

SHADOW STUDY

MODERN REAL ESTATE DEVELOPMENT

PROPOSED MIXED USE DEVELOPMENT

87-95 SEAGRAM DRIVE, WATERLOO, ON

MASRI O ARCHITECTS

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1. SCOPE & STUDY CRITERIA

This shadow study has been prepared by Masri O Inc. Architects as a part of an application for Zoning Bylaw Amendment and Official Plan Amendment being submitted to the City of Waterloo Planning Department in support of the re-development of five consolidated lots 87-95 Seagram Drive in Waterloo (Site).

The study is based on computer modeling of the shadows and their impact on surrounding areas of the proposed development. The shadow study has been prepared using a digital three-dimensional model that represents the proposed building per the design proposal. The model is geo-located to its precise location to provide an accurate representation of the shadowing that would occur surrounding the Site. The shadowing effects are evaluated based on the observed length of time any given property, sidewalk or yard are affected.

The analysis demonstrates shadowing in the spring (March 21), summer (June 21), fall (September 21), and winter (December 21), at one-hour time increments. The hourly intervals for June are 8:00 A.M. until 8:00 P.M. The hourly intervals for March/September are 8:00 A.M. until 7:00 P.M. The hourly intervals for December are 9:00 A.M. until 7:00 P.M. For the winter diagrams, we note that the shadowing effect for the later hours is simulated, but would not be perceived as sunset is expected to take place as early as 4:49 P.M. in the winter months.

2. PROPOSED DEVELOPMENT

The proposed development is a 34-storey mixed-use building consisting two towers and a connecting podium. The podium has 1 floor of commercial at the ground, and 7 floors of residential apartments complete with amenity spaces, bike parking and auxiliary spaces. The two Towers that sit atop the podium are each 27 storeys. Tower 1 has 1 floor of amenity space at the podium rooftop level, 24 floors of residential apartments and 2 floors of office space at the 33rd and 34th floors. Tower 2 has 1 floor of amenity space at the podium rooftop level and 26 floors of residential apartments.

The property fronts along the south side of Seagram Drive close to University of Waterloo, Wilfred Laurier University and Waterloo Park. The neighbouring buildings contain a mix of uses and building typologies including recreational buildings and residential buildings. The size and height of surrounding buildings vary from large 1 storey recreational buildings, to small 1 to 2-storey dwellings as well as mid-and-high-rise residential and mixed-use buildings.

3. NEIGHBOURING BUILDINGS

Neighbouring buildings include:

South:	University Stadium
West:	Rotary Club/KW Granite Club, Waterloo Park
North:	160 Lester St (4 storey Residence Building – Waterloo College Hall) 181 Lester St (17 storey apartment building) 96 Seagram Dr (2 storey house/apartments)
East:	85 Seagram Dr (6 storey apartment building)

Other surrounding buildings extending to the north are a mix of high-rise apartments and low-rise residential dwellings. Farther to the south and west is Waterloo Park. Farther to the east are mostly low-rise residential dwellings.

The neighbourhood context map shown in figure 1 below indicates the site outlined in red. Waterloo Park and University Stadium are shaded in green. Since the properties are located to the north of the park and recreational spaces, the shadow impact of the proposed development on those spaces are negligible.

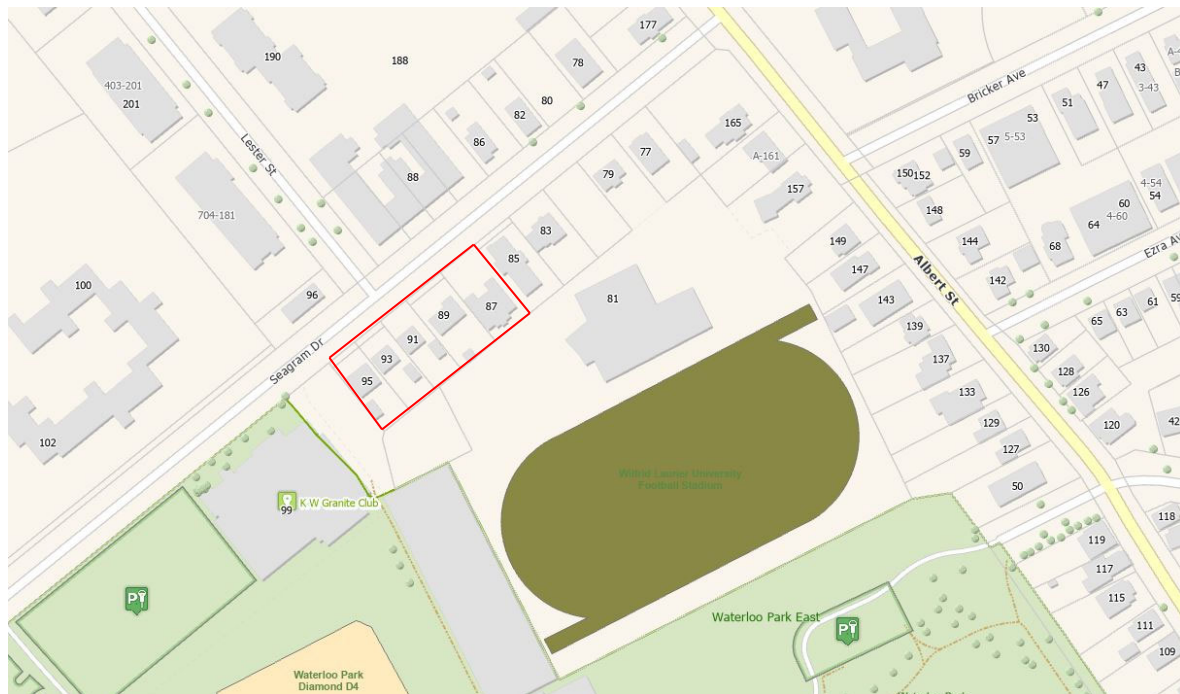
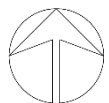


Figure 1 - Neighbourhood Surrounding Proposed Development



4. FINDINGS

The shadow impact is modelled based on 1-hour intervals and results are summarised below seasonally.

4.1 SPRING

As illustrated in the diagrams depicting shadows generated by the proposed building on March 21 (figures 2-13), the shadowing on the neighbouring North, West, and South properties is not impactful in the spring. Despite shadows being somewhat long in the spring due to the low angle of the sun, generally the sun moves quickly throughout the day along its short path.

Due to the lower sun angle, especially in the evening, the modeling shows the shadows cast onto properties to the east of the proposed development would be long before 9:00am and after 6:00pm. However, evening shadows are not impactful considering sunset at this time of year is around 7:30pm.

Due to the podium mass of the proposed development, the public sidewalk directly in front of the building is most affected by the generated shadows. Generally, sidewalks in front of the proposed development are shaded in the morning and receive sun in the afternoon and early evening.

Residential yards are not affected by shadowing from the proposed development in the morning and early afternoon due to the location of the site in relation to existing surrounding homes, which are all located towards the east and north-east of the Site.

