186 Margaret Street

Regulation	Provided
Area	1.264 hectares
Units	90
Height	3-4 storeys
Density	71.2 units per hectare
Parking	1.5 spaces / unit = 135 spaces
Accessible Parking	4 % of total spaces = 5 spaces

Township Owned Parcel

Regulation	Provided
Area	0.719 hectares
Units	69
Height	6 storeys
Density	96 units per hectare
Parking	1.5 spaces / unit = 86 spaces Surface = 36 spaces Underground = 50
Accessible Parking	4 % of total spaces = 4 spaces

Schedule "B" to
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Township of West Lincoln

SCHEDULE "A" TO THE FEBRUARY 10, 2020 PLANNING MINUTES

Margaret Street

Smithville, West Lincoln

Monday, February 10, 2020

186 Margaret Street & 132 College Street

Schedule "B" to
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Township of West Lincoln

SCHEDULE "A" TO THE FEBRUARY 10, 2020 PLANNING MINUTES

College Street Demonstration Plan

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Smithville, West Lincoln

186 Margaret Street & 132 College Street

Site Statistics

132 College Street

Regulation	Provided
Area	2.185 hectares
Units	13 two-storey townhouses (freehold); 30 apartment units; 60 stacked townhouse units **Total No. of Units = 103**
Height	2-4 storeys
Density	47.1 units per hectare (overall)
Parking (Residential)	1.5 spaces / unit = 135 spaces
Accessible Parking	4 % of total spaces = 6 spaces
Parking (Commercial)	1 space / 30 square metres = 31 spaces

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Official Plan Amendment No. 53
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Smithville, West Lincoln

186 Margaret Street & 132 College Street

Design Principles

1. **Connectivity and Active Transportation**
   - Promotes a pedestrian oriented community by providing connections to existing neighbourhoods and local amenities through the careful layout of streets, sidewalks and multi-use trails.

2. **Density and Built Form**
   - Accommodate a higher density than the existing residential neighbourhoods in the surrounding area, given the limited high density properties within the Smithville Urban Area and proximity of the sites to downtown.

3. **Variety**
   - contribute to a mix and range of housing types within the Smithville Urban Area.
   - Provide spacious amenity areas and a range and variation of building facades.

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Design Principles

4. **Parks and Amenity Spaces**
   - Planned to accommodate a park or amenity space for residents and/or visitors with active transportation connections to surrounding destinations.

5. **Safety and Health**
   - Contribute to neighbourhood safety by creating a strong pedestrian oriented site that minimizes conflict between pedestrians and vehicles;

Implementation

186 Margaret Street

Official Plan Amendment

- Currently designated "Institutional". Amendment required to designate site to "High Density Residential" to permit residential development and permit a higher density.

Zoning By-law Amendment

- Currently zoned "Institutional". An amendment is required to rezone the property to "Residential Medium Density (RM3)" to permit residential development that is similar in built form to the Demonstration Plan.

Township Owned Parcel

Official Plan Amendment

- An amendment is required to introduce a special policy area to permit an increased height of 6 storeys. Presently, a maximum height of 5 storeys is permitted.

Zoning By-law Amendment

- Currently zoned "Residential Medium Density (RM2)". An amendment is required to rezone the property to "Residential Medium Density (RM3)" to permit a mid-rise apartment development that is similar in built form to the Demonstration Plan.

Implementation

132 College Street

Official Plan Amendment

- Currently designated "Institutional" . An amendment is required to designate the site to "Residential/Mixed Use Area" in order to permit residential and mixed forms of residential/commercial.
- The irregular shaped parcel to the south will require an amendment to designate the site to "High Density Residential" to permit a wider range of residential uses.

Zoning By-law Amendment

- Currently zoned "Institutional". An amendment is required to rezone the lots along Morgan Avenue as "Residential Medium Density (RM2)" and the remaining balance of the site as "Residential Medium Density (RM3)".
- The irregularly shaped parcel to the south requires an amendment to rezone the land to "Residential Medium Density (RM3)" to permit a wider range of residential building types.

Questions?

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Monday, February 10, 2020

Smithville, West Lincoln

186 Margaret Street & 132 College Street

TRANSPORTATION IMPACT BRIEF

186 MARGARET STREET

TOWNSHIP OF WEST LINCOLN
NIAGARA REGION

PREPARED FOR:

TOWNSHIP OF WEST LINCOLN

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
2800 HIGH POINT DRIVE, SUITE 100
MILTON, ON L9T 6P4

JULY 2020

CFCA FILE NO. 0529-5575

CROZIER
CONSULTING ENGINEERS

Revision Number	Date	Comments
Rev.1	July 2020	Draft Issued for Client Review

1.0 Executive Summary

C.F. Crozier & Associates Inc. (Crozier) was retained by The Township of West Lincoln to undertake a Transportation Impact Brief in support of the planning application for the site located at 186 Margaret Street, and adjacent Township owned lands, in the Town of West Lincoln.

The subject lands cover an area of approximately 1.983 ha and currently consists of St. Martin School. Five 3-storey stacked townhouses for a total of 90 units; one 6-storey apartment building for a total of 69 units are proposed on the site.

Under 2020 existing conditions, all study intersections are expected to operate at a Level of Service "C" or better during the weekday a.m. and p.m. peak hours. The highest average delay of 21.1 seconds during the weekday a.m. peak hour and 22.3 seconds during the p.m. peak hour per vehicle is observed for the intersection of Griffin Street at St Catharines Street. The maximum volume to capacity ratio is 0.84 during the weekday p.m. peak hour for the eastbound movement.

Under future background conditions, the study intersections are projected to operate similarly to existing conditions. The intersections are expected to operate at a Level of Service "D" or better during the weekday a.m. and p.m. peak period.

To forecast the trips generated by the proposed development, the Institute of Transportation Engineers (ITE) 10th edition data was used. The proposed development is expected to generate 68 new vehicular 2-way trips during the morning peak hour (17 trips in / 51 trips out), and 85 new vehicular 2-way trips during the afternoon peak hour (53 trips in / 32 trips out).

Traffic operations at the study intersections after the addition of site traffic is similar when compared to the future background conditions. The study intersections are expected to operate with a level of service D or better with no individual movement operating overcapacity.

The development application can be supported by a traffic operations perspective. The surrounding road network can accommodate the traffic generated from the residential development proposed for 186 Margaret Street.

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2.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by The Township of West Lincoln to undertake a Transportation Impact Brief in support of the planning application for the site located at 186 Margaret Street, and adjacent Township owned lands, in the Town of West Lincoln.

3.0 Existing Conditions

3.1 Development Lands

The subject lands cover an area of approximately 1.983 ha and currently consists of St. Martin School. The subject lands are located in a mixed-use and commercial area. The site is bounded by Smithville United Church Cemetery to the north, Griffin Street to the east, Margaret Street to the west, and residential units to the south. Figure 1 shows the site location.

3.2 Boundary Road Network

With skewed directions, the directional orientation of the roadway system is ambiguous. To provide clarity throughout this report and in the supporting analysis, Griffin Street has been assigned a north-south orientation when it intersects with West Street and Mcmurchie Lane, and an east-west orientation when it intersects with St. Catherines Street.

West Street is an east-west roadway with a two-lane urban cross-section. West Street is under the jurisdiction of the Niagara Region and is classified as a regional road. The roadway has sidewalks available on both sides and has a posted speed limit of 50 km/h throughout the study area.

Mcmurchie Lane is an east-west laneway with a two-lane cross-section. The laneway currently provides access to commercial buildings adjacent to Mcmurchie Lane. There are no sidewalks along the laneway.

St. Catharines Street is an east-west regional road with a two-lane cross-section. There are sidewalks present along both sides of the roadway. St Catharines Street has a posted speed limit of 50 km/h

Griffin Street is a regional road with a two-lane cross-section with sidewalks on both sides, Griffin Street is named Station Street North of West Street and Griffin Street North between West Street and St Catharines Street. South of St Catharines Street, the roadway is named Griffin Street.

3.3 Traffic Data

Turning movement counts for the intersections Wade Road N at West Street (dated April 10, 2019) and Griffin Street at Griffin Street N/St Catharines Street (dated June 4, 2019) were received from the Region of Niagara. Given the current COVID-19 crisis, any counts done during the pandemic would not be representative of typical conditions. Therefore, an industry-standard growth rate of 2.0% per annum was applied to through volumes on West Street, Griffin Street and Catharines Street to grow the volumes to reflect the 2020 traffic volumes. Traffic along Wade Road, Edward Court, Margaret Street, Garden Drive and Leslie Court was estimated using the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition Traffic. Detailed calculations and traffic data contained in Appendix A provides a summary of the turning movement counts. Refer to Figure 2 for the existing 2020 traffic volumes.

3.4 Traffic Modeling

The assessment of intersections is based on the method outlined in the "Highway Capacity Manual, 2010" using Synchro 10 modelling software. Intersections are assessed using a Level of Service metric, with ranges of delay assigned a letter from "A" to "F". For stop-controlled intersections, a Level of Service "A" or "B" would typically be measured during off-peak hours when lesser traffic volumes are on the roadways. Levels of Service "C" through "F" would typically be measured in the commuter peak hours when higher vehicle volumes cause longer travel times. The Level of Service (LOS) definitions for signalized and un-signalized intersections are included in Appendix B.

Given the modelling limitations in Synchro, the intersection of Griffin Street N/Station Street & West Street is analyzed as a one-way stop control intersection(on West Street), with the northbound and southbound movements along Griffin Street and Station Street operating as free flow.

3.5 Intersection Operations

The traffic operations at the study intersection were analyzed based on the traffic volumes recorded in Figure 2. Detailed capacity analyses are included in Appendix C. The signal timings for the intersection of Griffin Street at St Catharines Street was provided by Niagara Region can be found in Appendix A. Table 1 outlines the existing traffic Levels of Service.

Table 1 Existing Levels of Service

Intersection	Peak Hour	Level of Service (Average Delay per Vehicle(s))	Maximum V/C & V/C Ratio(s) > 0.85 (Approach)
Wade Road N & West Street (Stop Control (NB))	Weekday A.M.	B (13.5 s)	0.10 (NB)
	Weekday P.M.	C (16.1 s)	0.09 (NB)
Griffin Street N/Station Street & West Street(Stop Control (EB))	Weekday A.M.	B (10.6 s)	0.28 (EB)
	Weekday P.M.	C (16.7 s)	0.62 (EB)
Griffin Street N & Mcmurchie Lane (Stop Control (EB))	Weekday A.M.	B (14.7 s)	0.04 (EB)
	Weekday P.M.	C (18.5 s)	0.03 (EB)
Griffin Street & Griffin Street N/St Catharines St (Signalized)	Weekday A.M.	C (21.1 s)	0.71 (EBT)
	Weekday P.M.	C (22.6 s)	0.84 (EBT)

Note1: The Level of Service of a signalized intersection is based on the average control delay per vehicle. The level of service of a stop-controlled intersection is based on the minor (stopped)approach control delay per vehicle.
Note2: The critical v/c ratio is considered to be the maximum v/c ratio at the intersection. All v/c ratios greater than 0.90 are outlined and highlighted.

As indicated in Table 1, all study intersections are expected to operate at a Level of Service "C" or better during the weekday a.m. and p.m. peak hours. The highest average delay of 21.1 seconds during the weekday a.m. peak hour and 22.3 seconds during the p.m. peak hour per vehicle is observed for the intersection of Griffin Street at St Catharines Street. The maximum volume to capacity ratio is 0.84 during the weekday p.m. peak hour for the eastbound movement. These

metrics indicate that the study intersections are operating efficiently with acceptable delays and reserve capacity to accommodate future increases in traffic volume.

4.0 Development Proposal

The project proposal is for the development of 186 Margaret Street. The subject lands cover an area of approximately 1.983 ha and currently consists of St. Martin School. The subject lands are located in a mixed-use and commercial area. The site is bounded by Smithville United Church Cemetery to the north, Griffin Street to the east, Margaret Street to the west, and residential units to the south.

As per the proposed concept plan dated January 23, 2020 (Figure 1), the site envisions five 3-storey stacked townhouses for a total of 90 units and one 6-storey apartment building for a total of 69 units.

There is one full movement access provided on Margaret Street and Smits Cove/Dove Lane each and an access onto Mcmurchie lane, which is recommended to operate as an ingress only access.

5.0 Future Background Conditions

5.1 Study Horizons

As per the Niagara Region guidelines for Traffic Impact Study, horizon years corresponding to the date of the study commission, as well as five years from the full build-out year is required. Considering the opening year of 2025, 2025 and 2030 horizon years were selected to assess the full operations of the boundary road network with and without the proposed development.

5.2 Traffic Growth Rates and Background Developments

Future background traffic volumes for the 2025 and 2030 horizon years consist of the following components:

- Background traffic growth from outside the study area; and,
- Traffic generated within the study area from other proposed developments.

An industry-standard growth rate of two percent was applied to all major movements along the study intersections.

A background development located at 132 College Street has been included as part of the background developments. The development is expected to generate 58 trips in the weekday a.m. peak hour and 70 trips in the weekday p.m. peak hour. 2025 and 2030, background volumes are illustrated in Figures 3 and 4.

5.3 Intersection Operations

The traffic operations at the study intersections were analyzed under future background conditions. Tables 2 outlines the 2025 and 2030 future background Levels of Service. Signal timings were optimized under future background conditions. Detailed capacity analyses are included in Appendix C.

Table 2: 2025 and 2030 Future Background Levels of Service

Intersection	Peak Hour	Level of Service (Average Delay per Vehicle(s))		Maximum V/C & V/C Ratio(s) > 0.85 (Approach)	
		2025 Background	2030 Background	2025 Background	2030 Background
Wade Road N & West Street (Stop Control (NB))	Weekday A.M.	B (14.5 s)	C (15.6 s)	0.11 (NB)	0.121 (NB)
	Weekday P.M.	C (17.8 s)	C (19.7 s)	0.10 (NB)	0.37 (NB)
Griffin Street N/Station Street & West Street(Stop Control (EB))	Weekday A.M.	C (18.1 s)	C (23.6 s)	0.40 (EBL)	0.55 (EBL)
	Weekday P.M.	C (20.6 s)	D (27.1 s)	0.65 (EBR)	0.75 (EBR)
Griffin Street N & Mcmurchie Lane (Stop Control (EB))	Weekday A.M.	C (16.7 s)	C (18.9 s)	0.05 (EB)	0.06 (EB)
	Weekday P.M.	C (23.0 s)	D (27.7 s)	0.03 (EB)	0.04 (EB)
Griffin Street & Griffin Street N/St Catharines St (Signalized)	Weekday A.M.	C (21.1 s)	C (21.1 s)	0.72 (EBT)	0.75 (EBT)
	Weekday P.M.	C (20.2 s)	C (22.1 s)	0.82 (EBT)	0.85 (EBT)

Note1: The Level of Service of a signalized intersection is based on the average control delay per vehicle. The level of service of a stop-controlled intersection is based on the minor (stopped)approach control delay per vehicle.
Note2: The critical v/c ratio is considered to be the maximum v/c ratio at the intersection. All v/c ratios greater than 0.90 are outlined and highlighted.

The study intersections are expected to operate at a level of service "D" or better during both weekday a.m. and p.m. peak hours, under 2025 and 2030 future background traffic conditions. Compared to existing conditions, the intersection of Griffin Street N/Station Street & West Street is expected to experience a maximum increase of 10.4 seconds of control delay. The intersection of Wade Road N & West Street is expected to experience an increase of the volume to capacity ratio of 0.28 under the weekday p.m. peak hour. All these metrics indicate that the intersections are expected to continue to operate at an efficient level of service, with reserve capacity to accommodate future increases in traffic volumes.

6.0 Site Generated Traffic

The proposed daycare center will result in additional vehicles on the boundary road network that previously did not exist. The proposed development will also cause additional turning movements at the study intersections.

The trip generation of the residential facility was forecasted using the fitted curve equations provided in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition, under the Land Use Category 220 "Multifamily Housing (Low Rise)" and Land Use Category 221 "Multifamily Housing (Mid Rise)". Trip generation estimates were based on the Concept Plan dated January 23, 2020, which proposes five 3-storey stacked townhouses for a total of 90 units and one 6-storey apartment building for a total of 69 units. According to the ITE Trip Generation Manual, the residential development is forecasted to generate 68 and 85 two-way trips in the weekday a.m. and

p.m. peak hours, respectively. The forecasted trips are tabulated in Table 3, and the distributed trips are illustrated in Figure 5.

Table 3: Trip Generation

Land Use	Units/GFA	Parameter	Weekday A.M.			Weekday P.M.		
			In	Out	2-Way	In	Out	2-Way
Residential Multifamily Housing (Low Rise) (220)	90	Gross Trips	10	33	43	34	20	54
Residential Multifamily Housing (Mid Rise) (221)	69	Gross Trips	7	18	25	19	12	31
Total Net Trips			**17**	**51**	**68**	**53**	**32**	**85**

The proposed development is expected to generate 68 new vehicular 2-way trips during the morning peak hour (17 trips in / 51 trips out), and 85 new vehicular 2-way trips during the afternoon peak hour (53 trips in / 32 trips out).

7.0 Total Traffic Conditions

7.1 Intersection Operations

The traffic operations at the study intersections were analyzed under future total conditions. Table 4 outlines 2025 and 2030 future total Levels of Service. Signal timings remain the same as future background conditions for each horizon year. Detailed capacity analyses are included in Appendix C. The 2025, and 2030 total traffic volumes are illustrated in Figures 6, and 7.

