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SHADOW IMPACT ANALYSIS

PROPOSED DEVELOPMENT
418-422 Guelph Line
Burlington, Ontario

KNYMH FILE # 18006

Prepared by:
Gord Alexiuk
KNYMH INC.

September 29, 2019

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1.0 PURPOSE:

The purpose of this report is to analyse the shadow impact of a proposed development upon the adjacent properties, streets, and public spaces at the above noted location. We will discuss and comment upon the shadow impact associated with the height and massing of the proposed development upon the adjacent properties using a computer generated model for analysis of the proposed building with a flat roof and a rooftop mechanical room which includes the rooftop building service equipment.

We have provided graphics along with a Site Plan and Satellite imagery of the surrounding area.

The property is located in Burlington Ontario, on the Southwest corner of the intersection between Guelph Line and New Street.

2.0 DESCRIPTION OF THE SITE AND NEIGHBOURING PROPERTIES:

The Subject Property: (Figure 2.1-1)

The subject property is a combination of 2 (two) lots; 418 Guelph Line and 422 Guelph Line. Both lot 418 & 422 are currently occupied by two (2) storey commercial buildings. The existing buildings will be removed as part of the scope in the proposed development. The subject lot area is 0.37 hectares.

The proposed development consists of one (1) buildings upon the subject lands. The building is a thirteen (13) storey mixed-use tower with a two (2) storey podium.

The subject lands and neighbouring parcels generally appear to be uniform in grade. For the purpose of this analysis the proposed development and adjacent properties are represented at the same elevation.

Neighbouring properties include:

2.1) TO THE SOUTHEAST (Study Area 1): The property abuts Neighbourhood Park land featuring the 'Waterfront Trail' multi-use path. Immediately across the Neighbourhood Park land are two (2) storey mixed use buildings. The properties located in close proximity to the subject land and in the Park land feature many mature deciduous trees that would actively shade these properties from spring through to fall seasons.

2.2) TO THE NORTH and NORTHWEST (Study Area 2): A parking lot lies North between the subject land and intersection of Guelph Line and New Street. The property abuts commercial space directly to the Northwest (#2434-2446 New Street) and across the Guelph Line to the North (#415-425, & 433 Guelph Line).

2.3) TO THE EAST (Study Area 3): The property abuts Guelph Line. Immediately across Guelph Line is the Roseland Character Area. Along Guelph Line the property on the North side of St. Clair Avenue is a two (2) storey commercial building, South of St. Clair Avenue are single two (2) storey dwellings. The properties located in closest proximity to the subject land feature many mature deciduous trees that would actively shade these properties from spring through to fall seasons.

2.4) TO THE SOUTH and SOUTHWEST (Study Area 4): The property abuts a single storey commercial building. A series of four (4) & five (5) storey Multi-unit Residential buildings (#2418-2424 New Street, 390 Guelph Line & 383-384 St.Paul Street) are located further West. Looking further Southwest are the 'Rosemount' eleven (11) storey Multi-unit Residential buildings (#2386 -2400 New Street).



SITE CONTEXT MAP

Latitude: 43.337781 N
Longitude: 79.784738 W

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3.0 METHOD OF ANALYSIS:

The method of analysis will consist of a discussion of the shadow impact the proposed development will have on the adjacent properties and the public realm. The summary is within Section 6.0.

The graphic analysis which we present within this report is developed using a computer generated modelling program in conjunction with satellite imagery and survey information with the following criteria specified in the Site Plan Application guidelines developed by the City of Burlington. [12.10 Standardized Shadow Impact Criteria, February/05]:

Geographic Coordinates: 43.337781 N, 79.784738 W
Standard Time: UTC -5:00
Daylight Savings Time: UTC -4:00
Test Dates: March 21, June 21, and December 21
Test Times: Standard time schedule.

Date / Time	Time 1	Time 2	Time 3
March 21 (UTC -4:00)	9:30 am	12:30 pm	3:30 pm
June 21 (UTC -4:00)	9:30 am	12:30 pm	3:30 pm
December 21 (UTC -5:00)	9:30 am	12:30 pm	3:30 pm

The in effect City of Burlington Official Plan states that, shadow impact is part of the criteria for evaluation proposals of Housing Intensification within established neighbourhoods; Part III, Section 2.5.2 A) (vii) reads;

> "significant sun-shadowing for extended periods on adjacent properties, particularly outdoor amenity areas, is at an acceptable level."

