Introduction

The neighborhood surrounding the vicinity of John Street is a diverse hub, consisting of a variation of medium to high density residential buildings, institutional facilities, outdoor amenities, commercial spaces and transit-oriented services. The site of 69 and 117 John Street aims to add a rich and vibrant proposal to an already diverse neighborhood, by introducing a series of high-rise towers that gently crescendos to meet the ever-evolving skyline of Mississauga's Downtown Core.

The architectural composition of the building proposed consists primarily of three high-rise components that begin with a 24-storey building to the east, and two more towers of 31-storeys and 32-storeys set towards the west. The building also features an 8-storey podium that connects all three towers. This structure is set back from John Street to gracefully frame the entryway to the site. A 30-meter setback to the north has also been implemented to allow for mitigating factors due the proximity of the Canadian Pacific Railway corridor. To the east, the building gently tapers down to allow ample access to a portion of the site that has been designated as a future parkland space (1,900 SQM).

The proposal's design has taken several factors into consideration in achieving a composition that effectively serves its unique sites conditions as well as to respect and mitigate its impact on the surrounding context. Some of these design strategies include meeting the specifications of the required angular planes stemming from the adjacent properties rear or side yards, adequate terracing of the building to better articulate it form, providing ample separation between the towers and adjusting the proportion of the floor plates. While these aspects of the design have lent themselves to the buildings' overall form and massing, these design intentions have also become critical factors in sculpting the building to mitigate the shadow impacts on the surrounding lands. These impacts shall be explored in detail in this report to rationalize the form and massing of the proposed building.
NOTE: The new design adds no significant additional shadows when compared to the previous submission. See shadow study casting diagrams.

How is the shadow study going to be analyzed?

The following shadow study examines two distinct sets of shadow studies to provide a comparative analysis of the proposed design to a previous massing strategy. This shadow study report also considers a series of existing site conditions that merit the shadow impacts of the proposal. These elements shall be presented and analyzed to demonstrate the design challenges that have been overcome to mitigate the shadows and validate their overall conformity to have a minimal shadow impact on the surrounding context.

Please note that the following shadow study report and accompanied shadow study documents have been prepared in reference to the City of Mississauga's Urban Design Terms of Reference: Standards for Shadow Studies (February 2023).

The latitude and longitude (43°35'10"N 79°37'10"W) used for the site in shadow drawings, and the astronomic north was determined by cross referencing Google Earth coordinates and Geolocation in SketchUp 2023. The base plan, building massing and terrain were referenced from Land Surveys and ArcGIS 3D Terrain data provided through The City of Mississauga's open data files to provide an accurate depiction of the site and its conditions.

TREGEBOV COGAN ARCHITECTURE

Original: October 2024

Revision for New Design: September 17, 2025 (Notes in Red)

69 & 117 JOHN STREET - SHADOW STUDY

Note: Shadow Study references the City of Mississauga's "Urban Design Terms of Reference: Standards for Shadow Studies, February 2023"

3.1 RESIDENTIAL PRIVATE OUTDOOR AMENITY SPACES

The proposed shadow must not exceed more than two consecutive hourly test times on areas such as private rear yards, decks, patios, and pools of surrounding residential dwellings on June 21 and Sept 21.

When analyzing the shadow in conformity with Criteria 3.1 for the June 21 test times, the proposals shadow does impede some portions of the "No Impact Zones" to the south of the site for more than two consecutive hourly test times during this test period. This occurs over five consecutive hourly test times, between the span of 16:20 to 19:33. However, it is important to note that this impact is minimized as the yards in these regions are already in shadow, primarily casted by the fences enclosing these backyards. This resulting shadow produced by the yard fences is due to the low sun angle conditions of the setting sun. This aspect of yard coverage has been analyzed more carefully with a series of diagrams to illustrate that there is little to no shadow impact following the 18:20 test time in June. Moreover, some of the yards immediately adjacent (3180 Little John Lane) have several sheds, gazebos and other structures that already shade or cover a majority of the yards. Therefore, the proposals shadow will not majorly contribute towards introducing any new shadows to severely impact or impede these "No Impact Zones".

NOTE: The proposed buildings in the new design cast additional shadow that now have a minor impact on the back yards of the townhouses between 2 and 3PM at the Equinox, and additional shadow from 4:12PM onwards, though the back yards of some of the towns south of John Street are located within their own shadow.