Table 4: 2025 and 2030 Future Total Levels of Service

Intersection	Peak Hour	Level of Service (Average Delay per Vehicle(s))		Maximum V/C & V/C Ratio(s) > 0.85 (Approach)	
		2025 Total	2030 Total	2025 Total	2030 Total
Wade Road N & West Street (Stop Control (NB))	Weekday A.M.	B (14.3 s)	C (15.3 s)	0.18 (NB)	0.19 (NB)
	Weekday P.M.	C (17.9 s)	C (19.9 s)	0.16 (NB)	0.18 (NB)
Griffin Street N/Station Street & West Street(Stop Control (EB))	Weekday A.M.	C (20.4 s)	D (32.4 s)	0.48 (EBL)	0.73 (EBL)
	Weekday P.M.	C (22.7 s)	D (31.3 s)	0.69 (EBL)	0.79 (EBL)
Griffin Street N & Mcmurchie Lane (Stop Control (EB))	Weekday A.M.	C (17.4 s)	C (19.8 s)	0.06 (EB)	0.07 (EB)
	Weekday P.M.	C (24.4 s)	D (29.3 s)	0.04 (EB)	0.05 (EB)
Griffin Street & Griffin Street N/St Catharines St (Signalized)	Weekday A.M.	C (21.0 s)	C (21.1 s)	0.73 (EBT)	0.75 (EBT)
	Weekday P.M.	C (20.4 s)	C (22.4 s)	0.82 (EBT)	0.86 (EBT)

Note1: The Level of Service of a signalized intersection is based on the average control delay per vehicle. The level of service of a stop-controlled intersection is based on the minor (stopped)approach control delay per vehicle.
Note2: The critical v/c ratio is considered to be the maximum v/c ratio at the intersection. All v/c ratios greater than 0.90 are outlined and highlighted.

The study intersections are expected to operate at an unchanged LOS "D" during both weekday a.m. and p.m. peak hours, under 2025 and 2030 future background traffic conditions. Compared to future background conditions, the intersection of Griffin Street N/Station Street & West Street is expected to experience a maximum increase of 8.8 seconds of control delay. The intersection of Griffin Street N/Station Street & West Street is expected to experience an increase of the volume to capacity ratio of 0.18 under the weekday a.m. peak hour. All these metrics indicate that the intersections are expected to continue to operate at an efficient level of service, with the addition of the site generated traffic.

8.0 Conclusion and Recommendations

Based on the analysis, our conclusions are as follows:

Development Proposal

The proposed site will consist of:

- Five 3-storey stacked townhouses for a total of 90 units
- One 6-storey apartment building for a total of 69 units
- Full movement access on Margaret Street and Dove Lane

Existing Conditions

- Turning movement counts for the intersections Wade Road N at West Street and Griffin Street at Griffin Street N/St Catharines Street were received from the Region of Niagara.
- An industry-standard growth rate of two percent was applied to traffic volumes to reflect 2020 volumes.
- Existing signal timings for the signalized intersection of Griffin Street at Griffin Street N/St Catharines Street in the study area were applied.
- Given the limitations in Synchro, the intersection of Griffin Street N/Station Street & West Street is analyzed as a one-way stop control intersection(on West Street), with the northbound and southbound movements along Griffin Street and Station Street operating as free flow.
- All intersections operate under capacity in both peak hours.

Background Conditions

- The industry-standard growth rate of two percent was applied to all movements along boundary roads in the study area that are not directly entering or exiting the site.
- Background developments included the site traffic generated by development located at 132 College Street in the vicinity of the site.
- All intersections operate with a level of service "D" or better under future background conditions with reserve capacity to accommodate future increases in traffic volumes.
- No trips were redistributed to incorporate the Smithville By-pass currently planned. This by-pass will lower volumes along Griffin Street and St. Catharines Street and ultimately improving traffic operations in the Smithville core.

Traffic Trip Generation

- The proposed development is expected to generate 68 new vehicular 2-way trips during the morning peak hour (17 trips in / 51 trips out), and 85 new vehicular 2-way trips during the afternoon peak hour (53 trips in / 32 trips out).

Future Conditions

- The intersection capacity analysis under the future total traffic conditions indicates that all the intersections will operate similarly to the future background conditions during both peak hours.

Recommendations

- Based on existing conditions it is recommended that Mcmurchie Lane operate as an ingress only access.
- Accordingly, development can be supported by traffic operations and safety perspectives. We trust that this review satisfies any access and transportation concerns associated with the site plan for this development. Please feel free to contact the undersigned for any further information required.

Respectfully submitted,

CF CROZIER & ASSOCIATES INC.

Aaron Wignall
Associate, Transportation

CF CROZIER & ASSOCIATES INC.

Kavleen Sachdeva E.I.T.
Transportation

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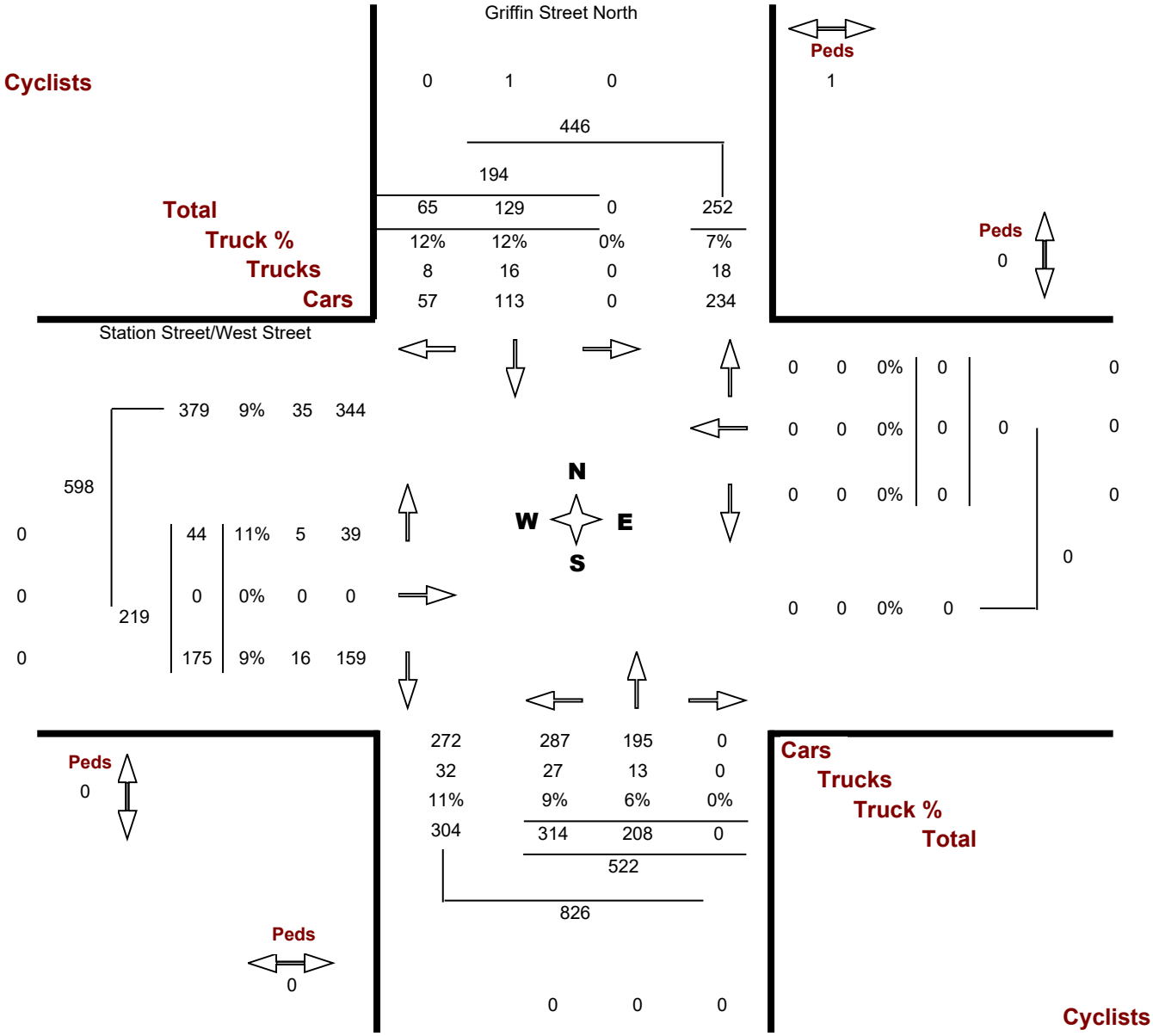
APPENDIX A

Traffic Data and, Signal Timing Plans

Schedule "B" to
Official Plan Amendment No. 53
Township of West Lincoln

Turning Movements Report - AM Period

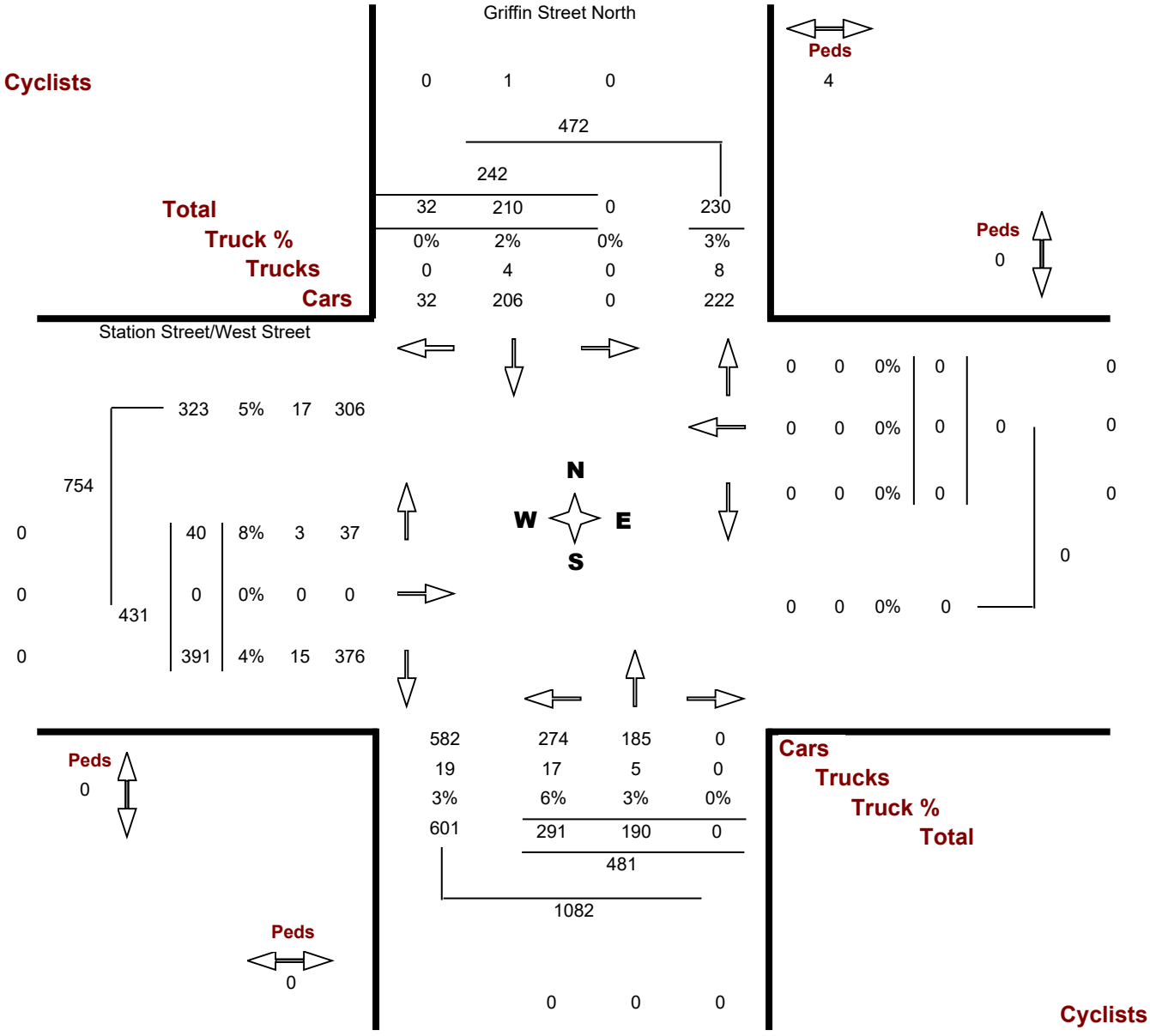
Location.....	Griffin Street North @ Station Street/West Street	**GeoID.....**	00096
Municipality.	WEST LINCOLN	**Count Date.**	Wednesday, 10 April, 2019
Traffic Cont.	Stop sign	**Count Time.**	07:00 AM — 09:00 AM
Major Dir.....	East west	**Peak Hour..**	07:00 AM — 08:00 AM



Schedule "B" to
Official Plan Amendment No. 53
Township of West Lincoln

Turning Movements Report - PM Period

Location.....	Griffin Street North @ Station Street/West Street	**GeoID.....**	00096
Municipality.	WEST LINCOLN	**Count Date.**	Wednesday, 10 April, 2019
Traffic Cont.	Stop sign	**Count Time.**	03:00 PM — 06:00 PM
Major Dir.....	East west	**Peak Hour..**	04:15 PM — 05:15 PM



Schedule "B" to
Official Plan Amendment No. 53
Township of West Lincoln

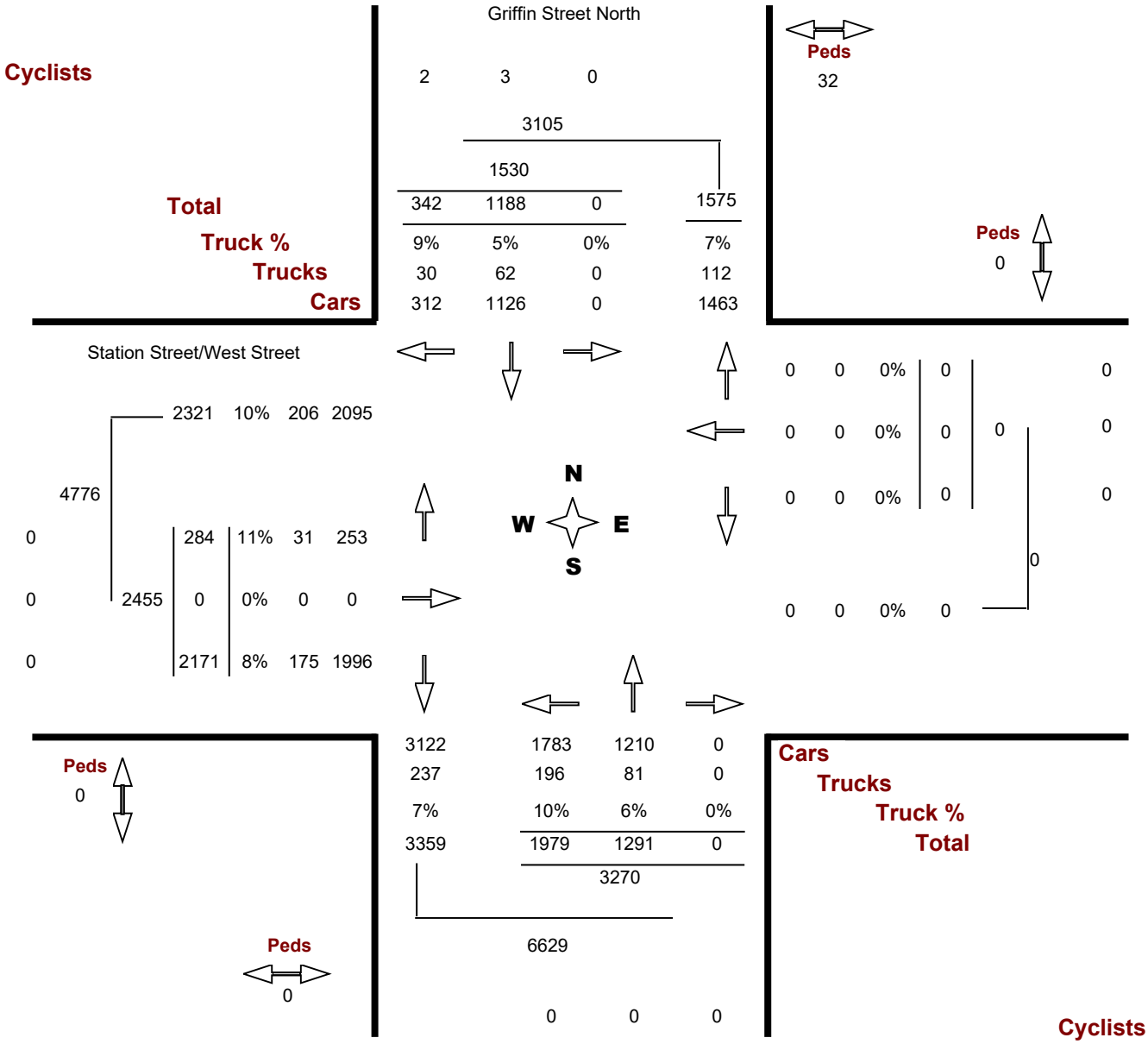
Turning Movement Count Report
Full Study

Location..... Griffin Street North @ Station Street/West Street

Municipality..... WEST LINCOLN

GeoID..... 00096

Count Date..... Wednesday, 10 April, 2019



Schedule "B" to
Official Plan Amendment No. 53
Township of West Lincoln

Niagara Region

Turning Movement Count - Details Report (15 min)