4.2 SUMMER

The diagrams depicting shadows generated by the proposed building on June 21 (figures 14-25), show the shadows in the summer months as shallower and moving more slowly over surrounding lands, due to the high altitude of the sun. Shadows are shorter and have low impact on surrounding properties, yards and sidewalks during the summer months.

At any time during the day in the summer, the shadows do not cover any single property fully, nor for more than two to three hourly time intervals.

4.3 FALL

As represented by the modeling for September 21 (figures 26-37), the proposed building generates shadows that are marginally more pronounced in the Fall as compared to the Summer – especially during the evening hours due to the low angle of the sun. However, the shadows cast in the Fall are virtually identical to those cast in the Spring with the sun path being short.

Due to the lower sun angle, especially in the evening, shadows cast onto buildings to the east and west of the proposed development appear longer before 9:00am and after 6:00pm. However, the late afternoon-early evening shadows have minor impact since sunset at this time of year is around 7:30p.m.

As mentioned previously, since the Site is located to its north, the proposed development generates no new net shadow on Waterloo Park.

With a similar result as the shadow diagrams for Spring, sidewalks in front of the proposed development are shaded in the morning and receive sun in the afternoon and early evening.

Residential yards are not affected by shadowing from the proposed development in the morning and early afternoon due to the location of the site in relation to existing surrounding homes, which are all located towards the east and north-east of the Site.

4.4 WINTER

Due to the low angle of the sun in winter, the diagrams depicting shadows generated by the proposed building on December 21 (figures 38-47), indicate long shadows being cast throughout the day. However, due to the path of the sun being the shortest of the year during winter months, the shadows move quickly across adjacent properties from west to east.

Shadow effects are observed all day, over much of the surrounding area to the north of the proposed development. Since the property is on the South side of Seagram Drive, the street helps to mitigate the effect on neighbouring properties. To the north, there are existing tall buildings that already generate some shadowing on their surroundings, some of which overlap the shadows generated by the proposed development.

4.5 POLICY CONTEXT

City of Waterloo Official Plan outlines requirements for Shadow Studies in certain circumstances, including for re-zoning applications, with the goal of achieving designs that minimize the adverse impacts (of shadow) on human comfort and surrounding properties.

City of Waterloo Urban Design Manual (UDM) evaluates compatible development based on the criteria below, which are similar to those proposed in the City Terms of Reference for Sun/Shadow Analyses:

As a principle, at least 50% or more of any property should not be shaded for more than two interval times (a four-hour equivalency); **or,**

As a principle, at least 50% of any property should be in full sun for at least two interval times (a four-hour equivalency).

The UDM describes the goal of minimizing shadow and wind impacts along public streets, public park spaces and outdoor amenity spaces. As well, the UDM describes certain massing and form recommendations for Tall Buildings, including the general preference toward tower buildings as opposed to large slab buildings due to their shadowing effect.

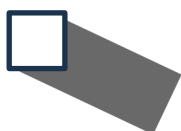
CONCLUSION

Spring and fall shadows cast by the proposed building appear long during the late morning and early afternoon hours, affecting the properties across the street, along the north, west, and east of the Site. However, these properties are not shadowed by more than 50% or for more than four, 1-hour intervals (4hrs), and they continue to receive full sun outside the timeframe mentioned. Shadows in the spring and fall after 6:00 pm appear dramatic in the modeling due to the low sun angle, but pose no tangible concern due to the time of day.

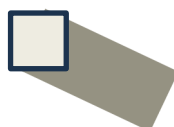
Shadow effects in the winter are long throughout the day but move quickly across affected properties which are therefore not exposed to excessive shadowing. Despite the height of the building being 34 storeys, its point tower massing helps mitigate the overall effect of the shadows cast onto the neighbouring properties. In other words, the proposed development massing contributes less shadowing effect than a slab tower would.

In summary, the findings of the Shadow Modeling indicate that the shadows generated by the proposed development will not shade 50% or more of neighbouring properties, sidewalks or yards for more than four interval times (a four-hour equivalency). No mitigative measures are recommended.