JUNE 21:

TIME	AREA OF IMPACT
7:07	*No Impact*
7:20	*No Impact*
8:20	*No Impact*
9:20	*No Impact*
10:20	*No Impact*
11:20	*No Impact*
12:20	*No Impact*
13:20	*No Impact*
14:20	*No Impact*
15:20	*No Impact*
16:20	*Impact On Townhomes Across John Street, Directly To The South And South-East. With Partial Coverage On Little John Lane*
17:20	*Impact On Townhomes Across John Street, Directly To The South And South-East. With Partial Coverage On Little John Lane*
18:20	*Minimal Impact On Townhomes Across John Street, Directly To The South And South-East. With Coverage On Little John Lane*
19:20	*No Impact. Zones Shadowed Primarily By Own Yard Fences*
19:33	*No Impact. Zones Shadowed Primarily By Own Yard Fences*

SEPTEMBER 21:

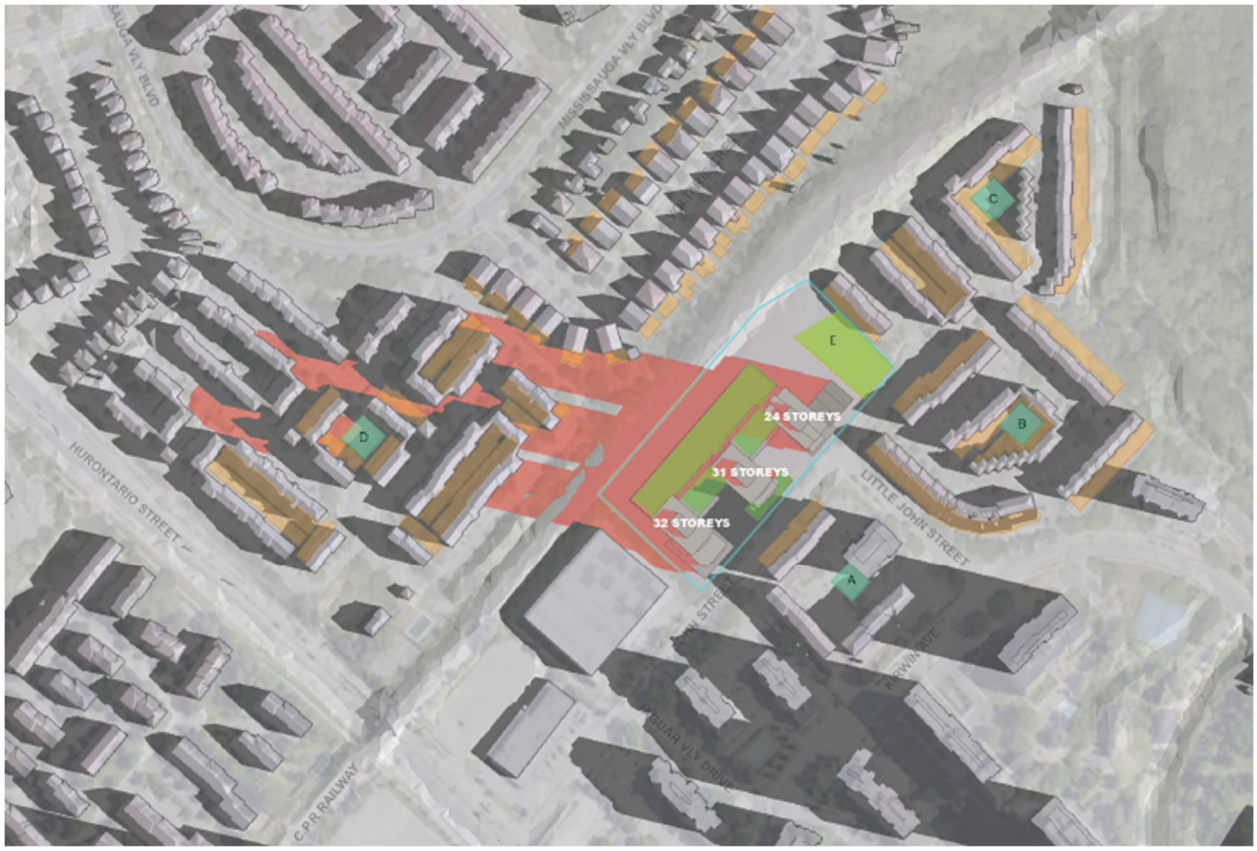
Upon examining the shadow study analysis of the September 21 test times, it is apparent that there is a drastic contrast between existing shadows and the new shadows cast by the proposal. In the early hours of 8:35am it is apparent that the shadows casted by several of the existing townhomes and houses to the north of the tracks already bear a significant impact on their own yards. These conditions persist up to 11:12am. During these times there are no new shadows being casted on the townhome to the north for more than two consecutive test times. To the north-east, the semi-detached house of 94 Voltarie Cres. does receive a shadow for three consecutive test times. However it is important to note two conditions during the third hour of impact. Primarily, the area of impact on the specific yard at both 10:12am and 10:12am both cover less than 10% of the "no impact zone" in this area. Moreover, this portion of shadow, being the leading edge of the shadow represents a gradient effect or penumbra. That is to say, the shadow at these intervals are not a harsh or absolute line separating light from shadow, but is a soft, feathered shadow. To better understand the delineation of shadows umbra and penumbra please refer to Figure 04. A more precise analysis of these key areas can also be examined on the following pages.
NOTE: No significant change with the new design

As for the later hours of impact, between 16:12 to 17:48 it is apparent that the new shadow does not impact the yards of the townhouses to the south-east for more than two consecutive test times. This is because the yards in question are shadowed by their own fences for the last test time (17:48). This indicates that the new shadows during the evening periods of September 21 does not impede any "no impact zones" beyond two- consecutive test times. This has also been evaluated further in the following equinox diagrams.