Location..... Griffin Street North @ Station Street/West Street

Municipality..... WEST LINCOLN

Count Date..... Wednesday, April 10, 2019

		Griffin Street North										Station Street/West Street									
		North Approach					South Approach					East Approach					West Approach				
Time Period		LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
07:00	07:15	0	27	15	0	42	72	37	0	0	109	0	0	0	0	0	11	0	48	0	59
07:15	07:30	0	23	11	0	34	91	54	0	0	145	0	0	0	0	0	8	0	38	0	46
07:30	07:45	0	39	15	0	54	85	57	0	0	142	0	0	0	0	0	5	0	44	0	49
07:45	08:00	0	40	24	0	64	66	60	0	0	126	0	0	0	0	0	20	0	45	0	65
Hourly Total		0	129	65	0	194	314	208	0	0	522	0	0	0	0	0	44	0	175	0	219
08:00	08:15	0	31	12	0	43	65	51	0	0	116	0	0	0	0	0	6	0	33	0	39
08:15	08:30	0	35	11	0	46	65	41	0	0	106	0	0	0	0	0	11	0	38	0	49
08:30	08:45	0	38	12	0	50	53	52	0	0	105	0	0	0	0	0	4	0	54	0	58
08:45	09:00	0	46	17	0	63	77	41	0	0	118	0	0	0	0	0	9	0	63	0	72
Hourly Total		0	150	52	0	202	260	185	0	0	445	0	0	0	0	0	30	0	188	0	218
11:00	11:15	0	27	8	0	35	64	34	0	0	98	0	0	0	0	0	9	0	56	0	65
11:15	11:30	0	29	12	0	41	61	37	0	0	98	0	0	0	0	0	8	0	46	0	54
11:30	11:45	0	28	8	0	36	41	27	0	0	68	0	0	0	0	0	5	0	63	0	68
11:45	12:00	0	30	10	0	40	55	34	0	0	89	0	0	0	0	0	9	0	57	0	66
Hourly Total		0	114	38	0	152	221	132	0	0	353	0	0	0	0	0	31	0	222	0	253
12:00	12:15	0	47	11	0	58	60	30	0	0	90	0	0	0	0	0	4	0	63	0	67
12:15	12:30	0	29	9	0	38	67	36	0	0	103	0	0	0	0	0	12	0	76	0	88
12:30	12:45	0	36	6	0	42	41	45	0	0	86	0	0	0	0	0	6	0	47	0	53
12:45	13:00	0	23	6	0	29	47	37	0	0	84	0	0	0	0	0	8	0	52	0	60
Hourly Total		0	135	32	0	167	215	148	0	0	363	0	0	0	0	0	30	0	238	0	268
13:00	13:15	0	35	4	0	39	53	26	0	0	79	0	0	0	0	0	9	0	53	0	62
13:15	13:30	0	15	8	0	23	42	32	0	0	74	0	0	0	0	0	6	0	54	0	60
13:30	13:45	0	25	6	0	31	46	25	0	0	71	0	0	0	0	0	5	0	52	0	57
13:45	14:00	0	30	5	0	35	53	21	0	0	74	0	0	0	0	0	7	0	67	0	74
Hourly Total		0	105	23	0	128	194	104	0	0	298	0	0	0	0	0	27	0	226	0	253
15:00	15:15	0	41	20	0	61	70	48	0	0	118	0	0	0	0	0	10	0	68	0	78
15:15	15:30	0	45	6	0	51	61	44	0	0	105	0	0	0	0	0	9	0	88	0	97
15:30	15:45	0	38	20	0	58	70	40	0	0	110	0	0	0	0	0	11	0	104	0	115
15:45	16:00	0	61	18	0	79	49	34	0	0	83	0	0	0	0	0	7	0	83	0	90
Hourly Total		0	185	64	0	249	250	166	0	0	416	0	0	0	0	0	37	0	343	0	380

Schedule "B" to
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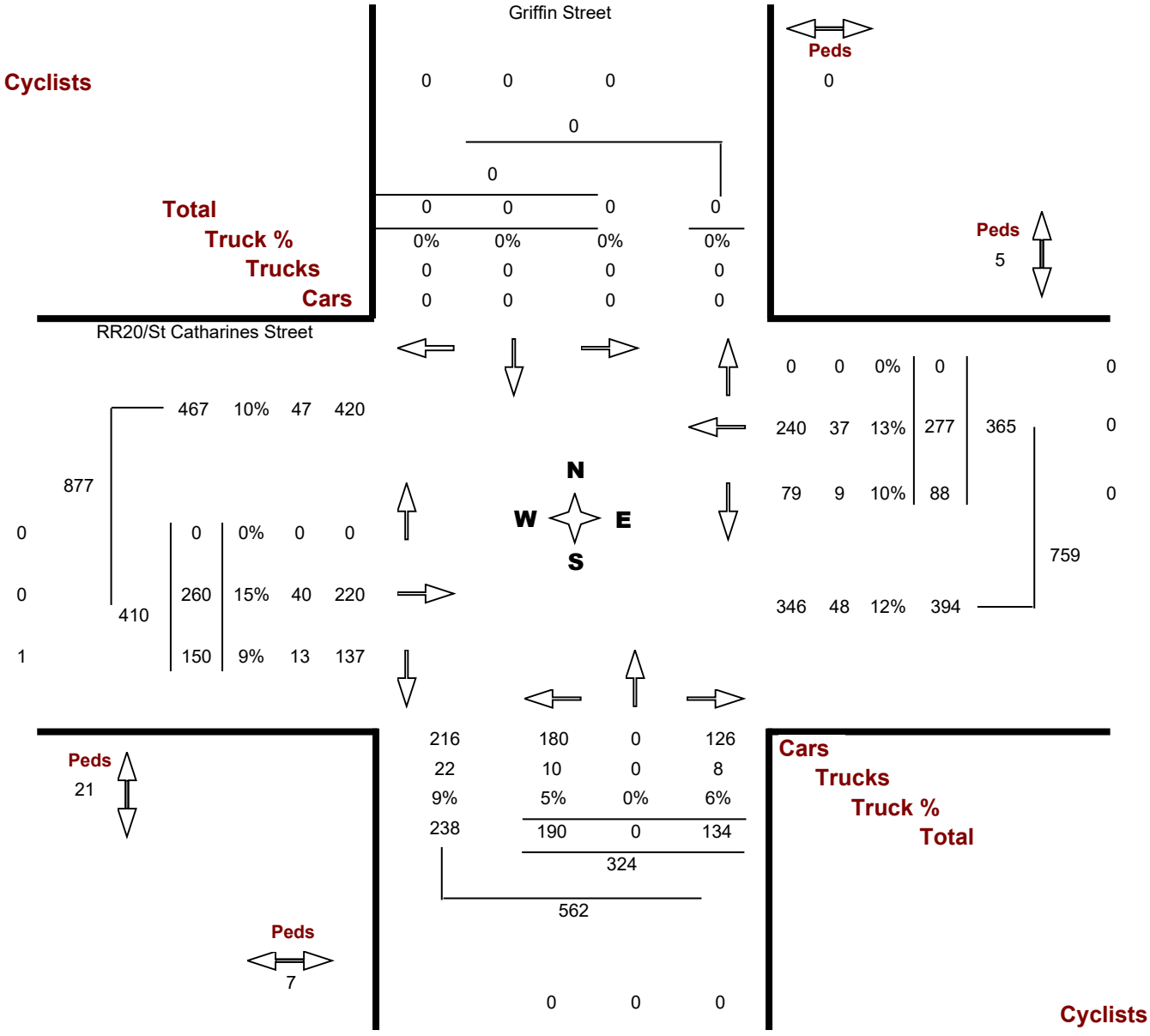
Township of West Lincoln

		Griffin Street North										Station Street/West Street									
		North Approach					South Approach					East Approach					West Approach				
Time Period		LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
16:00	16:15	0	52	9	0	61	51	45	0	0	96	0	0	0	0	0	12	0	112	0	124
16:15	16:30	0	48	8	0	56	66	46	0	0	112	0	0	0	0	0	11	0	99	0	110
16:30	16:45	0	59	8	0	67	81	56	0	0	137	0	0	0	0	0	10	0	90	0	100
16:45	17:00	0	43	5	0	48	63	49	0	0	112	0	0	0	0	0	9	0	95	0	104
Hourly Total		0	202	30	0	232	261	196	0	0	457	0	0	0	0	0	42	0	396	0	438
17:00	17:15	0	60	11	0	71	81	39	0	0	120	0	0	0	0	0	10	0	107	0	117
17:15	17:30	0	37	9	0	46	71	45	0	0	116	0	0	0	0	0	9	0	105	0	114
17:30	17:45	0	50	8	0	58	64	42	0	0	106	0	0	0	0	0	9	0	75	0	84
17:45	18:00	0	21	10	0	31	48	26	0	0	74	0	0	0	0	0	15	0	96	0	111
Hourly Total		0	168	38	0	206	264	152	0	0	416	0	0	0	0	0	43	0	383	0	426
Grand Total		0	1188	342	0	1530	1979	1291	0	0	3270	0	0	0	0	0	284	0	2171	0	2455
Truck %		0%	5%	9%	0%	6%	10%	6%	0%	0%	8%	0%	0%	0%	0%	0%	11%	0%	8%	0%	8%

Schedule "B" to
Official Plan Amendment No. 53
Township of West Lincoln

Turning Movements Report - AM Period

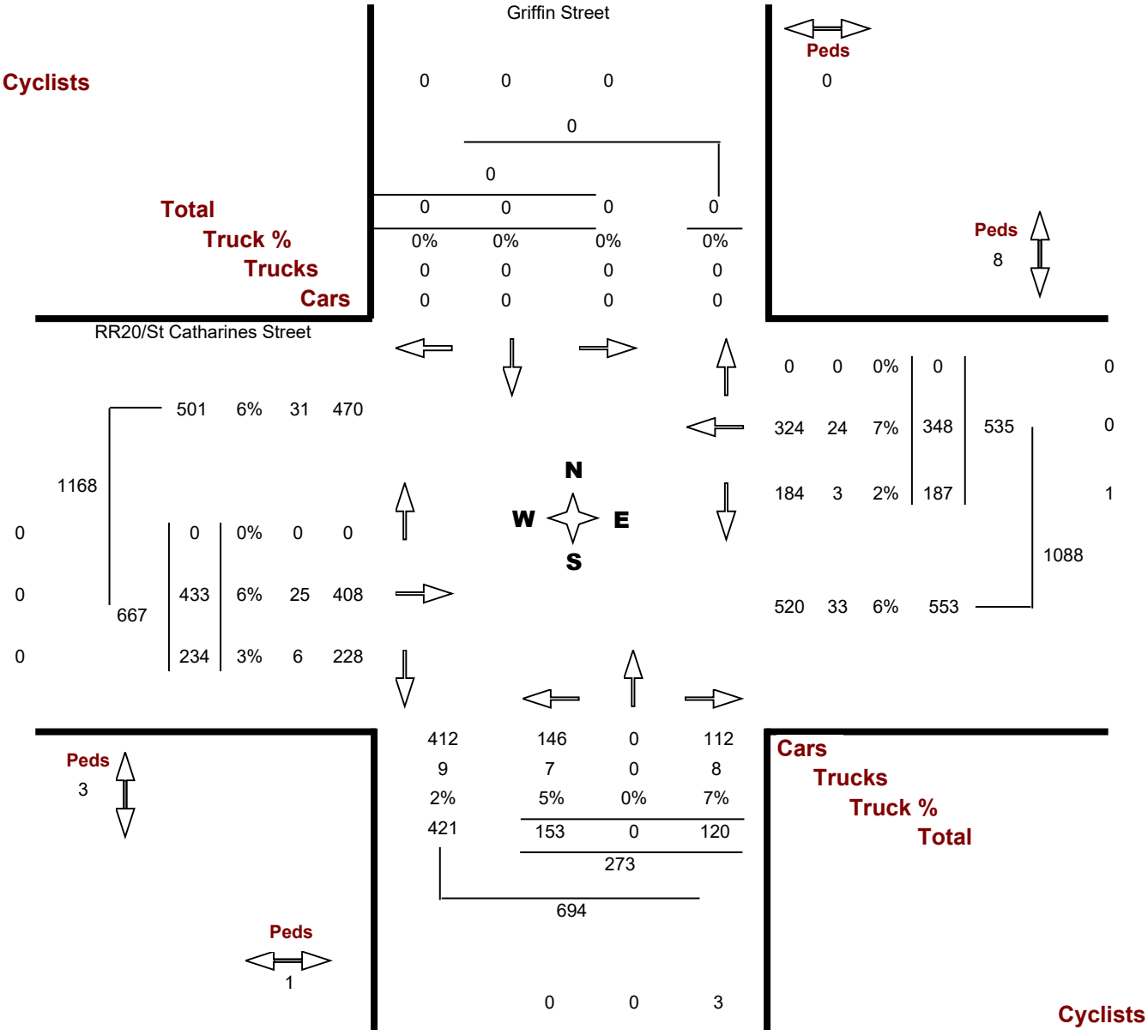
Location.....	Griffin Street @ RR20/St Catharines Street	**GeoID.....**	00094
Municipality.	WEST LINCOLN	**Count Date.**	Tuesday, 04 June, 2019
Traffic Cont.	Traffic signal	**Count Time.**	07:00 AM — 09:00 AM
Major Dir.....	East west	**Peak Hour..**	08:00 AM — 09:00 AM



Schedule "B" to
Official Plan Amendment No. 53
Township of West Lincoln

Turning Movements Report - PM Period

Location.....	Griffin Street @ RR20/St Catharines Street	**GeoID.....**	00094
Municipality.	WEST LINCOLN	**Count Date.**	Tuesday, 04 June, 2019
Traffic Cont.	Traffic signal	**Count Time.**	03:00 PM — 06:00 PM
Major Dir.....	East west	**Peak Hour..**	04:15 PM — 05:15 PM

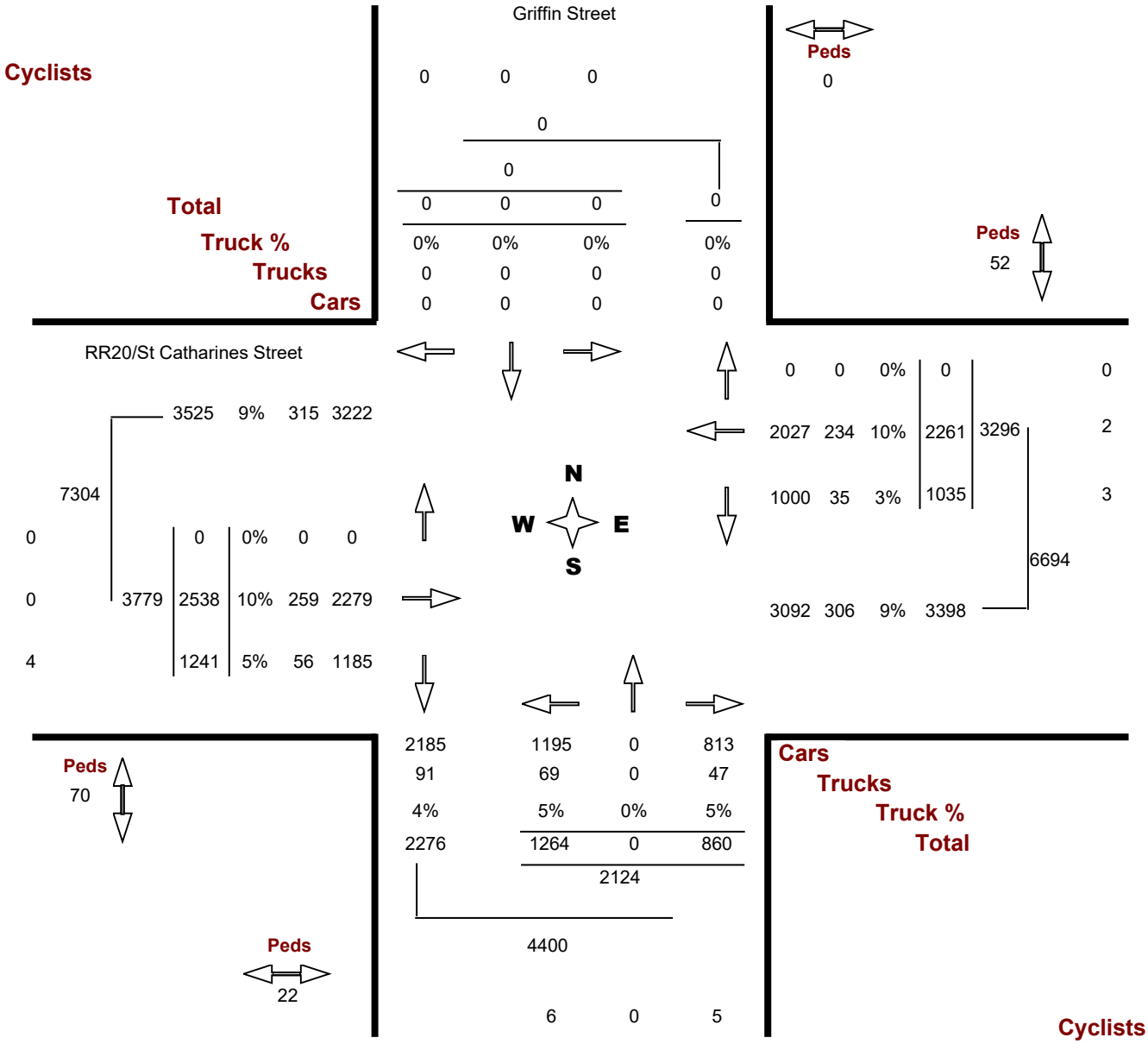


Schedule "B" to
Official Plan Amendment No. 53
Township of West Lincoln

Niagara Region

Turning Movement Count Report
Full Study

Location..... Griffin Street @ RR20/St Catharines Street
Municipality..... WEST LINCOLN
GeoID..... 00094
Count Date..... Tuesday, 04 June, 2019



Schedule "B" to
Official Plan Amendment No. 53
Township of West Lincoln

Niagara Region

Turning Movement Count - Details Report (15 min)

Location..... Griffin Street @ RR20/St Catharines Street

Municipality..... WEST LINCOLN

Count Date..... Tuesday, June 04, 2019

		Griffin Street										RR20/St Catharines Street									
		North Approach					South Approach					East Approach					West Approach				
Time Period		LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
07:00	07:15	0	0	0	0	0	44	0	22	0	66	10	52	0	0	62	0	67	21	0	88
07:15	07:30	0	0	0	0	0	40	0	27	0	67	19	71	0	0	90	0	45	18	0	63
07:30	07:45	0	0	0	0	0	48	0	30	0	78	24	83	0	0	107	0	65	21	0	86
07:45	08:00	0	0	0	0	0	54	0	22	0	76	20	87	0	0	107	0	67	30	0	97
Hourly Total		0	0	0	0	0	186	0	101	0	287	73	293	0	0	366	0	244	90	0	334
08:00	08:15	0	0	0	0	0	42	0	27	0	69	21	57	0	0	78	0	60	22	0	82
08:15	08:30	0	0	0	0	0	41	0	21	0	62	16	65	0	0	81	0	65	40	0	105
08:30	08:45	0	0	0	0	0	57	0	40	0	97	21	76	0	0	97	0	57	46	0	103
08:45	09:00	0	0	0	0	0	50	0	46	0	96	30	79	0	0	109	0	78	42	0	120
Hourly Total		0	0	0	0	0	190	0	134	0	324	88	277	0	0	365	0	260	150	0	410
11:00	11:15	0	0	0	0	0	33	0	26	0	59	19	54	0	0	73	0	73	26	0	99
11:15	11:30	0	0	0	0	0	29	0	26	0	55	29	63	0	0	92	0	63	23	0	86
11:30	11:45	0	0	0	0	0	27	0	22	0	49	21	61	0	0	82	0	78	28	0	106
11:45	12:00	0	0	0	0	0	40	0	25	0	65	29	55	0	0	84	0	58	17	0	75
Hourly Total		0	0	0	0	0	129	0	99	0	228	98	233	0	0	331	0	272	94	0	366
12:00	12:15	0	0	0	0	0	33	0	27	0	60	36	53	0	0	89	0	79	32	0	111
12:15	12:30	0	0	0	0	0	28	0	24	0	52	31	69	0	0	100	0	78	34	0	112
12:30	12:45	0	0	0	0	0	30	0	28	0	58	39	79	0	0	118	0	81	30	0	111
12:45	13:00	0	0	0	0	0	49	0	34	0	83	41	74	0	0	115	0	70	26	0	96
Hourly Total		0	0	0	0	0	140	0	113	0	253	147	275	0	0	422	0	308	122	0	430
13:00	13:15	0	0	0	0	0	39	0	29	0	68	36	51	0	0	87	0	61	28	0	89
13:15	13:30	0	0	0	0	0	43	0	25	0	68	30	67	0	0	97	0	59	27	0	86
13:30	13:45	0	0	0	0	0	32	0	23	0	55	28	64	0	0	92	0	64	30	0	94
13:45	14:00	0	0	0	0	0	32	0	18	0	50	28	64	0	0	92	0	74	28	0	102
Hourly Total		0	0	0	0	0	146	0	95	0	241	122	246	0	0	368	0	258	113	0	371
15:00	15:15	0	0	0	0	0	40	0	26	0	66	42	69	0	0	111	0	68	42	0	110
15:15	15:30	0	0	0	0	0	36	0	17	0	53	39	76	0	0	115	0	80	42	0	122
15:30	15:45	0	0	0	0	0	54	0	32	0	86	33	63	0	0	96	0	89	64	0	153
15:45	16:00	0	0	0	0	0	40	0	30	0	70	42	81	0	0	123	0	100	51	0	151
Hourly Total		0	0	0	0	0	170	0	105	0	275	156	289	0	0	445	0	337	199	0	536