DIAGRAM KEY



Proposed Development



Existing Building



Latitude N 43.46 43°
Longitude W 80.5204°

5. SPRING SHADOW DIAGRAMS



Figure 2 - March 21 @ 8:00 am



Figure 3 - March 21 @ 9:00 am



Figure 4 - March 21 @ 10:00 am

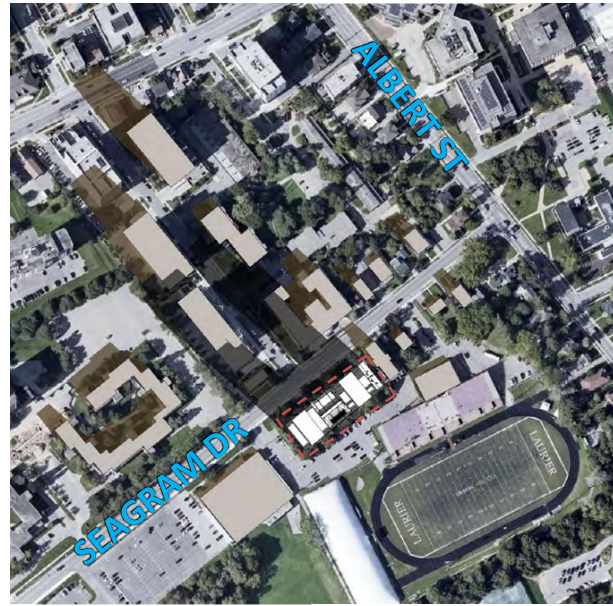


Figure 5 - March 21 @ 11:00 am

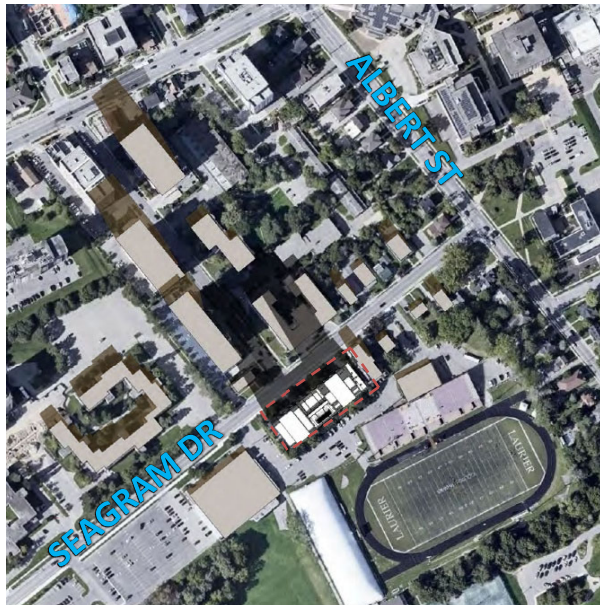


Figure 6 - March 21 @ 12:00 pm

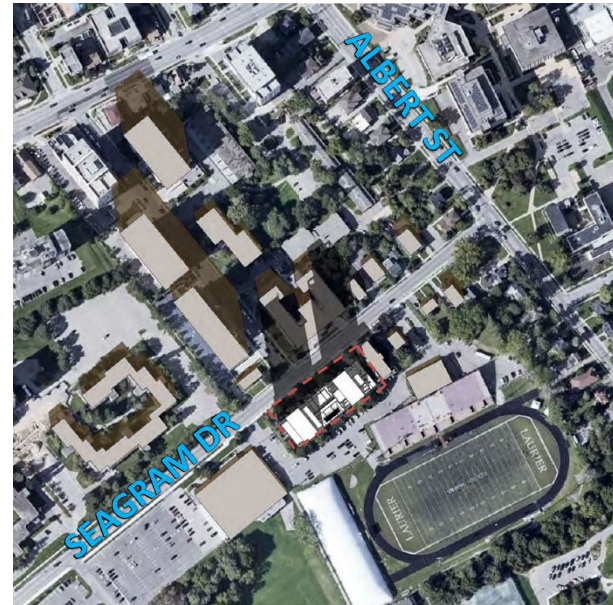


Figure 7 - March 21 @ 1:00 pm

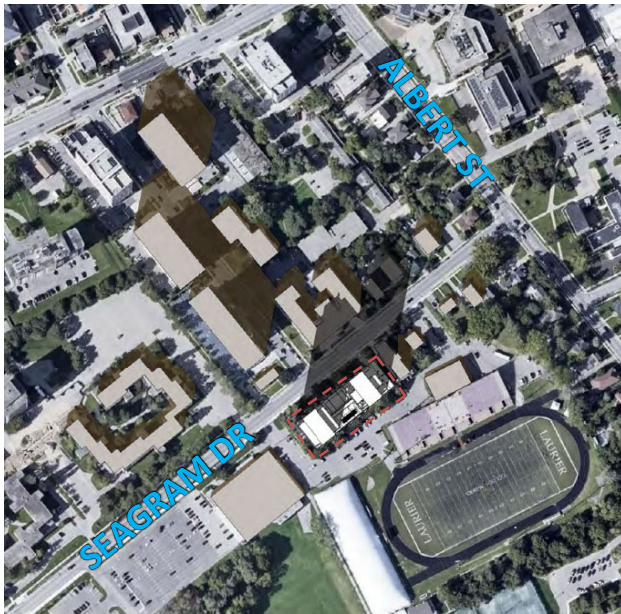


Figure 8 - March 21 @ 2:00 pm

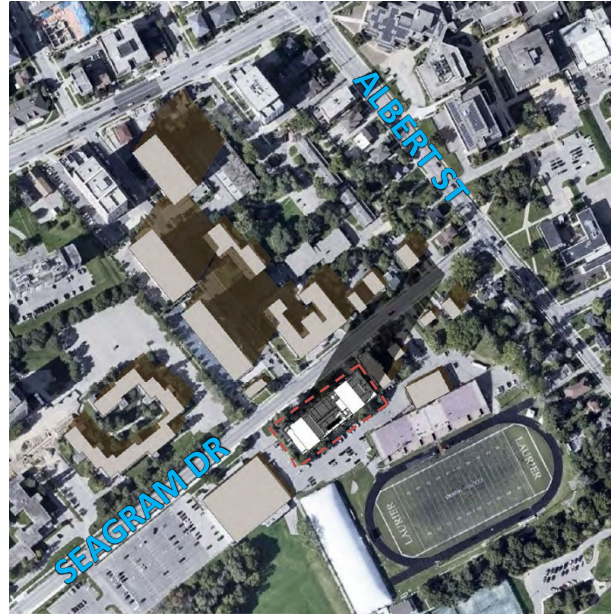


Figure 9 - March 21 @ 3:00 pm



Figure 10 - March 21 @ 4:00 pm

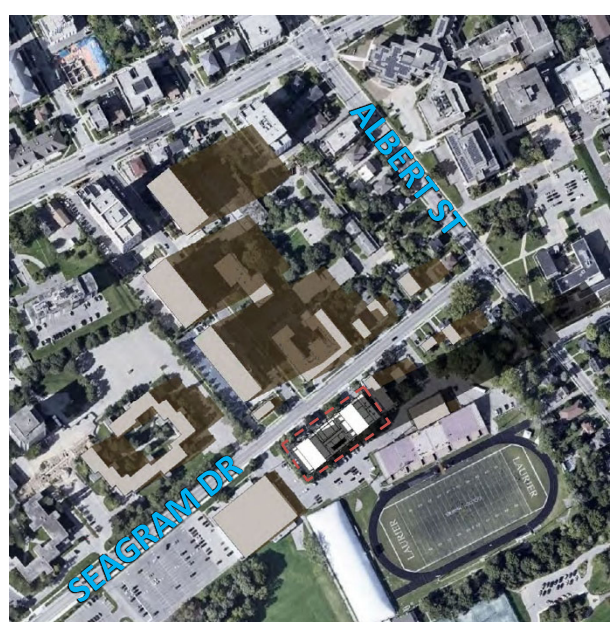


Figure 11 - March 21 @ 5:00 pm



Figure 12 - March 21 @ 6:00 pm

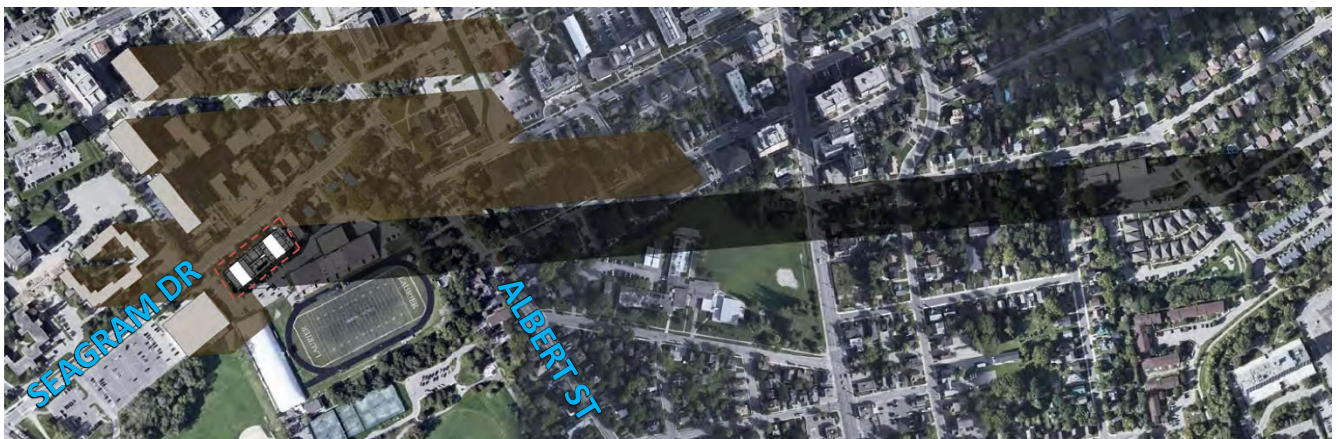
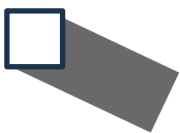
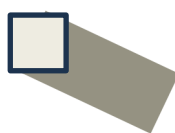