Impact Analysis (Residential Amenity): Adequate sunlight is available for outdoor residential amenity spaces to maximize their use. As per City of Burlington Official Plan the impact on adjacent properties will be evaluated for extended periods of sun-shadowing and provide a subjective analysis as to whether it is at an acceptable level.
Impact Analysis (Public Space-OP): Public sidewalks, plazas, parks, school yards and other non-residential outdoor amenity areas will be evaluated for adequate sunlight to maximize their use. As per City of Burlington Official Plan the impact on adjacent properties will be evaluated for extended periods of sun-shadowing and provide a subjective analysis as to whether it is at an acceptable level.

The City of Burlington Tall Building Guidelines applied to the subject land indicate that;
2.3 a) *podium (not including the tower) should ensure a minimum of five consecutive hours of sunlight on the opposite side of the street at the equinoxes (March 21 and September 21) except where existing conditions preclude.*
2.3 b) *a minimum of five consecutive hours of sunlight over more than 60% of a park or playground area or a public open space at the equinoxes (March 21 and September 21).*

Impact Analysis (Public Space-TBG): Public sidewalk (opposite side of street), plus 60% of plazas, parks, school yards and other non-residential outdoor amenity areas will be evaluated for adequate sunlight to maximize their use for a minimum of five consecutive hours at the equinoxes (March 21 & September 21).

4.0 SHADOW IMPACT ANALYSIS OF THE PROPOSED DEVELOPMENT

4.1 WINTER SOLSTICE SHADOWS: (DECEMBER 21 • Figure 4.1-1 through 4.1-3)

The following section provides a summary of the Winter shadow effect of the proposal upon the surrounding area. This commentary will discuss the impact of the proposed mixed use building's shadows upon properties at the North, East and West side of the subject property. The impact is studied at the specific time schedule noted in section 12.10 of the City of Burlington's Site Application guidelines [February/05] with an 'as of right' comparative example illustrating a 2,500 sq.m, 3 storey (12m) mass currently permitted by the Zoning by-law [December/15].

It should be noted that Winter Shadows are the 'longest' in terms of the shadow length due to a very low sun angle…but shadows are present for the shortest period of time (hours in the day) due to a very short days this time of year. The times for this period are under Eastern Standard Time (UTC -5:00).

4.1A 9:30am December 21 (Figure 4.1-1)

From 9:30am, the sun in winter rotates approximately 116-degrees from east to west in approximately 9-hours at this time of year. At this time the sun has an altitude angle of 12.77 degrees.

Study Area (2) Impact

- Morning shadow falls upon the commercial properties on the West side of Guelph Line, crossing New Street extending North to the commercial property at #480 Guelph Line.
- Pedestrian sidewalk in shadow on both sides along New Street, and the South side of Guelph line.

Comparative Example

- The example shows a similar impact to commercial properties south of New Street and sidewalk along New Street but does not extend beyond New Street.

4.1B 12:30pm December 21 (Figure 4.1-2)

At 12:30pm, the sun in winter is still relatively low (22.98-degrees) in the sky and is located directly south of the subject property.

Study Area (2) Impact

- Shadow falls upon the commercial properties on the East side of the intersection between Guelph Line South and New Street.
- Pedestrian sidewalk in shadow on both sides along Guelph Line, and South side of New Street.

Comparative Example

- The majority of the shadow falls upon the subject land and West sidewalk along Guelph Line with minimal impact to the adjacent commercial properties to the North.

4.1C 3:30pm December 21 (Figure 4.1-3)

At 3:30pm, the sun in winter is starting to descend and is 9.85 degrees above the horizon. At the winter solstice and just over an hour prior to sunset, this shallow angle is the largest shadow generating condition analyzed in this report.

Study Area (1) Impact

- Shadow crosses the Neighbourhood Park land on the East side of Guelph Line.

Study Area (2) Impact

- Shadow falls upon the commercial property on the East side of Guelph Line.
- Pedestrian sidewalk in shadow on both sides along Guelph Line.

Study Area (3) Impact

- The Eastern extent of the shadow crosses the back yard of five (5) residential dwellings along the North side of St. Clair Avenue. Properties impacted #3029, 3037, 3043, 3049, & 3057 St. Clair Avenue

Comparative Example

- The shadow has a similar impact to commercial properties East of New Street and Neighbourhood Park land but does not extend beyond the Park land impacting properties on St.Clair Ave.