Schedule "B" to
Official Plan Amendment No. 53
Township of West Lincoln

		Griffin Street										RR20/St Catharines Street									
		North Approach					South Approach					East Approach					West Approach				
Time Period		LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
16:00	16:15	0	0	0	0	0	36	0	32	0	68	34	63	0	0	97	0	110	63	0	173
16:15	16:30	0	0	0	0	0	34	0	42	0	76	40	94	0	0	134	0	126	55	0	181
16:30	16:45	0	0	0	0	0	36	0	25	0	61	51	86	0	0	137	0	95	57	0	152
16:45	17:00	0	0	0	0	0	27	0	25	0	52	55	81	0	0	136	0	94	63	0	157
Hourly Total		0	0	0	0	0	133	0	124	0	257	180	324	0	0	504	0	425	238	0	663
17:00	17:15	0	0	0	0	0	56	0	28	0	84	41	87	0	0	128	0	118	59	0	177
17:15	17:30	0	0	0	0	0	38	0	15	0	53	49	75	0	0	124	0	110	59	0	169
17:30	17:45	0	0	0	0	0	43	0	29	0	72	39	74	0	0	113	0	107	65	0	172
17:45	18:00	0	0	0	0	0	33	0	17	0	50	42	88	0	0	130	0	99	52	0	151
Hourly Total		0	0	0	0	0	170	0	89	0	259	171	324	0	0	495	0	434	235	0	669
Grand Total		0	0	0	0	0	1264	0	860	0	2124	1035	2261	0	0	3296	0	2538	1241	0	3779
Truck %		0%	0%	0%	0%	0%	5%	0%	5%	0%	5%	3%	10%	0%	0%	8%	0%	10%	5%	0%	8%

Signal Code: 014020						
Intersection: RR14 (GRIFFIN ST.) & RR20 (ST. CATHERINES ST.)						
Municipality: westlincoln						
Owner: Region						
Last Modified: 8/6/2015 8:29:39 AM						
Timing Parameters	WBD ADV HWY 20	EBD & WBD HWY 20	NBD GRIFFIN ST.	n/a	n/a	n/a
Min Green	6	10	8	0	0	0
Walk	0	10	8	0	0	0
Ped Clearance	0	16	12	0	0	0
Vehicle Ext.	2.5	5	3.5	0	0	0
Max Green	12	35	25	0	0	0
Yellow	3	4.1	4.1	0	0	0
All Red	0	2.7	2	0	0	0

		Offset
Minimum Cycle	30.9	0
Pedestrian Cycle	58.9	
Maximum Cycle	87.9	0
Operation	FA	

Installed On:
3/16/2010
Count Date:
11/12/2008

FA = Fully Actuated **SA = Semi Actuated** **FT = Fixed Time**

***Note: you need to change the paper orientation from Portriat to Landscape**

APPENDIX B

Levels of Service Definitions

Level of Service Definitions

Signalized Intersections

Level of Service	Control Delay per Vehicle (seconds)	Interpretation
A	≤ 10	EXCELLENT. Extremely favourable progression with most vehicles arriving during the green phase. Most vehicles do not stop and short cycle lengths may contribute to low delay.
B	> 10 and ≤ 20	VERY GOOD. Very good progression and/or short cycle lengths with slightly more vehicles stopping than LOS "A" causing slightly higher levels of average delay.
C	> 20 and ≤ 35	GOOD. Fair progression and longer cycle lengths lead to a greater number of vehicles stopping than LOS "B".
D	> 35 and ≤ 55	FAIR. Congestion becomes noticeable with higher average delays resulting from a combination of long cycle lengths, high volume-to-capacity ratios and unfavourable progression.
E	> 55 and ≤ 80	POOR. Lengthy delays values are indicative of poor progression, long cycle lengths and high volume-to-capacity ratios. Individual cycle failures are common with individual movement failures also common.
F	> 80	UNSATISFACTORY. Indicative of oversaturated conditions with vehicular demand greater than the capacity of the intersection.

Adapted from Highway Capacity Manual 2000, Transportation Research Board

Schedule "B" to
Official Plan Amendment No. 53
Township of West Lincoln

Level of Service Definitions

Two-Way Stop Controlled Intersections

Level of Service	Control Delay per Vehicle (seconds)	Interpretation
A	≤ 10	EXCELLENT. Large and frequent gaps in traffic on the main roadway. Queuing on the minor street is rare.
B	> 10 and ≤ 15	VERY GOOD. Many gaps exist in traffic on the main roadway. Queuing on the minor street is minimal.
C	> 15 and ≤ 25	GOOD. Fewer gaps exist in traffic on the main roadway. Delay on minor approach becomes more noticeable.
D	> 25 and ≤ 35	FAIR. Infrequent and shorter gaps in traffic on the main roadway. Queue lengths develop on the minor street.
E	> 35 and ≤ 50	POOR. Very infrequent gaps in traffic on the main roadway. Queue lengths become noticeable.
F	> 50	UNSATISFACTORY. Very few gaps in traffic on the main roadway. Excessive delay with significant queue lengths on the minor street.

Adapted from Highway Capacity Manual 2000, Transportation Research Board

APPENDIX C

Detailed Capacity Analyses

HCM Unsignalized Intersection Capacity Analysis
1: Wade Road N & West Street

Existing AM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	215	12	3	383	34	9
Future Volume (Veh/h)	215	12	3	383	34	9
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	234	13	3	416	37	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			247		662	240
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			247		662	240
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		91	99
cM capacity (veh/h)			1319		426	798

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	247	419	47
Volume Left	0	3	37
Volume Right	13	0	10
cSH	1700	1319	472
Volume to Capacity	0.15	0.00	0.10
Queue Length 95th (m)	0.0	0.1	2.5
Control Delay (s)	0.0	0.1	13.5
Lane LOS		A	B
Approach Delay (s)	0.0	0.1	13.5
Approach LOS			B

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	34.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: Griffin Street N/Station Street & West Street

Existing AM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	45	179	320	212	132	66
Future Volume (Veh/h)	45	179	320	212	132	66
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	49	195	348	230	143	72
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (m)				166		
pX, platoon unblocked						
vC, conflicting volume	1105	179	143			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1105	179	143			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	72	77	76			
cM capacity (veh/h)	177	864	1440			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	244	348	230	215
Volume Left	49	348	0	0
Volume Right	195	0	0	72
cSH	881	1440	1700	1700
Volume to Capacity	0.28	0.24	0.14	0.13
Queue Length 95th (m)	8.6	7.2	0.0	0.0
Control Delay (s)	14.9	8.3	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	14.9	5.0		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	44.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
3: Griffin Street N & Mcmurchie Lane

Existing AM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	7	3	505	365	2
Future Volume (Veh/h)	8	7	3	505	365	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	8	3	549	397	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				59		
pX, platoon unblocked	0.86					
vC, conflicting volume	953	398	399			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	866	398	399			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	100			
cM capacity (veh/h)	279	652	1160			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	17	552	399
Volume Left	9	3	0
Volume Right	8	0	2
cSH	381	1160	1700
Volume to Capacity	0.04	0.00	0.23
Queue Length 95th (m)	1.1	0.1	0.0
Control Delay (s)	14.9	0.1	0.0
Lane LOS	B	A	
Approach Delay (s)	14.9	0.1	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	41.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
4: Griffin Street & Griffin Street N/St Catharines St

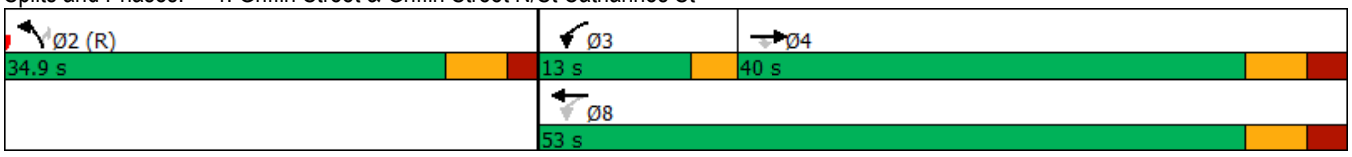
Existing AM Peak Hour

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	265	153	90	283	194	137
Future Volume (vph)	265	153	90	283	194	137
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		30.0	20.0		0.0	15.0
Storage Lanes		1	1		1	1
Taper Length (m)			15.0		2.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1735	1475	1648	1735	1648	1475
Flt Permitted			0.362		0.950	
Satd. Flow (perm)	1735	1475	628	1735	1648	1475
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		166				128
Link Speed (k/h)	50			50	50	
Link Distance (m)	59.2			69.0	143.2	
Travel Time (s)	4.3			5.0	10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	288	166	98	308	211	149
Shared Lane Traffic (%)						
Lane Group Flow (vph)	288	166	98	308	211	149
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2	1	1	2	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (m)	30.5	6.1	6.1	30.5	6.1	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	1.8	6.1	6.1	1.8	6.1	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4	4	3	8	2	2
Switch Phase						
Minimum Initial (s)	10.0	10.0	6.0	10.0	8.0	8.0
Minimum Split (s)	32.8	32.8	9.0	32.8	26.1	26.1
Total Split (s)	40.0	40.0	13.0	53.0	34.9	34.9
Total Split (%)	45.5%	45.5%	14.8%	60.3%	39.7%	39.7%
Maximum Green (s)	33.2	33.2	10.0	46.2	28.8	28.8
Yellow Time (s)	4.1	4.1	3.0	4.1	4.1	4.1
All-Red Time (s)	2.7	2.7	0.0	2.7	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	3.0	6.8	6.1	6.1
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	C-Max	C-Max
Walk Time (s)	10.0	10.0		10.0	8.0	8.0
Flash Dont Walk (s)	16.0	16.0		16.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	20.7	20.7	34.2	30.4	44.6	44.6
Actuated g/C Ratio	0.24	0.24	0.39	0.35	0.51	0.51
v/c Ratio	0.71	0.35	0.28	0.51	0.25	0.18
Control Delay	39.9	6.1	16.7	24.3	16.0	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.9	6.1	16.7	24.3	16.0	5.0
LOS	D	A	B	C	B	A
Approach Delay	27.5			22.5	11.5	
Approach LOS	C			C	B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 87.9			
Actuated Cycle Length: 87.9			
Offset: 0 (0%), Referenced to phase 2:NBL and 6:, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.71			
Intersection Signal Delay: 21.1		Intersection LOS: C	
Intersection Capacity Utilization 46.3%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 4: Griffin Street & Griffin Street N/St Catharines St



HCM Unsignalized Intersection Capacity Analysis
1: Wade Road N & West Street

Existing PM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	434	39	10	320	22	6
Future Volume (Veh/h)	434	39	10	320	22	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	472	42	11	348	24	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			514		863	493
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			514		863	493
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		93	99
cM capacity (veh/h)			1052		322	576

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	514	359	31
Volume Left	0	11	24
Volume Right	42	0	7
cSH	1700	1052	357
Volume to Capacity	0.30	0.01	0.09
Queue Length 95th (m)	0.0	0.2	2.2
Control Delay (s)	0.0	0.4	16.0
Lane LOS		A	C
Approach Delay (s)	0.0	0.4	16.0
Approach LOS			C

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	37.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: Griffin Street N/Station Street & West Street

Existing PM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	41	399	297	194	214	33
Future Volume (Veh/h)	41	399	297	194	214	33
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	45	434	323	211	233	36
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (m)				166		
pX, platoon unblocked						
vC, conflicting volume	1108	251	233			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1108	251	233			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	74	45	76			
cM capacity (veh/h)	176	788	1335			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	479	323	211	269
Volume Left	45	323	0	0
Volume Right	434	0	0	36
cSH	869	1335	1700	1700
Volume to Capacity	0.55	0.24	0.12	0.16
Queue Length 95th (m)	26.1	7.2	0.0	0.0
Control Delay (s)	16.7	8.6	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	16.7	5.2		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	8.4		
Intersection Capacity Utilization	47.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
3: Griffin Street N & Mcmurchie Lane

Existing PM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	4	6	501	647	7
Future Volume (Veh/h)	3	4	6	501	647	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	4	7	545	703	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				59		
pX, platoon unblocked	0.85					
vC, conflicting volume	1266	707	711			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1225	707	711			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	99			
cM capacity (veh/h)	167	435	888			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	7	552	711
Volume Left	3	7	0
Volume Right	4	0	8
cSH	258	888	1700
Volume to Capacity	0.03	0.01	0.42
Queue Length 95th (m)	0.6	0.2	0.0
Control Delay (s)	19.4	0.2	0.0
Lane LOS	C	A	
Approach Delay (s)	19.4	0.2	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
4: Griffin Street & Griffin Street N/St Catharines St

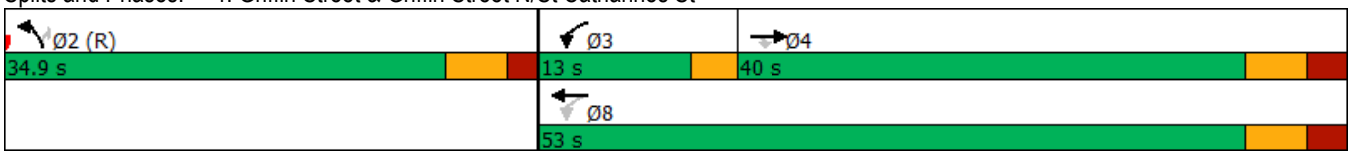
Existing PM Peak Hour

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	442	239	191	355	156	122
Future Volume (vph)	442	239	191	355	156	122
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		30.0	20.0		0.0	15.0
Storage Lanes		1	1		1	1
Taper Length (m)			15.0		2.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1735	1475	1648	1735	1648	1475
Flt Permitted			0.220		0.950	
Satd. Flow (perm)	1735	1475	382	1735	1648	1475
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		176				133
Link Speed (k/h)	50			50	50	
Link Distance (m)	59.2			69.0	143.2	
Travel Time (s)	4.3			5.0	10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	480	260	208	386	170	133
Shared Lane Traffic (%)						
Lane Group Flow (vph)	480	260	208	386	170	133
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2	1	1	2	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (m)	30.5	6.1	6.1	30.5	6.1	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	1.8	6.1	6.1	1.8	6.1	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4	4	3	8	2	2
Switch Phase						
Minimum Initial (s)	10.0	10.0	6.0	10.0	8.0	8.0
Minimum Split (s)	32.8	32.8	9.0	32.8	26.1	26.1
Total Split (s)	40.0	40.0	13.0	53.0	34.9	34.9
Total Split (%)	45.5%	45.5%	14.8%	60.3%	39.7%	39.7%
Maximum Green (s)	33.2	33.2	10.0	46.2	28.8	28.8
Yellow Time (s)	4.1	4.1	3.0	4.1	4.1	4.1
All-Red Time (s)	2.7	2.7	0.0	2.7	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	3.0	6.8	6.1	6.1
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	C-Max	C-Max
Walk Time (s)	10.0	10.0		10.0	8.0	8.0
Flash Dont Walk (s)	16.0	16.0		16.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	29.0	29.0	45.5	41.7	33.3	33.3
Actuated g/C Ratio	0.33	0.33	0.52	0.47	0.38	0.38
v/c Ratio	0.84	0.43	0.62	0.47	0.27	0.21
Control Delay	40.9	9.4	19.1	17.0	22.1	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.9	9.4	19.1	17.0	22.1	5.0
LOS	D	A	B	B	C	A
Approach Delay	29.8			17.7	14.6	
Approach LOS	C			B	B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 87.9			
Actuated Cycle Length: 87.9			
Offset: 0 (0%), Referenced to phase 2:NBL and 6:, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 22.6		Intersection LOS: C	
Intersection Capacity Utilization 60.2%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: Griffin Street & Griffin Street N/St Catharines St



HCM Unsignalized Intersection Capacity Analysis 2025 Future Background AM Peak Hour
1: Wade Road N & West Street

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	240	12	3	433	34	9
Future Volume (Veh/h)	240	12	3	433	34	9
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	261	13	3	471	37	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			274		744	268
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			274		744	268
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		90	99
cM capacity (veh/h)			1289		381	771

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	274	474	47
Volume Left	0	3	37
Volume Right	13	0	10
cSH	1700	1289	427
Volume to Capacity	0.16	0.00	0.11
Queue Length 95th (m)	0.0	0.1	2.8
Control Delay (s)	0.0	0.1	14.5
Lane LOS		A	B
Approach Delay (s)	0.0	0.1	14.5
Approach LOS			B

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	37.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 2025 Future Background AM Peak Hour
2: Griffin Street N/Station Street & West Street