Figure 13 - March 21 @ 7:00 pm



Proposed Development



Existing Building



Latitude N 43.46 43°
Longitude W 80.5204°

6. SUMMER SHADOW DIAGRAMS



Figure 14 - June 21 @ 8:00 am

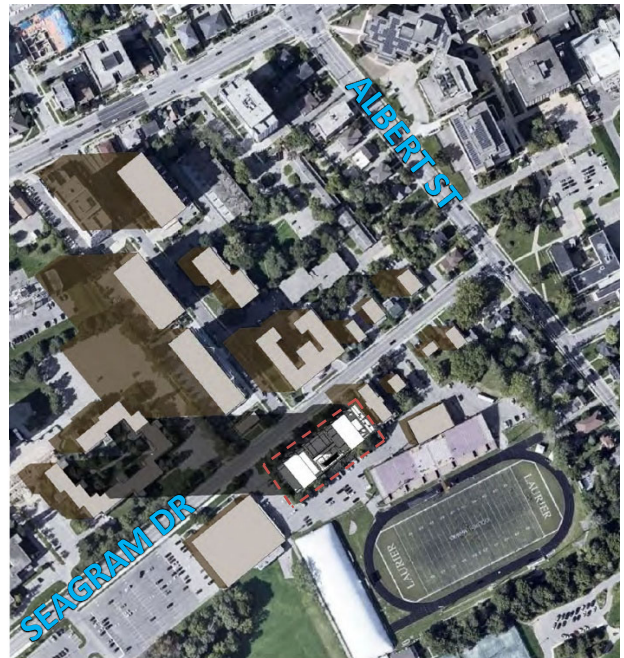


Figure 15 - June 21 @ 9:00 am



Figure 16 - June 21 @ 10:00 am

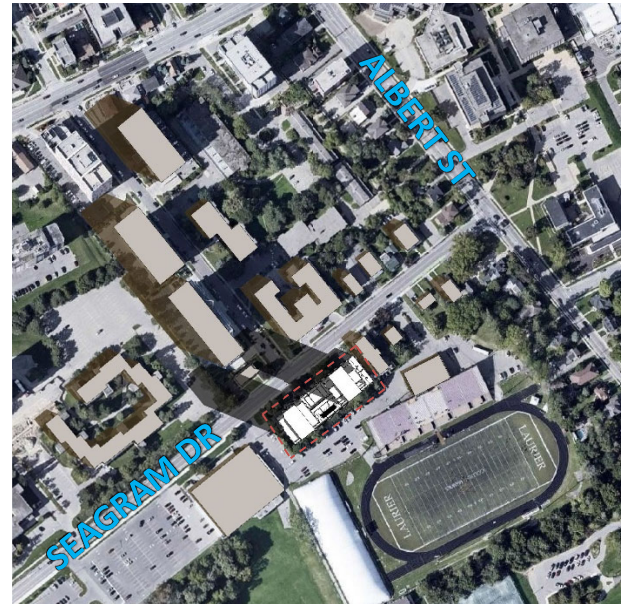


Figure 17 - June 21 @ 11:00 am



Figure 18 - June 21 @ 12:00 pm

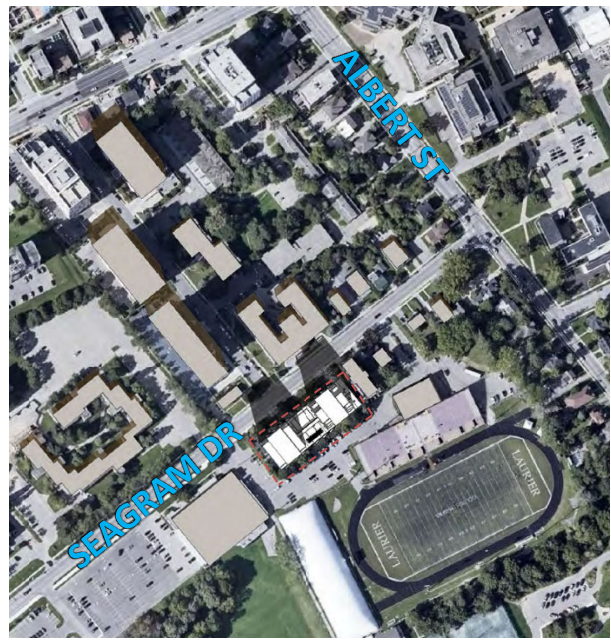


Figure 19 - June 21 @ 1:00 pm