DECEMBER 21, 9:30AM

UTC: (-05:00)
Latitude: 43.337781 N
Longitude: 79.784738 W

N

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DECEMBER 21, 12:30PM

UTC: (-05:00)
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4.2 SPRING EQUINOX SHADOWS: (MARCH 21 • Figure 4.2-1 to 4.2-3)

A summary of the Spring shadow effect of the proposal upon the surrounding area. This commentary will discuss the impact of the proposed mixed use building's shadows upon properties at the north, east and southeast side of the subject property. The impact is studied at the specific time schedule noted in section 12.10 of the City of Burlington's Site Plan Application guidelines [February/05] with an 'as of right' comparative example illustrating a 2,500 sq.m, 3 storey (12m) mass currently permitted by the Zoning by-law [December/15].

It should be noted that the Fall and Spring are "moderate" in terms of shadow length and duration relative to annual shadows. The times for this period are under Eastern Daylight Time. (UTC -4:00)

4.2A 9:30am March 21 (Figure 4.2-1)

From 9:30am, the sun in spring rotates approximately 184-degrees from east to west in 12-hours. It is low in the sky rising to approximately 23-degrees at this time of day.

Study Area (2) Impact

- Morning shadow falls upon the commercial properties on both sides of New Street.
- Pedestrian sidewalk in shadow on both sides along New Street.

Comparative Example

- The example shows a similar impact to the adjacent commercial properties south of New Street and does not extend beyond New Street.

4.2B 12:30pm March 21 (Figure 4.2-2)

At 12:30pm, the sun in spring is 45.38-degrees in the sky and originates from near-south.

Study Area (2) Impact

- Shadow falls upon the commercial properties on the South side of the intersection between Guelph Line South and New Street.
- South pedestrian sidewalk along Guelph Line moderately impacted.

Comparative Example

- The majority of the shadow falls upon the subject land and West sidewalk along Guelph Line with minimal impact to the adjacent commercial properties to the North.

4.2C 3:30pm March 21 (Figure 4.2-3)

At 3:30pm, the sun in spring is past its peak. It is approximately 39.04-degrees above the horizon and the shadows are still relatively short at this time of day.

Study Area (2) Impact

- Shadow falls upon the commercial property on the East side of Guelph Line.

Pedestrian sidewalk impacted on both sides along Guelph Line.

Comparative Example

- The majority of the shadow falls upon the subject land and West sidewalk along Guelph Line.





MARCH 21, 9:30AM

UTC: (-04:00)
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Longitude: 79.784738 W

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MARCH 21, 12:30PM

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4.3 SUMMER SOLSTICE SHADOWS: (JUNE 21 • Figure 4.3-1 to Figure 4.3-3)

A summary of the Summer Shadow effect of the subject property upon the surrounding area. This commentary will discuss the impact of the proposed Residential building's shadows upon properties at the north, west, east and southeast side of the subject property. The impact is studied at the specific time schedule noted in section 12.10 of the City of Burlington's Site Plan Application guidelines [February/05] with an 'as of right' comparative example illustrating a 2,500 sq.m, 3 storey (12m) mass currently permitted by the Zoning by-law [December/15].

At this time of year the solar altitude is at a maximum; Shadows are minor and do not extend far from the built form, falling mostly upon the development site itself. The times for this period are under Eastern Daylight Time. (UTC -4:00)

4.3A 9:30am June 21 (Figure 4.3-1)

At 9:30am, the sun is rising and already at 38.91 degrees. The sun will rotate almost 250 degrees in the sky on this day over fifteen and a half hours.

Study Area (2) Impact

- Morning shadow falls upon the commercial properties on the south side of New Street.

Comparative Example

- The example shows a similar impact to the adjacent commercial properties south of New Street but does not extend to the buildings.

4.3B 12:30pm June 21 (Figure 4.3-2)

At 12:30pm, the sun in summer is reaching its peak in the sky (67-degrees) originating from the south.

Study Area (2) Impact

- The majority of the shadow falls upon the subject land with minimal impact to the commercial properties on the South side of the intersection between Guelph Line South and New Street but does not extend to the buildings.
- South pedestrian sidewalk along Guelph Line moderately impacted.

Comparative Example

- The majority of the shadow falls upon the subject land.

4.3C 3:30pm June 21 (Figure 4.3-3)

At 3:30pm, the sun in summer has begun descending and is still at about 56.8 degrees altitude. The sun appears to be shining from the southwest.

Study Area (2) Impact

- Shadow falls upon the commercial property on the East side of Guelph Line.
- Pedestrian sidewalk in shadow on both sides along Guelph Line.