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	50	200	364	241	148	73
Future Volume (Veh/h)	50	200	364	241	148	73
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	54	217	396	262	161	79
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (m)				166		
pX, platoon unblocked						
vC, conflicting volume	1254	200	161			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1254	200	161			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	60	74	72			
cM capacity (veh/h)	137	840	1418			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	271	396	262	240
Volume Left	54	396	0	0
Volume Right	217	0	0	79
cSH	686	1418	1700	1700
Volume to Capacity	0.40	0.28	0.15	0.14
Queue Length 95th (m)	14.4	8.8	0.0	0.0
Control Delay (s)	18.1	8.5	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	18.1	5.1		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	7.1		
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 2025 Future Background AM Peak Hour
3: Griffin Street N & Mcmurchie Lane

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	7	3	575	407	2
Future Volume (Veh/h)	8	7	3	575	407	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	8	3	625	442	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				59		
pX, platoon unblocked	0.84					
vC, conflicting volume	1074	443	444			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	992	443	444			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	99	100			
cM capacity (veh/h)	228	615	1116			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	17	628	444
Volume Left	9	3	0
Volume Right	8	0	2
cSH	324	1116	1700
Volume to Capacity	0.05	0.00	0.26
Queue Length 95th (m)	1.3	0.1	0.0
Control Delay (s)	16.7	0.1	0.0
Lane LOS	C	A	
Approach Delay (s)	16.7	0.1	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
4: Griffin Street & Griffin Street N/St Catharines St

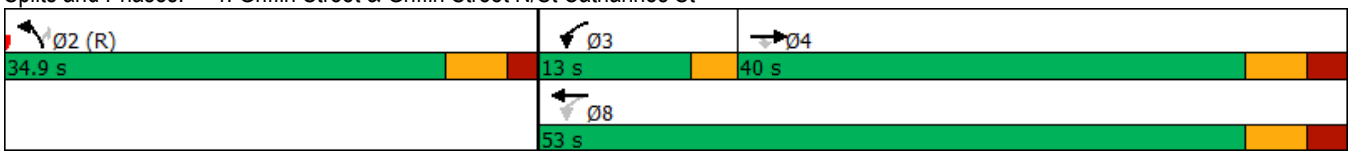
2025 Future Backgorund AM Peak Hour

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	298	168	107	331	213	156
Future Volume (vph)	298	168	107	331	213	156
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		30.0	20.0		0.0	15.0
Storage Lanes		1	1		1	1
Taper Length (m)			15.0		2.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1735	1475	1648	1735	1648	1475
Flt Permitted			0.334		0.950	
Satd. Flow (perm)	1735	1475	579	1735	1648	1475
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		183				133
Link Speed (k/h)	50			50	50	
Link Distance (m)	59.2			69.0	143.2	
Travel Time (s)	4.3			5.0	10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	324	183	116	360	232	170
Shared Lane Traffic (%)						
Lane Group Flow (vph)	324	183	116	360	232	170
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2	1	1	2	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (m)	30.5	6.1	6.1	30.5	6.1	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	1.8	6.1	6.1	1.8	6.1	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4	4	3	8	2	2
Switch Phase						
Minimum Initial (s)	10.0	10.0	6.0	10.0	8.0	8.0
Minimum Split (s)	32.8	32.8	9.0	32.8	26.1	26.1
Total Split (s)	40.0	40.0	13.0	53.0	34.9	34.9
Total Split (%)	45.5%	45.5%	14.8%	60.3%	39.7%	39.7%
Maximum Green (s)	33.2	33.2	10.0	46.2	28.8	28.8
Yellow Time (s)	4.1	4.1	3.0	4.1	4.1	4.1
All-Red Time (s)	2.7	2.7	0.0	2.7	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	3.0	6.8	6.1	6.1
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	C-Max	C-Max
Walk Time (s)	10.0	10.0		10.0	8.0	8.0
Flash Dont Walk (s)	16.0	16.0		16.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	22.7	22.7	36.5	32.7	42.3	42.3
Actuated g/C Ratio	0.26	0.26	0.42	0.37	0.48	0.48
v/c Ratio	0.72	0.35	0.33	0.56	0.29	0.22
Control Delay	38.6	5.5	16.3	23.8	17.9	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.6	5.5	16.3	23.8	17.9	6.2
LOS	D	A	B	C	B	A
Approach Delay	26.6			22.0	12.9	
Approach LOS	C			C	B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 87.9			
Actuated Cycle Length: 87.9			
Offset: 0 (0%), Referenced to phase 2:NBL and 6:, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 21.1		Intersection LOS: C	
Intersection Capacity Utilization 50.4%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 4: Griffin Street & Griffin Street N/St Catharines St



HCM Unsignalized Intersection Capacity Analysis 2025 Future Background PM Peak Hour
1: Wade Road N & West Street

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	491	39	10	357	22	6
Future Volume (Veh/h)	491	39	10	357	22	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	534	42	11	388	24	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			576		965	555
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			576		965	555
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		91	99
cM capacity (veh/h)			997		280	531

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	576	399	31
Volume Left	0	11	24
Volume Right	42	0	7
cSH	1700	997	313
Volume to Capacity	0.34	0.01	0.10
Queue Length 95th (m)	0.0	0.3	2.5
Control Delay (s)	0.0	0.4	17.8
Lane LOS		A	C
Approach Delay (s)	0.0	0.4	17.8
Approach LOS			C

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	40.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 2025 Future Background PM Peak Hour
2: Griffin Street N/Station Street & West Street

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	45	453	332	216	243	36
Future Volume (Veh/h)	45	453	332	216	243	36
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	49	492	361	235	264	39
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (m)				166		
pX, platoon unblocked						
vC, conflicting volume	1240	284	264			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1240	284	264			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	65	35	72			
cM capacity (veh/h)	140	755	1300			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	541	361	235	303
Volume Left	49	361	0	0
Volume Right	492	0	0	39
cSH	831	1300	1700	1700
Volume to Capacity	0.65	0.28	0.14	0.18
Queue Length 95th (m)	37.5	8.7	0.0	0.0
Control Delay (s)	20.6	8.8	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	20.6	5.3		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	9.9		
Intersection Capacity Utilization	53.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 2025 Future Background PM Peak Hour
3: Griffin Street N & Mcmurchie Lane

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	4	6	560	733	7
Future Volume (Veh/h)	3	4	6	560	733	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	4	7	609	797	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				59		
pX, platoon unblocked	0.85					
vC, conflicting volume	1424	801	805			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1410	801	805			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	99			
cM capacity (veh/h)	128	384	819			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	7	616	805
Volume Left	3	7	0
Volume Right	4	0	8
cSH	207	819	1700
Volume to Capacity	0.03	0.01	0.47
Queue Length 95th (m)	0.8	0.2	0.0
Control Delay (s)	23.0	0.2	0.0
Lane LOS	C	A	
Approach Delay (s)	23.0	0.2	0.0
Approach LOS	C		

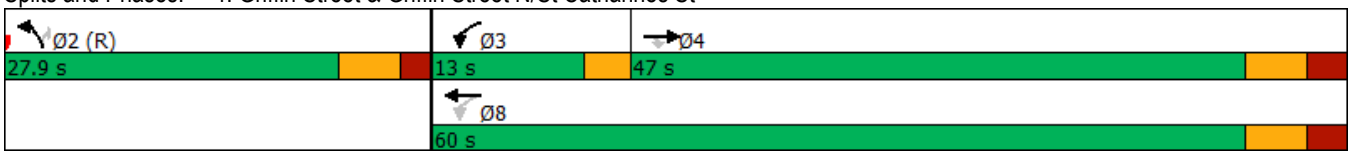
Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization		52.3%	ICU Level of Service A
Analysis Period (min)		15	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	507	263	216	399	172	143
Future Volume (vph)	507	263	216	399	172	143
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		30.0	20.0		0.0	15.0
Storage Lanes		1	1		1	1
Taper Length (m)			15.0		2.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1735	1475	1648	1735	1648	1475
Flt Permitted			0.214		0.950	
Satd. Flow (perm)	1735	1475	371	1735	1648	1475
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		194				134
Link Speed (k/h)	50			50	50	
Link Distance (m)	59.2			69.0	143.2	
Travel Time (s)	4.3			5.0	10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	551	286	235	434	187	155
Shared Lane Traffic (%)						
Lane Group Flow (vph)	551	286	235	434	187	155
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2	1	1	2	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (m)	30.5	6.1	6.1	30.5	6.1	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	1.8	6.1	6.1	1.8	6.1	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4	4	3	8	2	2
Switch Phase						
Minimum Initial (s)	10.0	10.0	6.0	10.0	8.0	8.0
Minimum Split (s)	32.8	32.8	9.0	32.8	26.1	26.1
Total Split (s)	47.0	47.0	13.0	60.0	27.9	27.9
Total Split (%)	53.5%	53.5%	14.8%	68.3%	31.7%	31.7%
Maximum Green (s)	40.2	40.2	10.0	53.2	21.8	21.8
Yellow Time (s)	4.1	4.1	3.0	4.1	4.1	4.1
All-Red Time (s)	2.7	2.7	0.0	2.7	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	3.0	6.8	6.1	6.1
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	C-Max	C-Max
Walk Time (s)	10.0	10.0		10.0	8.0	8.0
Flash Dont Walk (s)	16.0	16.0		16.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	34.3	34.3	51.0	47.2	27.8	27.8
Actuated g/C Ratio	0.39	0.39	0.58	0.54	0.32	0.32
v/c Ratio	0.82	0.41	0.66	0.47	0.36	0.28
Control Delay	33.8	7.5	17.4	13.7	27.8	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.8	7.5	17.4	13.7	27.8	8.2
LOS	C	A	B	B	C	A
Approach Delay	24.8			15.0	18.9	
Approach LOS	C			B	B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 87.9			
Actuated Cycle Length: 87.9			
Offset: 0 (0%), Referenced to phase 2:NBL and 6:, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 20.2		Intersection LOS: C	
Intersection Capacity Utilization 66.4%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 4: Griffin Street & Griffin Street N/St Catharines St



HCM Unsignalized Intersection Capacity Analysis 2025 Future Total AM Peak Hour
1: Wade Road N & West Street

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	241	14	10	438	44	32
Future Volume (Veh/h)	241	14	10	438	44	32
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	262	15	11	476	48	35
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			277		768	270
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			277		768	270
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		87	95
cM capacity (veh/h)			1286		367	769

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	277	487	83
Volume Left	0	11	48
Volume Right	15	0	35
cSH	1700	1286	471
Volume to Capacity	0.16	0.01	0.18
Queue Length 95th (m)	0.0	0.2	4.8
Control Delay (s)	0.0	0.3	14.3
Lane LOS		A	B
Approach Delay (s)	0.0	0.3	14.3
Approach LOS			B

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	45.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 2025 Future Total AM Peak Hour
2: Griffin Street N/Station Street & West Street

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	57	218	375	245	150	74
Future Volume (Veh/h)	57	218	375	245	150	74
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	237	408	266	163	80
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (m)				166		
pX, platoon unblocked						
vC, conflicting volume	1285	203	163			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1285	203	163			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	52	72	71			
cM capacity (veh/h)	129	838	1416			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	299	408	266	243
Volume Left	62	408	0	0
Volume Right	237	0	0	80
cSH	624	1416	1700	1700
Volume to Capacity	0.48	0.29	0.16	0.14
Queue Length 95th (m)	19.7	9.1	0.0	0.0
Control Delay (s)	20.4	8.6	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	20.4	5.2		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	7.9		
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	7	3	590	427	3
Future Volume (Veh/h)	8	7	3	590	427	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	8	3	641	464	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				59		
pX, platoon unblocked	0.84					
vC, conflicting volume	1112	466	467			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1038	466	467			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	99	100			
cM capacity (veh/h)	214	597	1094			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	17	644	467
Volume Left	9	3	0
Volume Right	8	0	3
cSH	307	1094	1700
Volume to Capacity	0.06	0.00	0.27
Queue Length 95th (m)	1.3	0.1	0.0
Control Delay (s)	17.4	0.1	0.0
Lane LOS	C	A	
Approach Delay (s)	17.4	0.1	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	46.3%	ICU Level of Service	A
Analysis Period (min)	15		

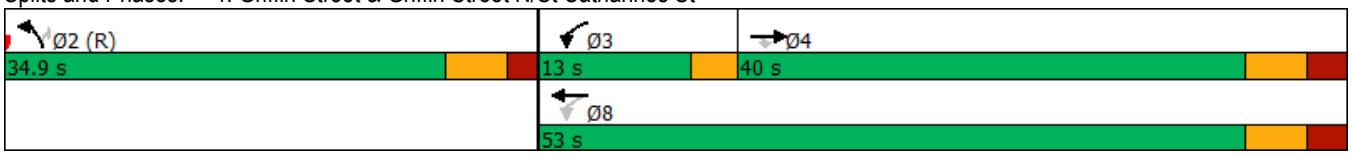
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	308	177	109	334	225	162
Future Volume (vph)	308	177	109	334	225	162
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		30.0	20.0		0.0	15.0
Storage Lanes		1	1		1	1
Taper Length (m)			15.0		2.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1735	1475	1648	1735	1648	1475
Flt Permitted			0.326		0.950	
Satd. Flow (perm)	1735	1475	566	1735	1648	1475
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		187				130
Link Speed (k/h)	50			50	50	
Link Distance (m)	59.2			69.0	143.2	
Travel Time (s)	4.3			5.0	10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	335	192	118	363	245	176
Shared Lane Traffic (%)						
Lane Group Flow (vph)	335	192	118	363	245	176
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2	1	1	2	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (m)	30.5	6.1	6.1	30.5	6.1	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	1.8	6.1	6.1	1.8	6.1	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2

Lanes, Volumes, Timings 2025 Future Total AM Peak Hour
4: Griffin Street & Griffin Street N/St Catharines St

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4	4	3	8	2	2
Switch Phase						
Minimum Initial (s)	10.0	10.0	6.0	10.0	8.0	8.0
Minimum Split (s)	32.8	32.8	9.0	32.8	26.1	26.1
Total Split (s)	40.0	40.0	13.0	53.0	34.9	34.9
Total Split (%)	45.5%	45.5%	14.8%	60.3%	39.7%	39.7%
Maximum Green (s)	33.2	33.2	10.0	46.2	28.8	28.8
Yellow Time (s)	4.1	4.1	3.0	4.1	4.1	4.1
All-Red Time (s)	2.7	2.7	0.0	2.7	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	3.0	6.8	6.1	6.1
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	C-Max	C-Max
Walk Time (s)	10.0	10.0		10.0	8.0	8.0
Flash Dont Walk (s)	16.0	16.0		16.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	23.3	23.3	37.1	33.3	41.7	41.7
Actuated g/C Ratio	0.27	0.27	0.42	0.38	0.47	0.47
v/c Ratio	0.73	0.36	0.34	0.55	0.31	0.23
Control Delay	38.2	5.7	16.0	23.2	18.7	6.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.2	5.7	16.0	23.2	18.7	6.9
LOS	D	A	B	C	B	A
Approach Delay	26.4			21.4	13.8	
Approach LOS	C			C	B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 87.9			
Actuated Cycle Length: 87.9			
Offset: 0 (0%), Referenced to phase 2:NBL and 6:, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 21.0		Intersection LOS: C	
Intersection Capacity Utilization 51.8%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 4: Griffin Street & Griffin Street N/St Catharines St



HCM Unsignalized Intersection Capacity Analysis 2025 Future Total PM Peak Hour
1: Wade Road N & West Street

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	497	49	30	360	26	22
Future Volume (Veh/h)	497	49	30	360	26	22
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	540	53	33	391	28	24
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			593		1024	566
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			593		1024	566
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		89	95
cM capacity (veh/h)			983		252	523

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	593	424	52
Volume Left	0	33	28
Volume Right	53	0	24
cSH	1700	983	331
Volume to Capacity	0.35	0.03	0.16
Queue Length 95th (m)	0.0	0.8	4.2
Control Delay (s)	0.0	1.0	17.9
Lane LOS		A	C
Approach Delay (s)	0.0	1.0	17.9
Approach LOS			C

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 2025 Future Total PM Peak Hour
2: Griffin Street N/Station Street & West Street

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	48	472	353	218	250	38
Future Volume (Veh/h)	48	472	353	218	250	38
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	52	513	384	237	272	41
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (m)				166		
pX, platoon unblocked						
vC, conflicting volume	1298	292	272			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1298	292	272			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	59	31	70			
cM capacity (veh/h)	125	747	1291			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	565	384	237	313
Volume Left	52	384	0	0
Volume Right	513	0	0	41
cSH	822	1291	1700	1700
Volume to Capacity	0.69	0.30	0.14	0.18
Queue Length 95th (m)	42.6	9.5	0.0	0.0
Control Delay (s)	22.7	9.0	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	22.7	5.5		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	10.9		
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis Township of West Lincoln 2025 Future Total PM Peak Hour
3: Griffin Street N & Mcmurchie Lane

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	4	6	582	755	11
Future Volume (Veh/h)	3	4	6	582	755	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	4	7	633	821	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				59		
pX, platoon unblocked	0.84					
vC, conflicting volume	1474	827	833			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1469	827	833			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	99			
cM capacity (veh/h)	117	371	800			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	7	640	833
Volume Left	3	7	0
Volume Right	4	0	12
cSH	192	800	1700
Volume to Capacity	0.04	0.01	0.49
Queue Length 95th (m)	0.9	0.2	0.0
Control Delay (s)	24.4	0.2	0.0
Lane LOS	C	A	
Approach Delay (s)	24.4	0.2	0.0
Approach LOS	C		