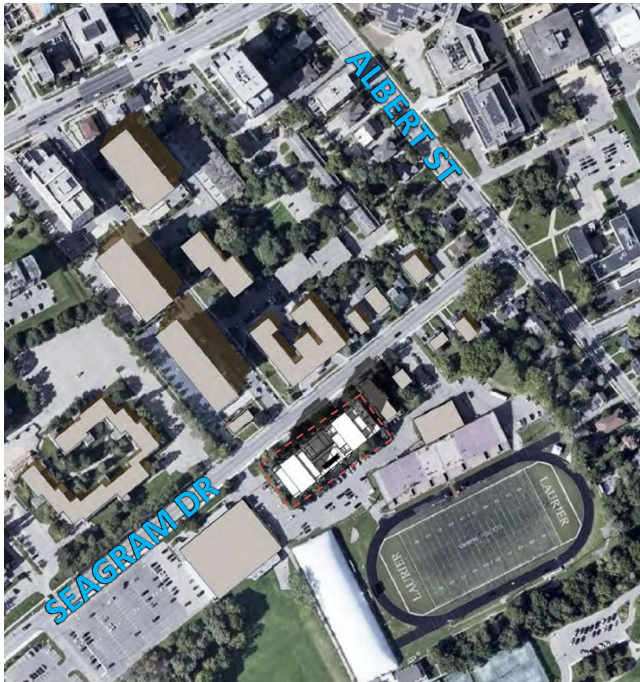


Figure 20 - June 21 @ 2:00 pm

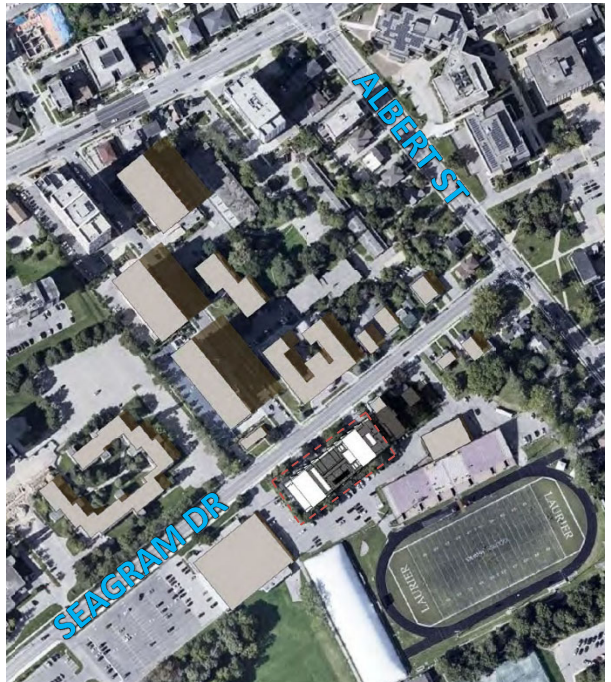


Figure 21 - June 21 @ 3:00 pm

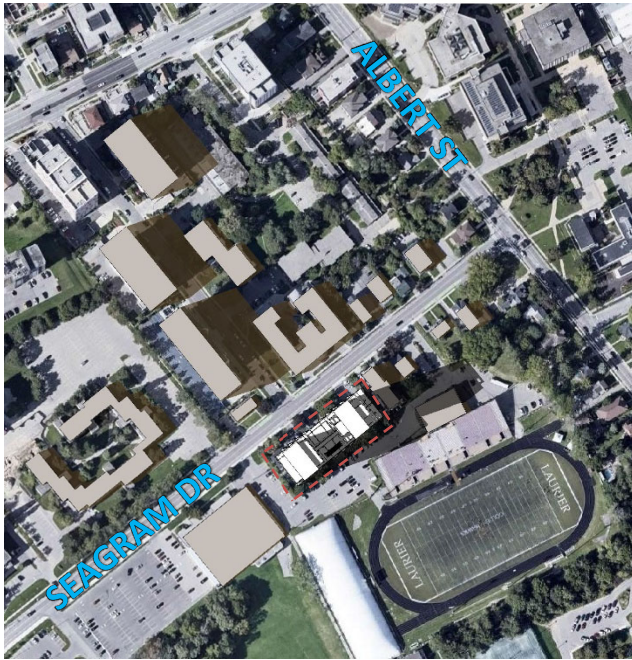


Figure 22 - June 21 @ 4:00 pm

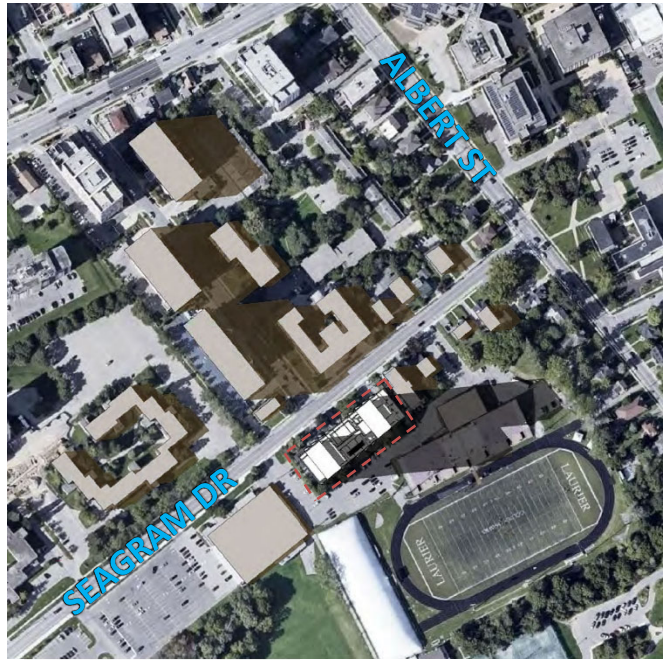


Figure 23 - June 21 @ 5:00 pm

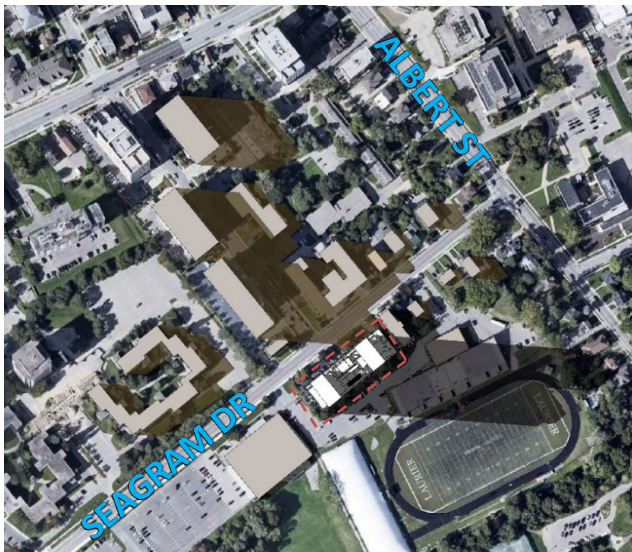


Figure 24 - June 21 @ 6:00 pm

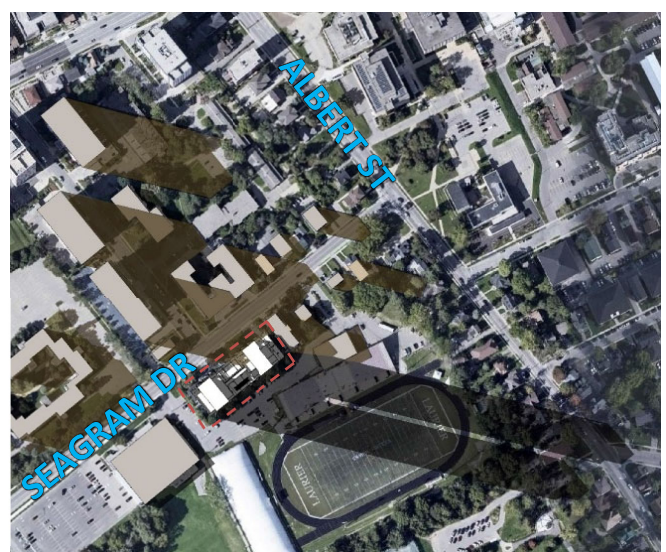
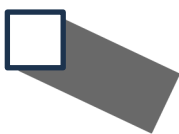
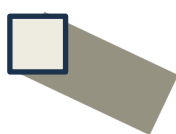