Comparative Example

- The majority of the shadow falls upon the subject land and West sidewalk along Guelph Line.





JUNE 21, 9:30AM

UTC: (-04:00)
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Figure 4.3-2





JUNE 21, 3:30PM

UTC: (-04:00)
Latitude: 43.337781 N
Longitude: 79.784738 W

N

5.0 GENERAL OBSERVATIONS: REGARDING THE PROPOSED DEVELOPMENT

5.1 The shadow impact on public sidewalks, plazas, parks, school yards and non-residential outdoor amenity areas on March 21, June 21, and December 21 (Public Space-OP):

- March 21 impact analysis indicates that the public sidewalk along New Street and Guelph Line will experience limited shading as the shadow sweeps across the surrounding properties throughout the day.
- June 21 impact analysis indicates that the public sidewalk along New Street and Guelph Line will experience limited shading as the shadow sweeps across the surrounding properties throughout the day
- December 21 impact analysis indicates that the public sidewalk along New Street and Guelph Line will experience limited shading as the shadow sweeps across the surrounding properties throughout the day. The shadow crosses the Neighbourhood Park Land 'Water Front Trail' late in the day with moderate impact to its use.

5.2 The shadow impact on residential amenity spaces on March 21, June 21, and December 21 (Residential Amenity):

- March 21 no impact to residential outdoor amenity spaces observed during this test period.
- June 21 no impact to residential outdoor amenity spaces observed during this test period.
- December 21 shadow impacts five (5) residential outdoor amenity spaces at #3029, 3037, 3043, 3049, & 3057 St. Clair Ave during the 3:30pm test time exclusively. These impacts are observed to be minor.
- The majority of the residential properties impacted already feature mature shade providing deciduous trees lining both sides of each lot and along the Neighbourhood Park land.

5.3 The shadow impact on Public sidewalk (opposite side of street), plus 60% of plazas, parks, school yards and other non-residential outdoor amenity areas on March 21 & September 21 (Public Space-TBG):

- March 21 and September 21 the public Trail is in shadow at 4:00pm.
- The public sidewalk on the opposite side of Guelph Line is in shadow at 2:00 pm on March 21 & 1:45pm on September 21.

Comparative Summary

The most noticeable difference between the two masses studied was the extension of the shadow during the December test period due to the height variation. The December shadow of the proposed development at the 9:30am and 3:30pm test times extends farther and affects additional properties; however, the impact of the proposed development will be consistent with the existing shadow impacts of built forms in that immediate area.

6.0 SUMMARY OBSERVATIONS: REGARDING IMPACT OF DEVELOPMENT UPON THE SURROUNDING AREA

The shadow impact on public sidewalks, plazas, parks, school yards and non-residential outdoor amenity areas on March 21, June 21, and December 21.

- The shadow analysis demonstrates during the test periods the public sidewalks and Neighbourhood Park land will experience long periods of continuous sunlight will minimal sun shading impacting their use.

The shadow impact on residential amenity spaces on March 21, June 21, and December 21.

- The March 21 and June 21 test periods show no indication of sun shading impact on outdoor amenity spaces. The December 21 3:30pm test period indicates that the outdoor amenity space of five (5) properties will experience minor sun shading impacts. The shadow impact on these properties is isolated to the narrow profile of the building form.
- The Residential amenity spaces and neighbouring park land shown to be impacted during the 3:30pm December 21 test periods are also impacted by mature plantings.

The shadow impact on Public sidewalk (opposite side of street), plus 60% of plazas, parks, school yards and other non-residential outdoor amenity areas on March 21 & September 21 as per the Tall Building Guidelines.

- The study found that both the public sidewalk on the opposite side of Guelph Line and the adjacent park land will experience more than 5 hours of continuous sunlight meeting the guideline requirements.

The proposed development is considerate to the guidelines set for shadow impact analysis by the City of Burlington on nearby established residential neighbourhoods. The building form and orientation of the proposed development ensures that sun shading impact is minimal upon the neighbouring residential properties and park land. Based upon the analysis we suggest that the proposed design will not have a significant negative impact on the surrounding neighbourhood.

In our opinion, this development is compatible with the area and does not have a significant impact on the existing neighbourhood in general.

The location for a development of this nature is well situated and suited to the area being close to existing commercial development and buffered from sensitive uses.

Sincerely,
KNYMH Inc.
Gord Alexiuk

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