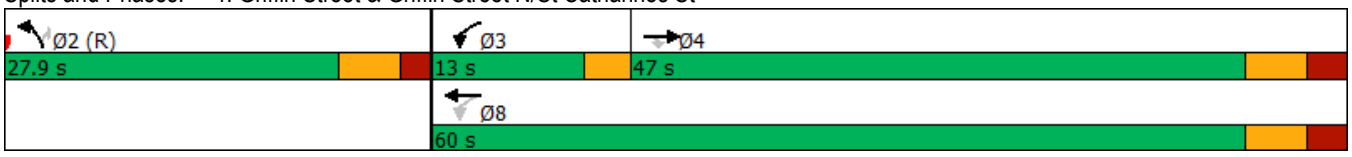
Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	514	278	222	411	182	147
Future Volume (vph)	514	278	222	411	182	147
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		30.0	20.0		0.0	15.0
Storage Lanes		1	1		1	1
Taper Length (m)			15.0		2.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1735	1475	1648	1735	1648	1475
Flt Permitted			0.210		0.950	
Satd. Flow (perm)	1735	1475	364	1735	1648	1475
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		202				131
Link Speed (k/h)	50			50	50	
Link Distance (m)	59.2			69.0	143.2	
Travel Time (s)	4.3			5.0	10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	559	302	241	447	198	160
Shared Lane Traffic (%)						
Lane Group Flow (vph)	559	302	241	447	198	160
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2	1	1	2	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (m)	30.5	6.1	6.1	30.5	6.1	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	1.8	6.1	6.1	1.8	6.1	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4	4	3	8	2	2
Switch Phase						
Minimum Initial (s)	10.0	10.0	6.0	10.0	8.0	8.0
Minimum Split (s)	32.8	32.8	9.0	32.8	26.1	26.1
Total Split (s)	47.0	47.0	13.0	60.0	27.9	27.9
Total Split (%)	53.5%	53.5%	14.8%	68.3%	31.7%	31.7%
Maximum Green (s)	40.2	40.2	10.0	53.2	21.8	21.8
Yellow Time (s)	4.1	4.1	3.0	4.1	4.1	4.1
All-Red Time (s)	2.7	2.7	0.0	2.7	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	3.0	6.8	6.1	6.1
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	C-Max	C-Max
Walk Time (s)	10.0	10.0		10.0	8.0	8.0
Flash Dont Walk (s)	16.0	16.0		16.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	34.6	34.6	51.3	47.5	27.5	27.5
Actuated g/C Ratio	0.39	0.39	0.58	0.54	0.31	0.31
v/c Ratio	0.82	0.43	0.68	0.48	0.38	0.29
Control Delay	33.9	7.7	18.2	13.7	28.4	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.9	7.7	18.2	13.7	28.4	9.0
LOS	C	A	B	B	C	A
Approach Delay	24.7			15.3	19.7	
Approach LOS	C			B	B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 87.9			
Actuated Cycle Length: 87.9			
Offset: 0 (0%), Referenced to phase 2:NBL and 6:, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 20.4		Intersection LOS: C	
Intersection Capacity Utilization 67.8%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 4: Griffin Street & Griffin Street N/St Catharines St



HCM Unsignalized Intersection Capacity Analysis 2030 Future Background AM Peak Hour
1: Wade Road N & West Street

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	265	12	3	479	34	9
Future Volume (Veh/h)	265	12	3	479	34	9
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	288	13	3	521	37	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			301		822	294
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			301		822	294
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		89	99
cM capacity (veh/h)			1260		343	745

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	301	524	47
Volume Left	0	3	37
Volume Right	13	0	10
cSH	1700	1260	388
Volume to Capacity	0.18	0.00	0.12
Queue Length 95th (m)	0.0	0.1	3.1
Control Delay (s)	0.0	0.1	15.6
Lane LOS		A	C
Approach Delay (s)	0.0	0.1	15.6
Approach LOS			C

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	40.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 2030 Future Background AM Peak Hour
2: Griffin Street N/Station Street & West Street

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	55	221	402	267	164	81
Future Volume (Veh/h)	55	221	402	267	164	81
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	60	240	437	290	178	88
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (m)				166		
pX, platoon unblocked						
vC, conflicting volume	1386	222	178			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1386	222	178			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	45	71	69			
cM capacity (veh/h)	108	818	1398			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	300	437	290	266
Volume Left	60	437	0	0
Volume Right	240	0	0	88
cSH	542	1398	1700	1700
Volume to Capacity	0.55	0.31	0.17	0.16
Queue Length 95th (m)	25.4	10.3	0.0	0.0
Control Delay (s)	23.6	8.7	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	23.6	5.3		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	8.4		
Intersection Capacity Utilization	52.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 2030 Future Background AM Peak Hour
3: Griffin Street N & Mcmurchie Lane

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	7	3	636	451	2
Future Volume (Veh/h)	8	7	3	636	451	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	8	3	691	490	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				59		
pX, platoon unblocked	0.83					
vC, conflicting volume	1188	491	492			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1123	491	492			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	99	100			
cM capacity (veh/h)	188	578	1071			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	17	694	492
Volume Left	9	3	0
Volume Right	8	0	2
cSH	275	1071	1700
Volume to Capacity	0.06	0.00	0.29
Queue Length 95th (m)	1.5	0.1	0.0
Control Delay (s)	18.9	0.1	0.0
Lane LOS	C	A	
Approach Delay (s)	18.9	0.1	0.0
Approach LOS	C		

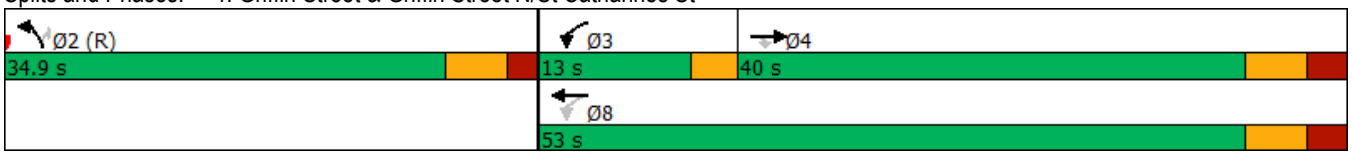
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	48.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	329	187	118	365	237	172
Future Volume (vph)	329	187	118	365	237	172
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		30.0	20.0		0.0	15.0
Storage Lanes		1	1		1	1
Taper Length (m)			15.0		2.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1735	1475	1648	1735	1648	1475
Flt Permitted			0.307		0.950	
Satd. Flow (perm)	1735	1475	533	1735	1648	1475
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		185				131
Link Speed (k/h)	50			50	50	
Link Distance (m)	59.2			69.0	143.2	
Travel Time (s)	4.3			5.0	10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	358	203	128	397	258	187
Shared Lane Traffic (%)						
Lane Group Flow (vph)	358	203	128	397	258	187
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2	1	1	2	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (m)	30.5	6.1	6.1	30.5	6.1	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	1.8	6.1	6.1	1.8	6.1	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4	4	3	8	2	2
Switch Phase						
Minimum Initial (s)	10.0	10.0	6.0	10.0	8.0	8.0
Minimum Split (s)	32.8	32.8	9.0	32.8	26.1	26.1
Total Split (s)	40.0	40.0	13.0	53.0	34.9	34.9
Total Split (%)	45.5%	45.5%	14.8%	60.3%	39.7%	39.7%
Maximum Green (s)	33.2	33.2	10.0	46.2	28.8	28.8
Yellow Time (s)	4.1	4.1	3.0	4.1	4.1	4.1
All-Red Time (s)	2.7	2.7	0.0	2.7	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	3.0	6.8	6.1	6.1
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	C-Max	C-Max
Walk Time (s)	10.0	10.0		10.0	8.0	8.0
Flash Dont Walk (s)	16.0	16.0		16.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	24.3	24.3	40.2	36.4	38.6	38.6
Actuated g/C Ratio	0.28	0.28	0.46	0.41	0.44	0.44
v/c Ratio	0.75	0.38	0.36	0.55	0.36	0.26
Control Delay	38.2	6.3	15.2	21.7	20.4	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.2	6.3	15.2	21.7	20.4	7.9
LOS	D	A	B	C	C	A
Approach Delay	26.7			20.1	15.2	
Approach LOS	C			C	B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 87.9			
Actuated Cycle Length: 87.9			
Offset: 0 (0%), Referenced to phase 2:NBL and 6:, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.75			
Intersection Signal Delay: 21.1		Intersection LOS: C	
Intersection Capacity Utilization 54.2%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 4: Griffin Street & Griffin Street N/St Catharines St



HCM Unsignalized Intersection Capacity Analysis 2030 Future Background PM Peak Hour
1: Wade Road N & West Street

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	543	39	10	395	22	6
Future Volume (Veh/h)	543	39	10	395	22	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	590	42	11	429	24	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			632		1062	611
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			632		1062	611
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		90	99
cM capacity (veh/h)			951		245	494

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	632	440	31
Volume Left	0	11	24
Volume Right	42	0	7
cSH	1700	951	276
Volume to Capacity	0.37	0.01	0.11
Queue Length 95th (m)	0.0	0.3	2.8
Control Delay (s)	0.0	0.4	19.7
Lane LOS		A	C
Approach Delay (s)	0.0	0.4	19.7
Approach LOS			C

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		43.6%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis 2030 Future Background PM Peak Hour
2: Griffin Street N/Station Street & West Street

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	50	501	367	240	269	40
Future Volume (Veh/h)	50	501	367	240	269	40
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	54	545	399	261	292	43
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (m)				166		
pX, platoon unblocked						
vC, conflicting volume	1372	314	292			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1372	314	292			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	51	25	69			
cM capacity (veh/h)	110	727	1270			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	599	399	261	335
Volume Left	54	399	0	0
Volume Right	545	0	0	43
cSH	799	1270	1700	1700
Volume to Capacity	0.75	0.31	0.15	0.20
Queue Length 95th (m)	53.4	10.3	0.0	0.0
Control Delay (s)	27.1	9.1	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	27.1	5.5		0.0
Approach LOS	D			

Intersection Summary			
Average Delay	12.5		
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 2030 Future Background PM Peak Hour
3: Griffin Street N & Mcmurchie Lane

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	4	6	619	811	7
Future Volume (Veh/h)	3	4	6	619	811	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	4	7	673	882	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				59		
pX, platoon unblocked	0.83					
vC, conflicting volume	1573	886	890			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1588	886	890			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	99			
cM capacity (veh/h)	98	343	761			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	7	680	890
Volume Left	3	7	0
Volume Right	4	0	8
cSH	165	761	1700
Volume to Capacity	0.04	0.01	0.52
Queue Length 95th (m)	1.0	0.2	0.0
Control Delay (s)	27.7	0.2	0.0
Lane LOS	D	A	
Approach Delay (s)	27.7	0.2	0.0
Approach LOS	D		

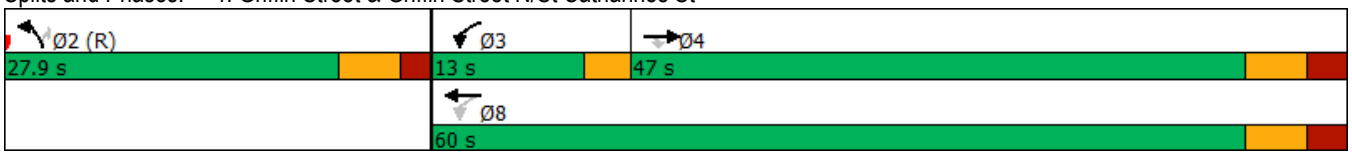
Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	560	292	239	441	190	158
Future Volume (vph)	560	292	239	441	190	158
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		30.0	20.0		0.0	15.0
Storage Lanes		1	1		1	1
Taper Length (m)			15.0		2.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1735	1475	1648	1735	1648	1475
Flt Permitted			0.183		0.950	
Satd. Flow (perm)	1735	1475	317	1735	1648	1475
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		194				135
Link Speed (k/h)	50			50	50	
Link Distance (m)	59.2			69.0	143.2	
Travel Time (s)	4.3			5.0	10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	609	317	260	479	207	172
Shared Lane Traffic (%)						
Lane Group Flow (vph)	609	317	260	479	207	172
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2	1	1	2	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (m)	30.5	6.1	6.1	30.5	6.1	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	1.8	6.1	6.1	1.8	6.1	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4	4	3	8	2	2
Switch Phase						
Minimum Initial (s)	10.0	10.0	6.0	10.0	8.0	8.0
Minimum Split (s)	32.8	32.8	9.0	32.8	26.1	26.1
Total Split (s)	47.0	47.0	13.0	60.0	27.9	27.9
Total Split (%)	53.5%	53.5%	14.8%	68.3%	31.7%	31.7%
Maximum Green (s)	40.2	40.2	10.0	53.2	21.8	21.8
Yellow Time (s)	4.1	4.1	3.0	4.1	4.1	4.1
All-Red Time (s)	2.7	2.7	0.0	2.7	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	3.0	6.8	6.1	6.1
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	C-Max	C-Max
Walk Time (s)	10.0	10.0		10.0	8.0	8.0
Flash Dont Walk (s)	16.0	16.0		16.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	36.2	36.2	52.9	49.1	25.9	25.9
Actuated g/C Ratio	0.41	0.41	0.60	0.56	0.29	0.29
v/c Ratio	0.85	0.44	0.76	0.49	0.43	0.33
Control Delay	35.7	8.3	25.1	13.2	30.1	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.7	8.3	25.1	13.2	30.1	9.9
LOS	D	A	C	B	C	A
Approach Delay	26.3			17.4	20.9	
Approach LOS	C			B	C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 87.9			
Actuated Cycle Length: 87.9			
Offset: 0 (0%), Referenced to phase 2:NBL and 6:, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 22.1		Intersection LOS: C	
Intersection Capacity Utilization 71.9%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 4: Griffin Street & Griffin Street N/St Catharines St



HCM Unsignalized Intersection Capacity Analysis 2030 Future Total AM Peak Hour
1: Wade Road N & West Street

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	266	14	10	484	44	32
Future Volume (Veh/h)	266	14	10	484	44	32
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	289	15	11	526	48	35
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			304		844	296
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			304		844	296
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		85	95
cM capacity (veh/h)			1257		330	743

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	304	537	83
Volume Left	0	11	48
Volume Right	15	0	35
cSH	1700	1257	431
Volume to Capacity	0.18	0.01	0.19
Queue Length 95th (m)	0.0	0.2	5.3
Control Delay (s)	0.0	0.3	15.3
Lane LOS		A	C
Approach Delay (s)	0.0	0.3	15.3
Approach LOS			C

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	47.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 2030 Future Total AM Peak Hour
2: Griffin Street N/Station Street & West Street

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	62	239	413	271	166	82
Future Volume (Veh/h)	62	239	413	271	166	82
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	260	449	295	180	89
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (m)				166		
pX, platoon unblocked						
vC, conflicting volume	1418	224	180			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1418	224	180			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	35	68	68			
cM capacity (veh/h)	102	815	1396			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	327	449	295	269
Volume Left	67	449	0	0
Volume Right	260	0	0	89
cSH	445	1396	1700	1700
Volume to Capacity	0.73	0.32	0.17	0.16
Queue Length 95th (m)	45.1	10.7	0.0	0.0
Control Delay (s)	32.4	8.8	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	32.4	5.3		0.0
Approach LOS	D			

Intersection Summary			
Average Delay	10.8		
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 2030 Future Total AM Peak Hour
3: Griffin Street N & Mcmurchie Lane

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	7	3	651	471	3
Future Volume (Veh/h)	8	7	3	651	471	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	8	3	708	512	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				59		
pX, platoon unblocked	0.83					
vC, conflicting volume	1228	514	515			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1171	514	515			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	99	100			
cM capacity (veh/h)	176	561	1051			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	17	711	515
Volume Left	9	3	0
Volume Right	8	0	3
cSH	260	1051	1700
Volume to Capacity	0.07	0.00	0.30
Queue Length 95th (m)	1.6	0.1	0.0
Control Delay (s)	19.8	0.1	0.0
Lane LOS	C	A	
Approach Delay (s)	19.8	0.1	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	49.8%	ICU Level of Service	A
Analysis Period (min)	15		

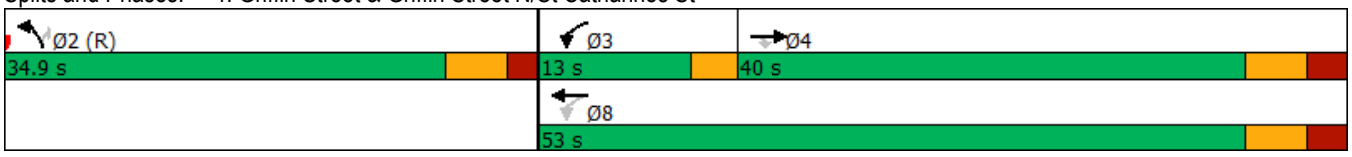
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	339	196	120	368	249	178
Future Volume (vph)	339	196	120	368	249	178
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		30.0	20.0		0.0	15.0
Storage Lanes		1	1		1	1
Taper Length (m)			15.0		2.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1735	1475	1648	1735	1648	1475
Flt Permitted			0.300		0.950	
Satd. Flow (perm)	1735	1475	520	1735	1648	1475
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		188				129
Link Speed (k/h)	50			50	50	
Link Distance (m)	59.2			69.0	143.2	
Travel Time (s)	4.3			5.0	10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	368	213	130	400	271	193
Shared Lane Traffic (%)						
Lane Group Flow (vph)	368	213	130	400	271	193
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2	1	1	2	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (m)	30.5	6.1	6.1	30.5	6.1	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	1.8	6.1	6.1	1.8	6.1	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2

Lanes, Volumes, Timings 2030 Future Total AM Peak Hour
4: Griffin Street & Griffin Street N/St Catharines St

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4	4	3	8	2	2
Switch Phase						
Minimum Initial (s)	10.0	10.0	6.0	10.0	8.0	8.0
Minimum Split (s)	32.8	32.8	9.0	32.8	26.1	26.1
Total Split (s)	40.0	40.0	13.0	53.0	34.9	34.9
Total Split (%)	45.5%	45.5%	14.8%	60.3%	39.7%	39.7%
Maximum Green (s)	33.2	33.2	10.0	46.2	28.8	28.8
Yellow Time (s)	4.1	4.1	3.0	4.1	4.1	4.1
All-Red Time (s)	2.7	2.7	0.0	2.7	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	3.0	6.8	6.1	6.1
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	C-Max	C-Max
Walk Time (s)	10.0	10.0		10.0	8.0	8.0
Flash Dont Walk (s)	16.0	16.0		16.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	24.8	24.8	40.6	36.8	38.2	38.2
Actuated g/C Ratio	0.28	0.28	0.46	0.42	0.43	0.43
v/c Ratio	0.75	0.39	0.37	0.55	0.38	0.27
Control Delay	38.2	6.7	15.1	21.3	21.1	8.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.2	6.7	15.1	21.3	21.1	8.5
LOS	D	A	B	C	C	A
Approach Delay	26.6			19.8	15.8	
Approach LOS	C			B	B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 87.9			
Actuated Cycle Length: 87.9			
Offset: 0 (0%), Referenced to phase 2:NBL and 6:, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.75			
Intersection Signal Delay: 21.1		Intersection LOS: C	
Intersection Capacity Utilization 55.7%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: Griffin Street & Griffin Street N/St Catharines St