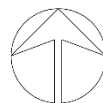
Figure 25 - June 21 @ 7:00 pm



Proposed Development



Existing Building



Latitude N 43.4643°
Longitude W 80.5204°

7. FALL SHADOW DIAGRAMS



Figure 26 - September 21 @ 8:00 am

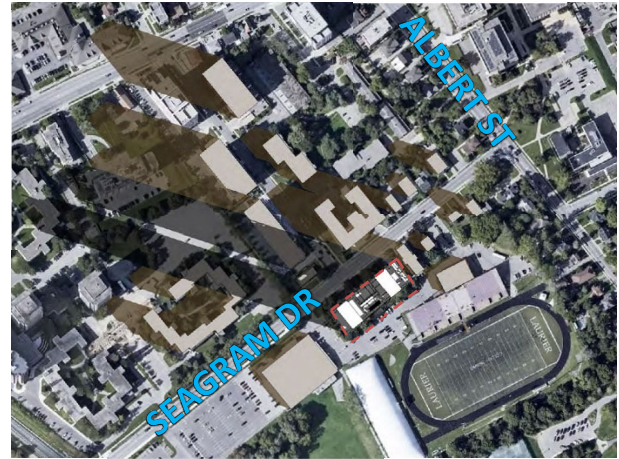


Figure 27 - September 21 @ 9:00 am



Figure 28 - September 21 @ 10:00 am

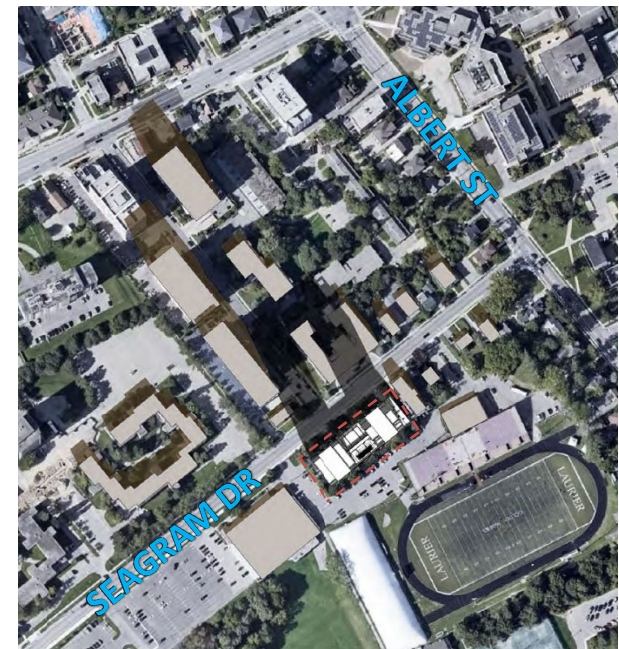


Figure 29 - September 21 @ 11:00 am

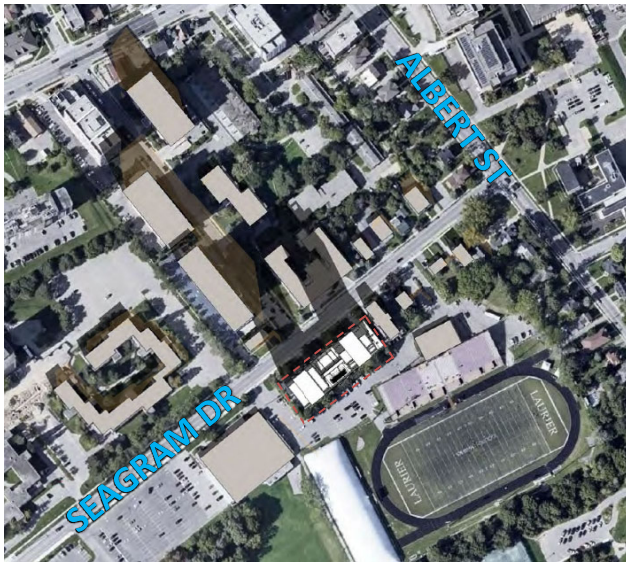


Figure 30 - September 21 @ 12:00 am

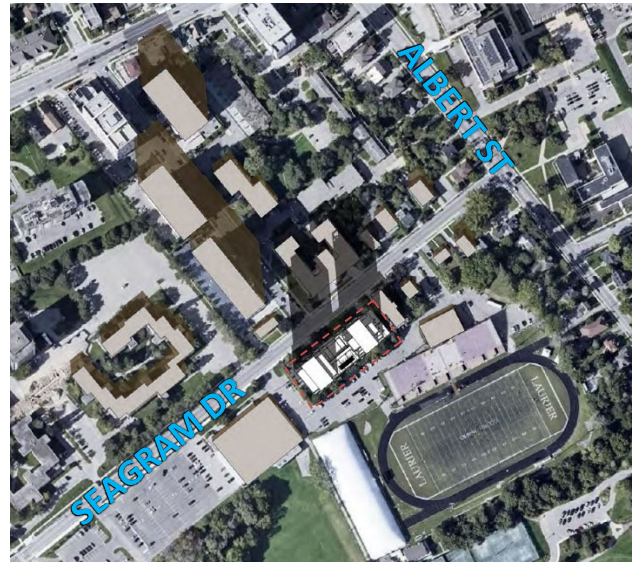


Figure 31 - September 21 @ 1:00 pm



Figure 32 - September 21 @ 2:00 pm

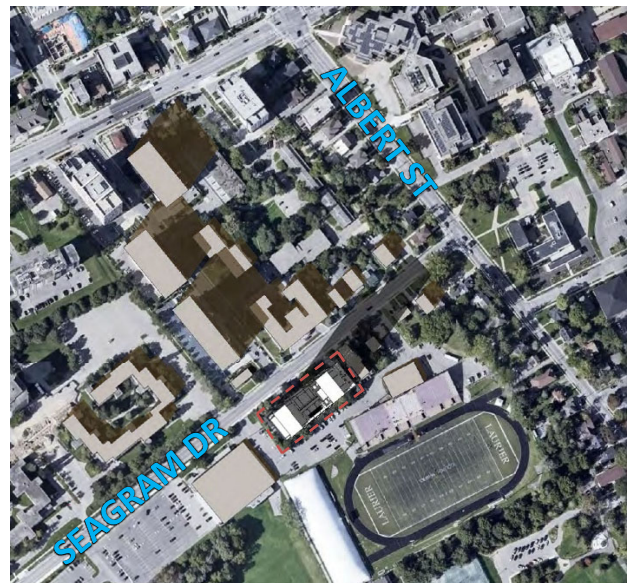


Figure 33 - September 21 @ 3:00 pm

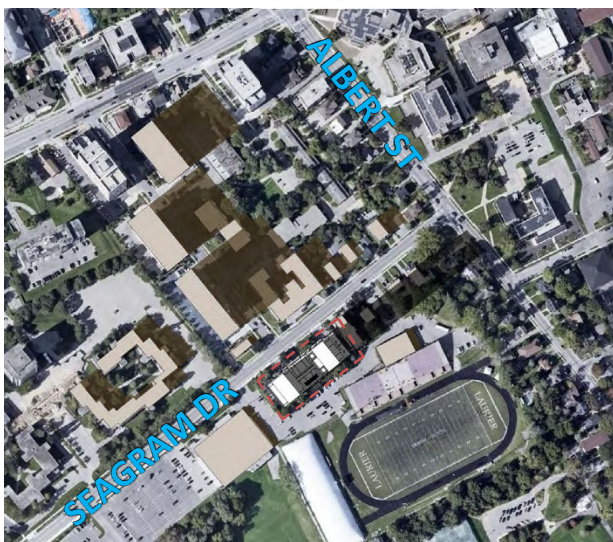


Figure 34 - September 21 @ 4:00 pm



Figure 35 - September 21 @ 5:00 pm

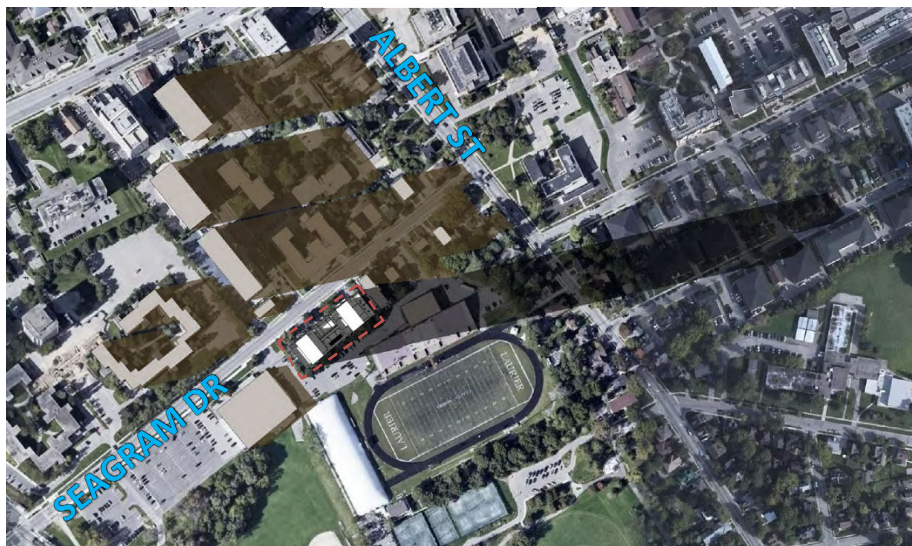


Figure 36 - September 21 @ 6:00 pm

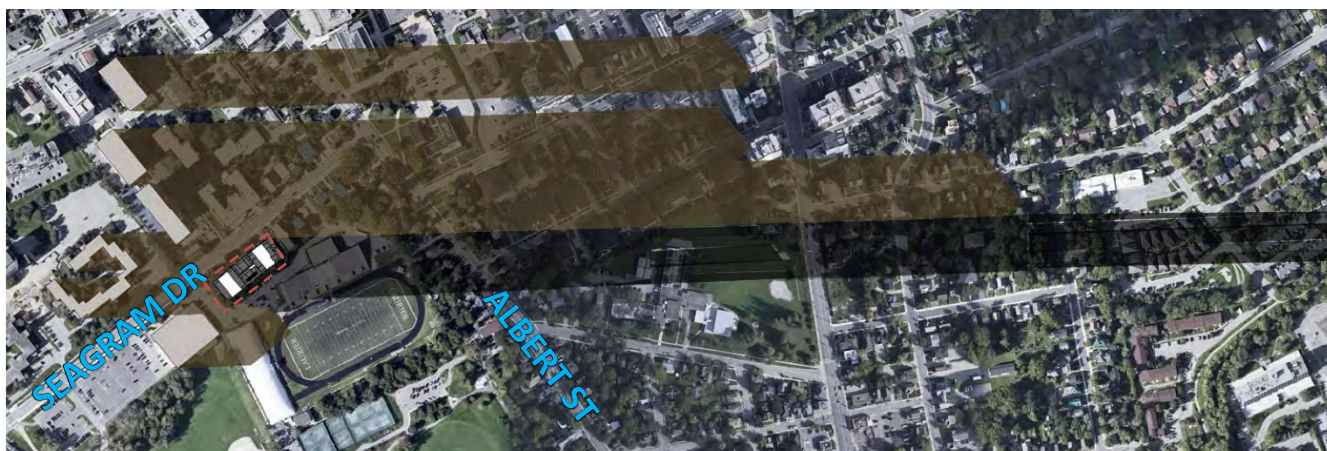
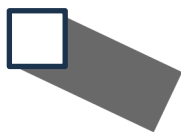
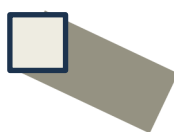