HCM Unsignalized Intersection Capacity Analysis 2030 Future Total PM Peak Hour
1: Wade Road N & West Street

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	549	49	30	398	26	22
Future Volume (Veh/h)	549	49	30	398	26	22
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	597	53	33	433	28	24
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			650		1122	624
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			650		1122	624
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		87	95
cM capacity (veh/h)			936		220	486

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	650	466	52
Volume Left	0	33	28
Volume Right	53	0	24
cSH	1700	936	294
Volume to Capacity	0.38	0.04	0.18
Queue Length 95th (m)	0.0	0.8	4.8
Control Delay (s)	0.0	1.0	19.9
Lane LOS		A	C
Approach Delay (s)	0.0	1.0	19.9
Approach LOS			C

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
Township of West Lincoln 2030 Future Total PM Peak Hour

2: Griffin Street N/Station Street & West Street

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	53	520	388	242	276	42
Future Volume (Veh/h)	53	520	388	242	276	42
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	58	565	422	263	300	46
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (m)				166		
pX, platoon unblocked						
vC, conflicting volume	1430	323	300			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1430	323	300			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	41	21	67			
cM capacity (veh/h)	99	718	1261			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	623	422	263	346
Volume Left	58	422	0	0
Volume Right	565	0	0	46
cSH	792	1261	1700	1700
Volume to Capacity	0.79	0.33	0.15	0.20
Queue Length 95th (m)	61.0	11.3	0.0	0.0
Control Delay (s)	31.3	9.3	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	31.3	5.7		0.0
Approach LOS	D			

Intersection Summary			
Average Delay	14.2		
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis Township of West Lincoln 2030 Future Total PM Peak Hour
3: Griffin Street N & Mcmurchie Lane

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	4	6	641	833	11
Future Volume (Veh/h)	3	4	6	641	833	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	4	7	697	905	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				59		
pX, platoon unblocked	0.83					
vC, conflicting volume	1622	911	917			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1648	911	917			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	99			
cM capacity (veh/h)	89	332	744			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	7	704	917
Volume Left	3	7	0
Volume Right	4	0	12
cSH	153	744	1700
Volume to Capacity	0.05	0.01	0.54
Queue Length 95th (m)	1.1	0.2	0.0
Control Delay (s)	29.6	0.3	0.0
Lane LOS	D	A	
Approach Delay (s)	29.6	0.3	0.0
Approach LOS	D		

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	58.3%	ICU Level of Service	B
Analysis Period (min)	15		

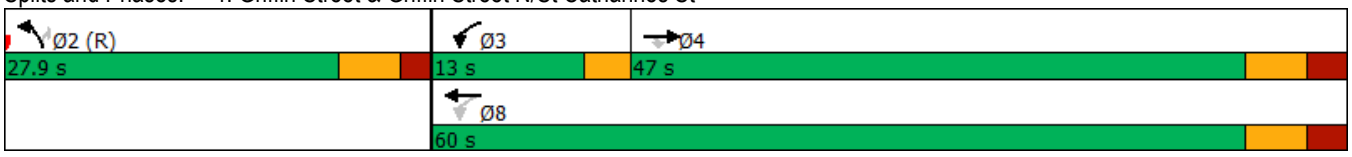
Lanes, Volumes, Timings 2030 Future Total PM Peak Hour
4: Griffin Street & Griffin Street N/St Catharines St

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	567	307	245	453	200	162
Future Volume (vph)	567	307	245	453	200	162
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		30.0	20.0		0.0	15.0
Storage Lanes		1	1		1	1
Taper Length (m)			15.0		2.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1735	1475	1648	1735	1648	1475
Flt Permitted			0.181		0.950	
Satd. Flow (perm)	1735	1475	314	1735	1648	1475
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		202				131
Link Speed (k/h)	50			50	50	
Link Distance (m)	59.2			69.0	143.2	
Travel Time (s)	4.3			5.0	10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	616	334	266	492	217	176
Shared Lane Traffic (%)						
Lane Group Flow (vph)	616	334	266	492	217	176
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2	1	1	2	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (m)	30.5	6.1	6.1	30.5	6.1	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	1.8	6.1	6.1	1.8	6.1	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4	4	3	8	2	2
Switch Phase						
Minimum Initial (s)	10.0	10.0	6.0	10.0	8.0	8.0
Minimum Split (s)	32.8	32.8	9.0	32.8	26.1	26.1
Total Split (s)	47.0	47.0	13.0	60.0	27.9	27.9
Total Split (%)	53.5%	53.5%	14.8%	68.3%	31.7%	31.7%
Maximum Green (s)	40.2	40.2	10.0	53.2	21.8	21.8
Yellow Time (s)	4.1	4.1	3.0	4.1	4.1	4.1
All-Red Time (s)	2.7	2.7	0.0	2.7	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	3.0	6.8	6.1	6.1
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	C-Max	C-Max
Walk Time (s)	10.0	10.0		10.0	8.0	8.0
Flash Dont Walk (s)	16.0	16.0		16.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	36.5	36.5	53.3	49.5	25.5	25.5
Actuated g/C Ratio	0.42	0.42	0.61	0.56	0.29	0.29
v/c Ratio	0.86	0.46	0.78	0.50	0.45	0.34
Control Delay	35.7	8.5	26.6	13.2	30.8	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.7	8.5	26.6	13.2	30.8	10.7
LOS	D	A	C	B	C	B
Approach Delay	26.2			17.9	21.8	
Approach LOS	C			B	C	

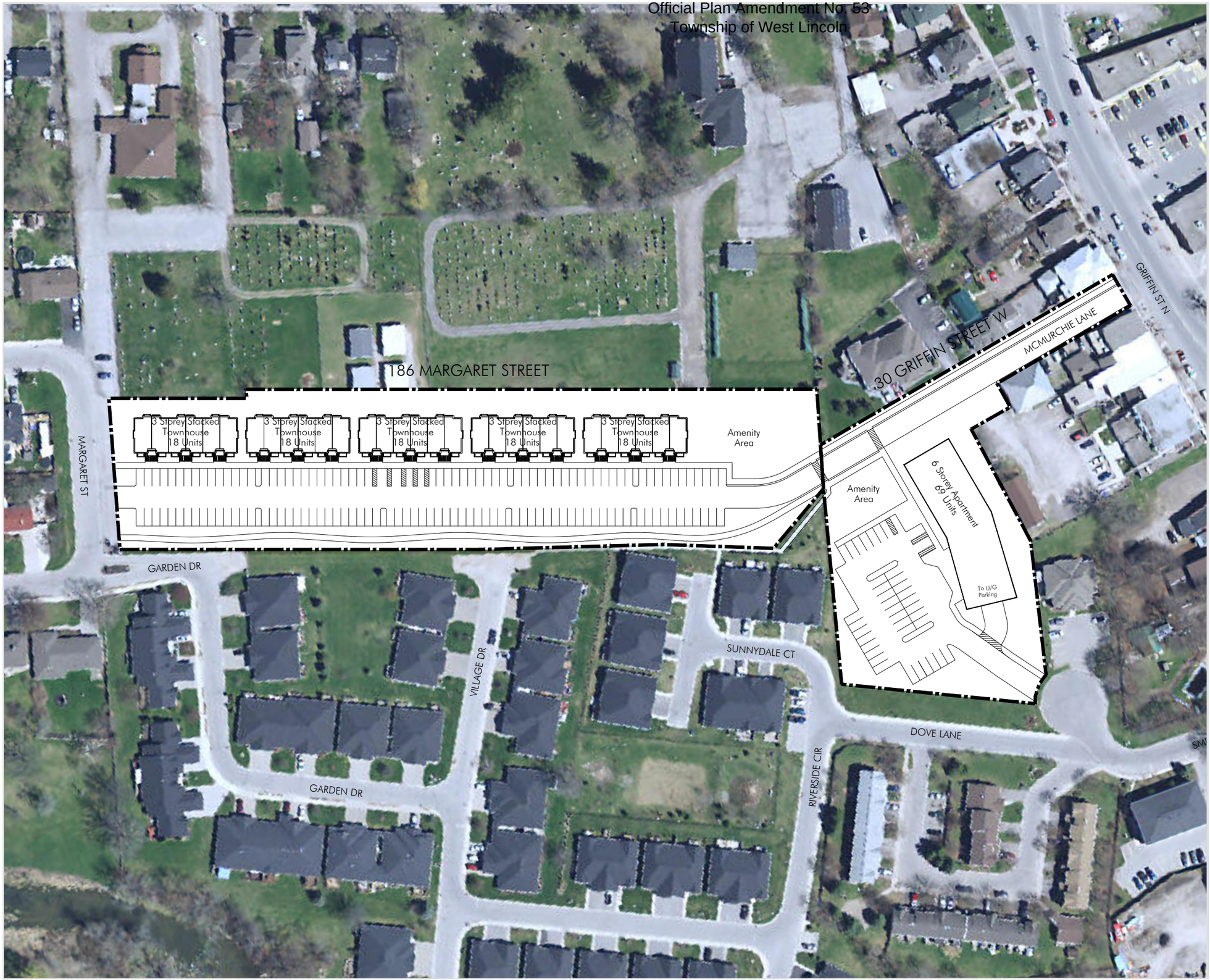
Intersection Summary			
Area Type:	Other		
Cycle Length: 87.9			
Actuated Cycle Length: 87.9			
Offset: 0 (0%), Referenced to phase 2:NBL and 6:, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 22.4		Intersection LOS: C	
Intersection Capacity Utilization 73.3%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 4: Griffin Street & Griffin Street N/St Catharines St



FIGURES

Schedule "B" to
Official Plan Amendment No. 53
Township of West Lincoln



Concept Plan

St. Martin School
186 Margaret St
Township of West Lincoln

Subject Lands

ZONING: RM3 & RH

186 Margaret Street
Area: ±1.264 ha
Units: 90
Density: 71.2 upha

Parking Required: 1.5 spaces/unit: 135
4% accessible spaces: 5

Parking Provided: 1.5 spaces/unit: 135
4% accessible spaces: 5

30 Griffin Street W
Area: ±0.719 ha
Units: 69
Density: 95.9 upha

Parking Required: 1.5 spaces/unit: 86
4% accessible spaces: 4

Parking Provided: 1.5 spaces/unit: 86
36 Surface
50 Underground
4% accessible spaces:
4 Surface

Notes:
SWOOP 2015 Aerial Imagery

Date: January 23, 2020

Scale: 1:1,250

File: 08234V

Drawn: JB

North

K:\08234V - SCHOOL SITE CONCEPT PLANS\CP\186 MARGARET ST\MARGARET_CP_23JAN2020.DWG

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
200-540 BINGEMANS CENTRE DR, KITCHENER, ON, N2B 3X9
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NOTE:
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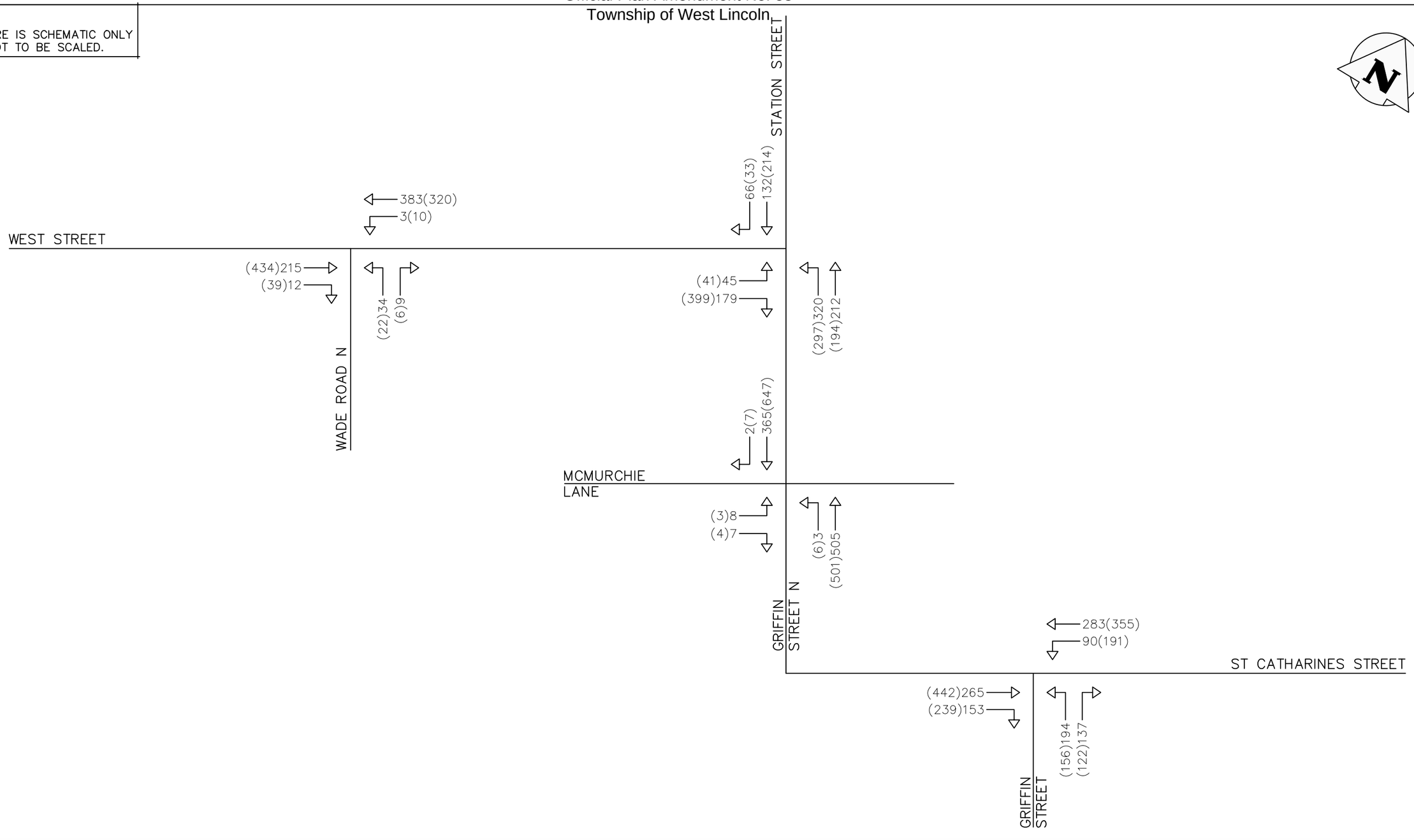

LEGEND:
AM(PM) WEEKDAY AM(PM) TRIP DISTRIBUTION

186 MARGARET STREET
TOWNSHIP OF WEST LINCOLN

2020 EXISTING TRAFFIC VOLUMES

CROZIER & ASSOCIATES Consulting Engineers
2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905 875-0026 T
905 875-4915 F
www.cfcrozier.ca

Drawn	Design	Project No.	
A.K.			529–5575
Check	Check	Scale	Dwg.
K.S.		N.T.S	FIG. 02

Schedule "B" to
Official Plan Amendment No. 53
Township of West Lincoln

NOTE:
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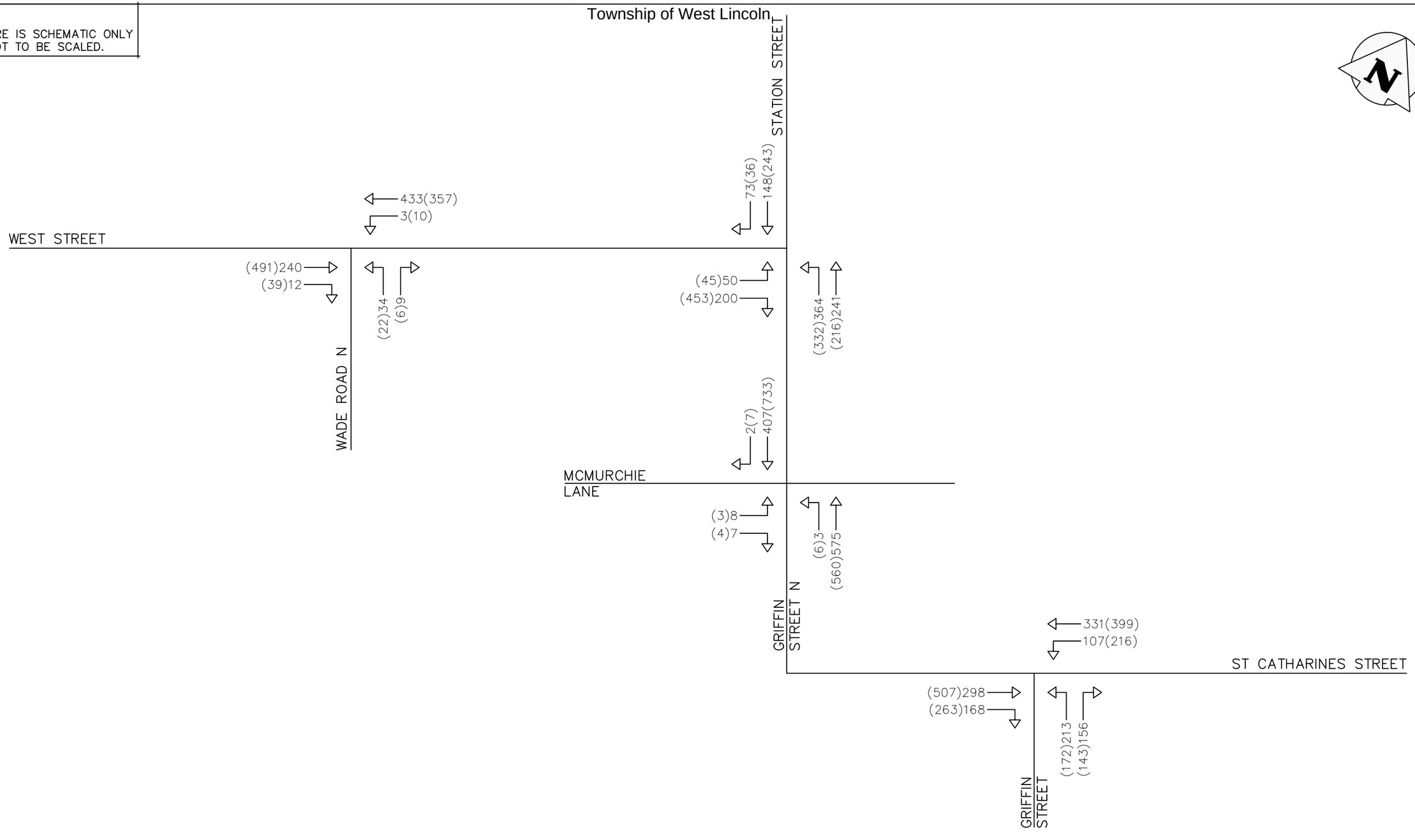