Figure 37 - September 21 @ 7:00 pm



Proposed Development



Existing Building



Latitude N 43.4643°
Longitude W 80.5204°

8. WINTER SHADOW DIAGRAMS



Figure 38 - December 21 @ 9:00 am

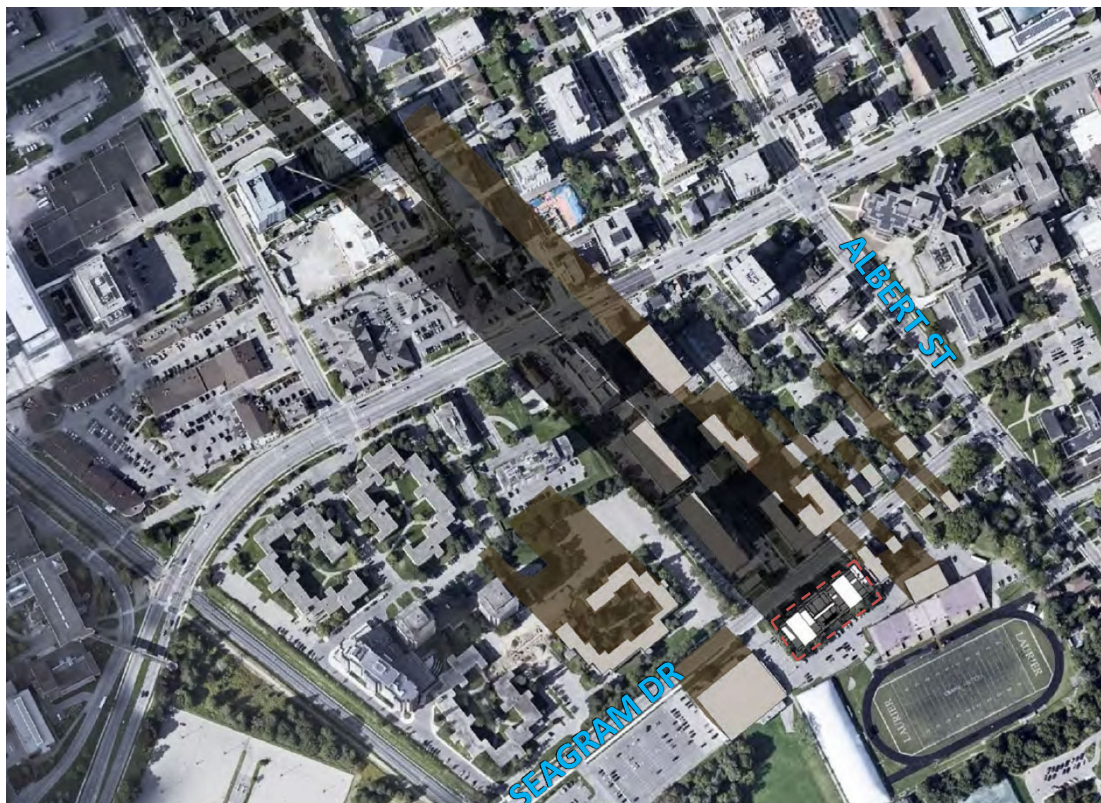


Figure 39 - December 21 @ 10:00 am



Figure 40 - December 21 @ 11:00 am



Figure 41 - December 21 @ 12:00 pm

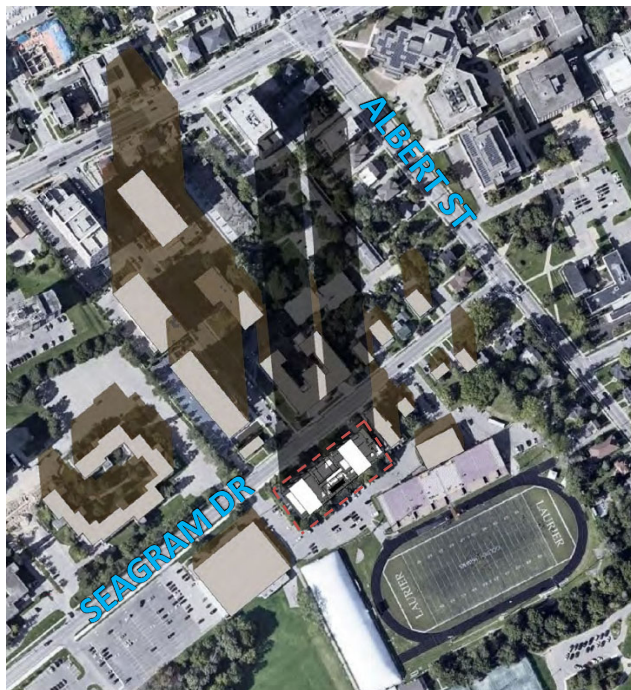


Figure 42 - December 21 @ 1:00 pm

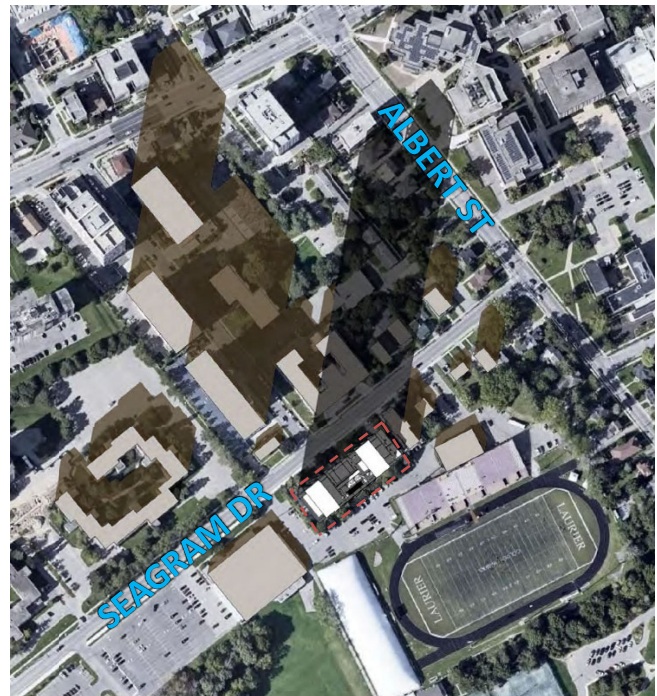


Figure 43 - December 21 @ 2:00 pm



Figure 44 - December 21 @ 3:00 pm



Figure 45 - December 21 @ 4:00 pm

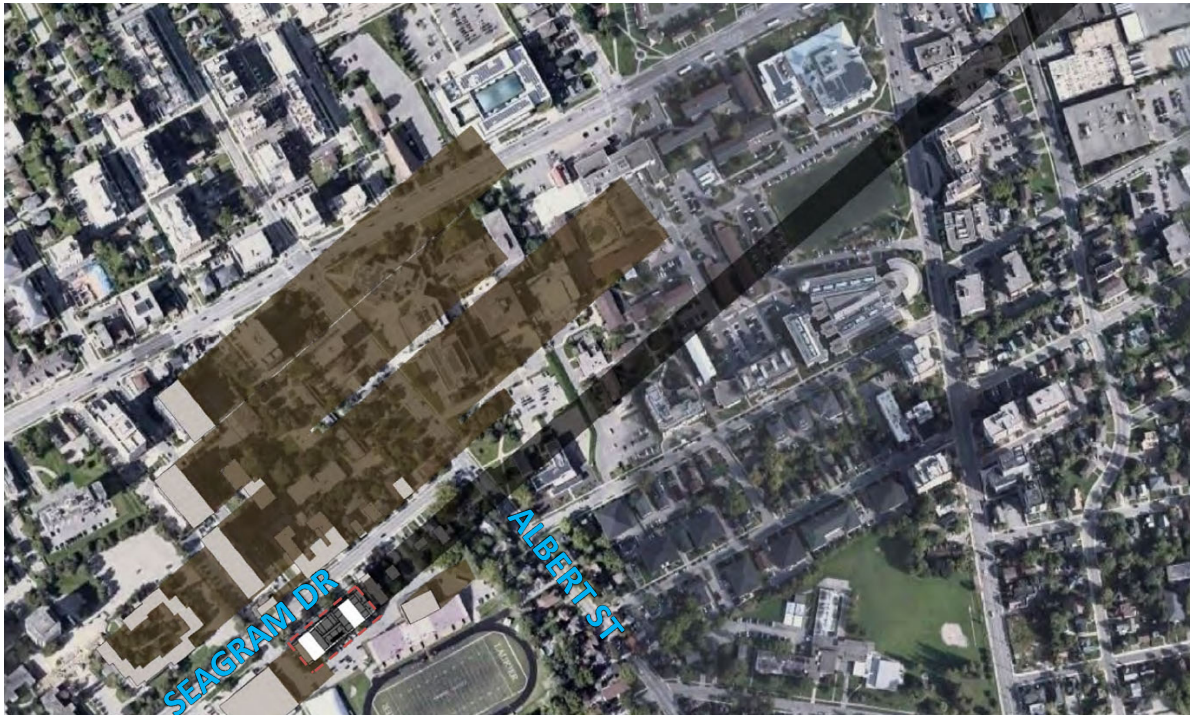
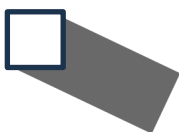


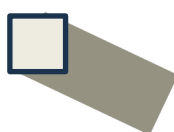
Figure 46 - December 21 @ 5:00 pm



Figure 47 - December 21 @ 6:00 pm



Proposed Development



Existing Building



Latitude N 43.4643°
Longitude W 80.5204°