LEGEND:
AM(PM) WEEKDAY AM(PM) TRIP DISTRIBUTION

186 MARGARET STREET
TOWNSHIP OF WEST LINCOLN

2025 FUTURE BACKGROUND
TRAFFIC VOLUMES

CROZIER & ASSOCIATES Consulting Engineers
2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905 875-0026 T
905 875-4915 F
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Drawn	Design	Project No.	
A.K.			529–5575
Check	Check	Scale	Dwg.
K.S.		N.T.S	FIG. 03

Schedule "B" to
Official Plan Amendment No. 53
Township of West Lincoln

NOTE:
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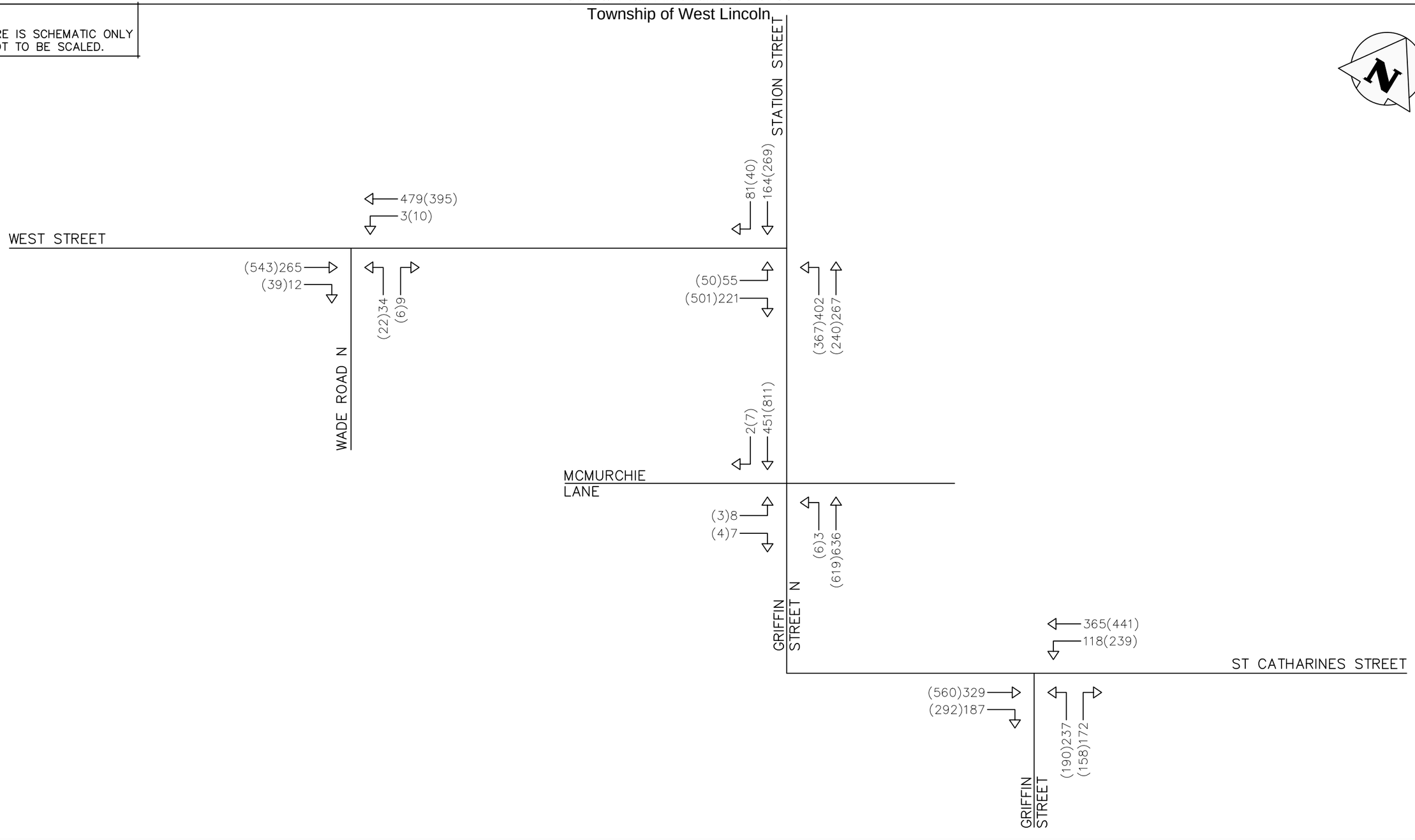

LEGEND:
AM(PM) WEEKDAY AM(PM) TRIP DISTRIBUTION

186 MARGARET STREET
TOWNSHIP OF WEST LINCOLN

2030 FUTURE BACKGROUND
TRAFFIC VOLUMES

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2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905 875-0026 T
905 875-4915 F
www.cfcrozier.ca

Drawn	Design	Project No.	
A.K.			529–5575
Check	Check	Scale	Dwg.
K.S.		N.T.S	FIG. 04

Schedule "B" to
Official Plan Amendment No. 53
Township of West Lincoln

NOTE:
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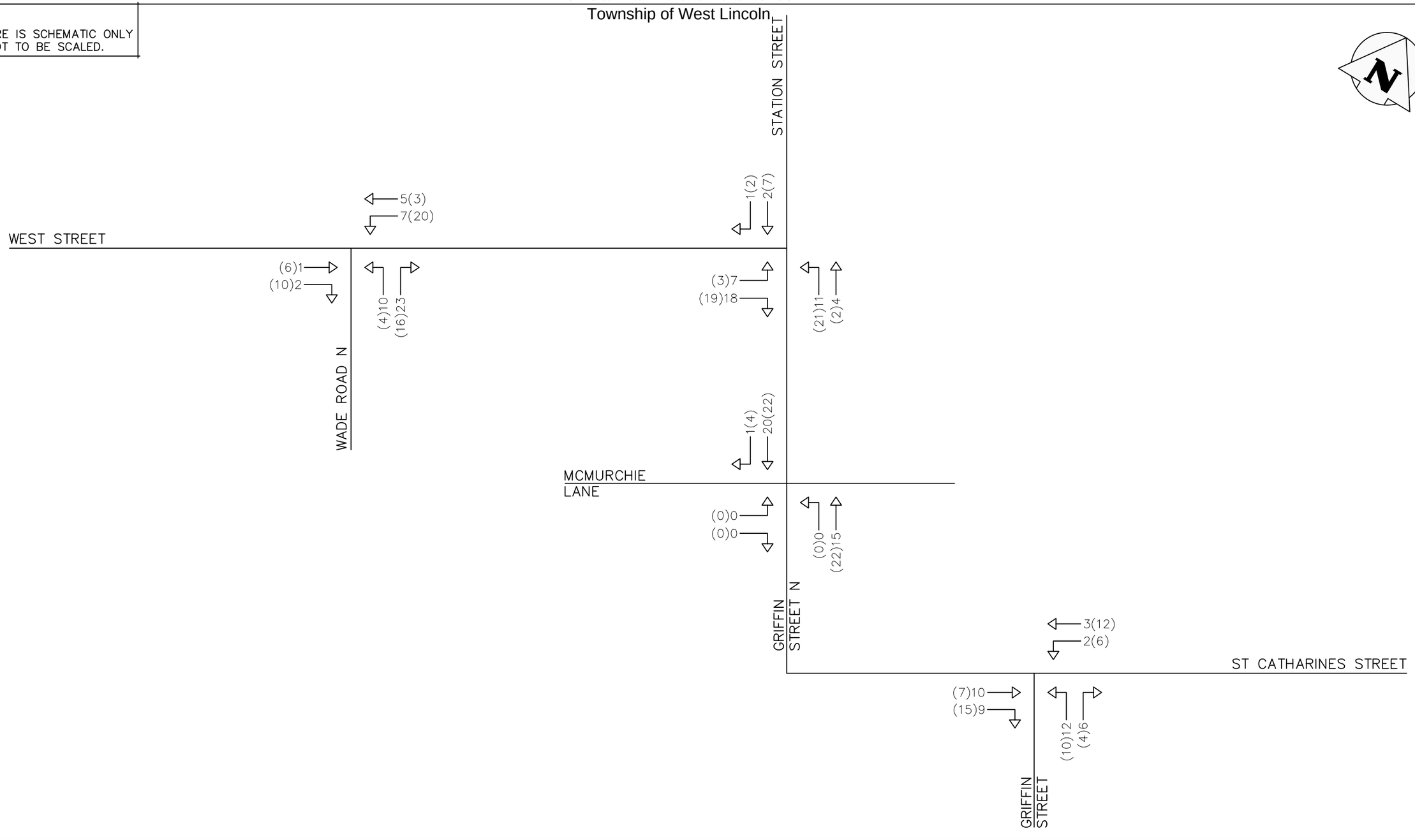

LEGEND:
AM(PM) WEEKDAY AM(PM) TRIP DISTRIBUTION

186 MARGARET STREET
TOWNSHIP OF WEST LINCOLN

SITE GENERATED TRIPS

CROZIER & ASSOCIATES Consulting Engineers
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905 875-0026 T
905 875-4915 F
WWW.CFCROZIER.CA

Drawn	Design	Project No.	
A.K.			529-5575
Check	Check	Scale	Dwg.
K.S.		N.T.S	FIG. 05

NOTE:
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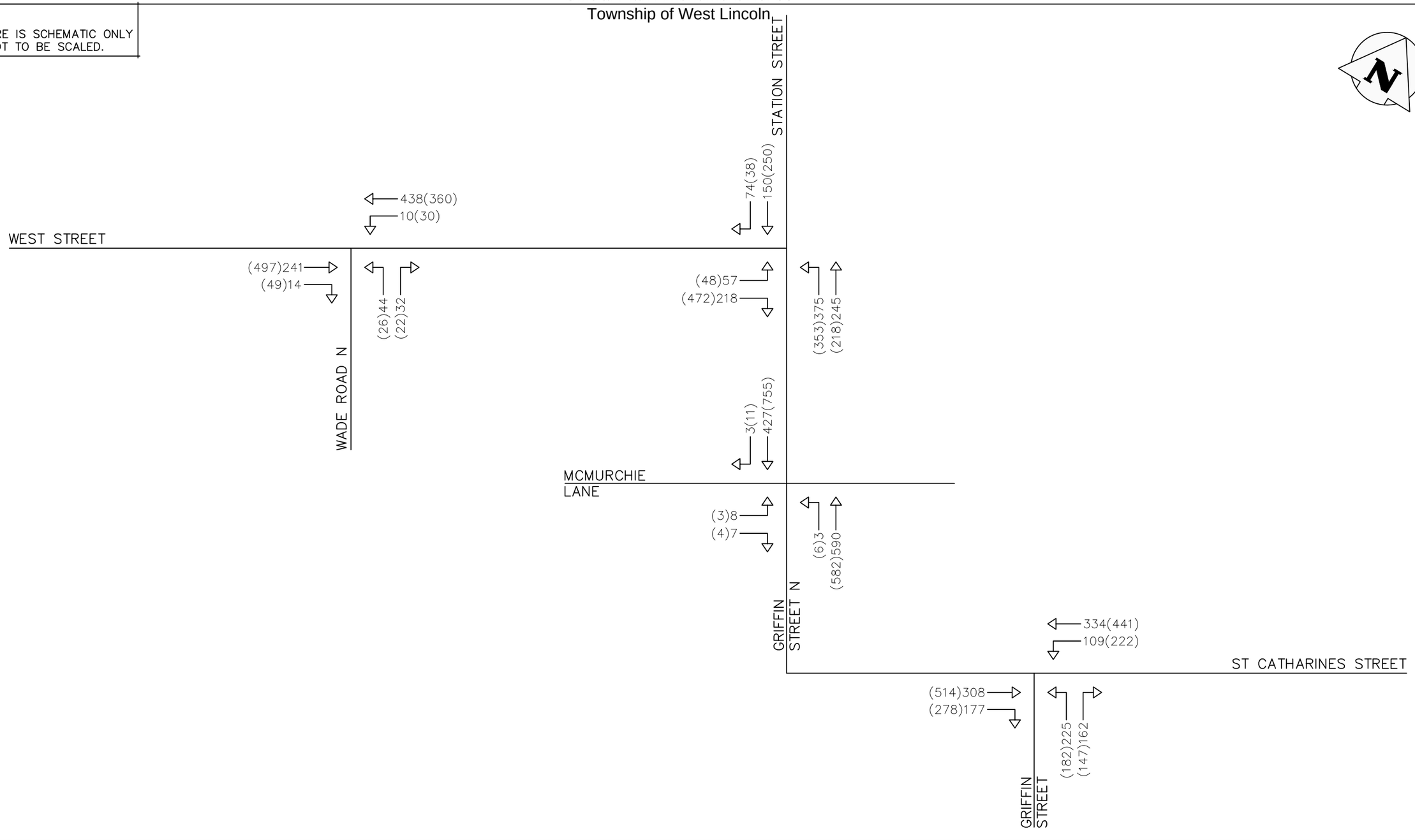

LEGEND:
AM(PM) WEEKDAY AM(PM) TRIP DISTRIBUTION

186 MARGARET STREET
TOWNSHIP OF WEST LINCOLN

2025 FUTURE TOTAL
TRAFFIC VOLUMES

CROZIER & ASSOCIATES Consulting Engineers
2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905 875-0026 T
905 875-4915 F
www.cfcrozier.ca

Drawn	Design	Project No.	
A.K.			529–5575
Check	Check	Scale	Dwg.
K.S.		N.T.S	FIG. 06

NOTE:
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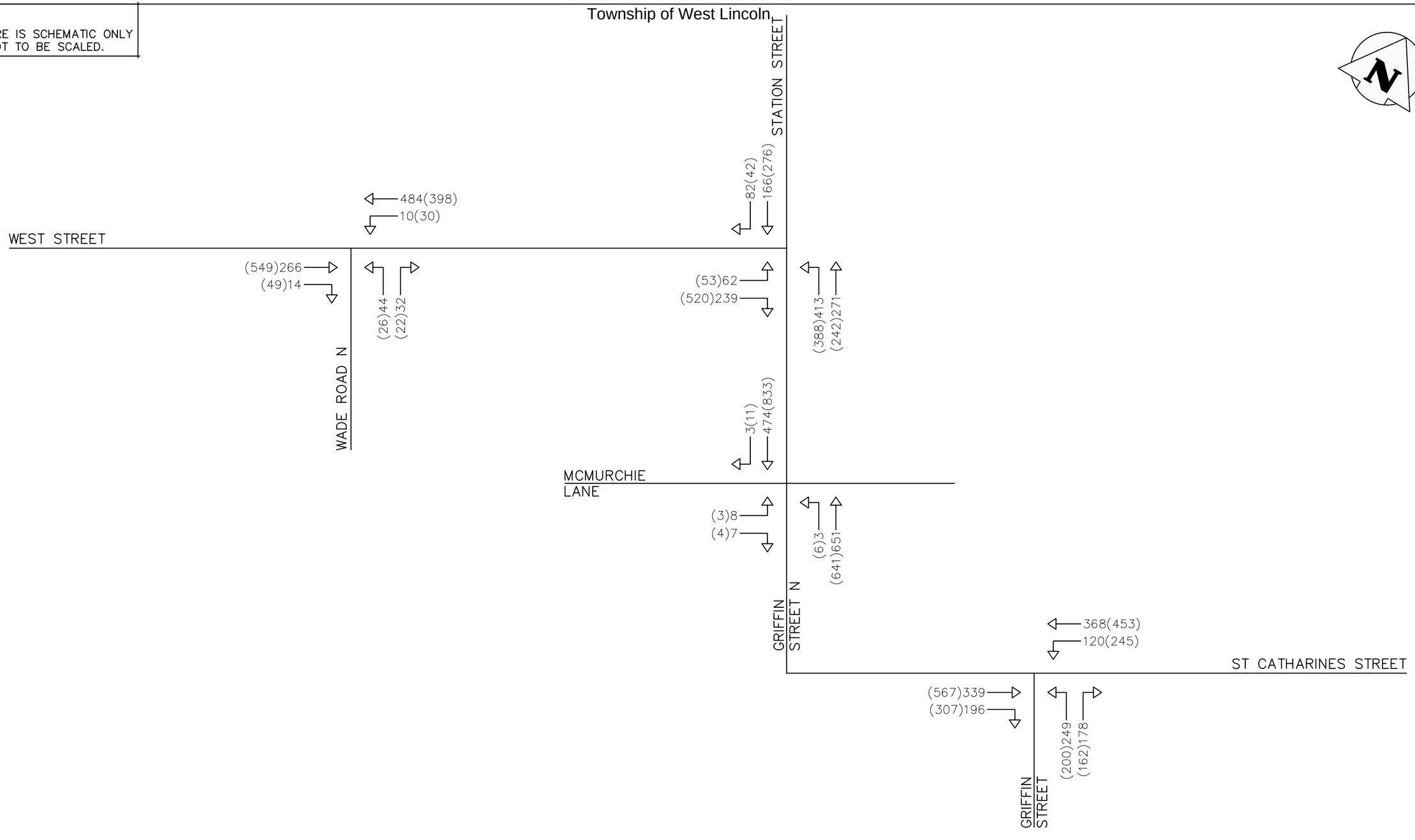

LEGEND:
AM(PM) WEEKDAY AM(PM) TRIP DISTRIBUTION

186 MARGARET STREET
TOWNSHIP OF WEST LINCOLN

2030 FUTURE TOTAL
TRAFFIC VOLUMES

CROZIER & ASSOCIATES Consulting Engineers
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905 875-0026 T
905 875-4915 F
WWW.CFCROZIER.CA

Drawn	Design	Project No.	
A.K.			529–5575
Check	Check	Scale	Dwg.
K.S.		N.T.S	FIG. 07