Thus, the proposal casts no 'new' shadows on these areas maintaining the criteria of not exceeding an impact of more than two consecutive hourly test times.
NOTE: With the new design the impact on the backyards of the townhouses south of John Street has a similar shadow impact, however less than 3 consecutive hours.

On September 21 shadow from the proposed development does not impede any of the North-West Townhouse Complex and Semi-Detached Home's private rear yards or amenity spaces between the time intervals of 7:05 to 10:12. The next shadow casted occurs to the east between 15:12 to 17:48.

As per *Mississauga's 2023 Standards for Shadow Study* the proposal does not cast a shadow within the 7.5 meter "No Impact Zones" for more than ***two consecutive hourly test times*** during September 21. While the study does indicate an impact spanning 8:35 AM to 10:12 AM (three test time), ***Figure 1*** below illustrates that the shadows of the existing structures and homes cast their own shadows (Dark Grey) onto these regions.
NOTE: This impact is essentially the same.



No Impact Zone | Outdoor Amenity Spaces | Communal Amenity | Existing Shadows | New Shadows

Figure 1: *Existing Shadows vs. New Shadow for September 21, at 8:35 AM.*

3.2 COMMUNAL OUTDOOR AMENITY AREAS

The proposed shadow must not exceed more than 50% of the test times covering areas such as children's play areas, school yards, tot lots, sandboxes, wading pools and other communal outdoor amenity areas on June 21, Sept 21 and Dec 21.

When analyzing the shadow in conformity with Criteria 3.2, the proposals shadow indicates that the shadows casted on these communal areas barely impede the conditions for the "Sun Access Factor" on each of the test dates. Thus, maintaining that the shadows casted cover at most, 10% to 20% of these spaces during the indicted test times. With the only exception being the impact on the proposed future parkland to the east during the Dec 21 test period. The key communal outdoor amenity spaces have been indicated (teal colour) in the attached shadow study diagrams and labeled 'A' through 'E' in the diagrams attached. 'A' is located at 3180 Kirwin Ave. 'B' is located at 3175 Kirwin Ave. south-side. 'C' is located at 3175 Kirwin Ave. north-side. 'D' is located at 180 Mississauga Valley Blvd. 'E' is the dedicated park space proposed to the east. The method of calculation for the Sun Access Factors listed in the table below have been measured and calculated as per the method cited in the City of Mississauga's Urban Design Terms of Reference: Standards for Shadow Studies.

NOTE: There is no change to this shadow impact.

ZONE	SUN ACCESS FACTOR - JUNE 21	SUN ACCESS FACTOR - SEPT 21	SUN ACCESS FACTOR - DEC 21
Area A – 335 m^2	*0.83*	*1.00*	*1.00*
Area B – 175 m^2	*1.00*	*0.93*	*1.00*
Area C – 100 m^2	*1.00*	*1.00*	*0.95*
Area D – 705 m^2	*1.00*	*0.98*	*1.00*
Area E – 1,900 m^2	*0.94*	*0.77*	*0.41*

JUNE 21:

TIME	AREA OF IMPACT
7:07	
7:20	
8:20	
9:20	
10:20	
11:20	
12:20	
13:20	*Minor impact on dedicated park land on east side of site.*
14:20	*Minor impact on dedicated park land on east side of site.*
15:20	*Minor impact on dedicated park land on east side of site.*
16:20	*Minor impact on dedicated park land on east side of site.*
17:20	*Minor impact on dedicated park land on east side of site.*
18:20	*Partial impact on playground located to the south at 3180 Kirwin Ave. Minor impact on dedicated park land to the east.*
19:20	*Impact on playground located at 3180 Kirwin Ave. Minor impact on dedicated park land to the east.*
19:33	*Impact on playground located at 3180 Kirwin Ave. Minor impact on dedicated park land to the east.*

SEPTEMBER 21:

TIME	AREA OF IMPACT
8:35	*Partial impact on play structure or playground located to the north at 180 Mississauga Vly. Blvd.*
9:12	
10:12	
11:12	*Minor impact on dedicated park land to the east.*
12:12	*Minor impact on dedicated park land to the east.*
13:12	*Increased impact on dedicated park land to the east.*
14:12	*Increased impact on dedicated park land to the east.*
15:12	*Increased impact on dedicated park land to the east.*
16:12	*Increased impact on dedicated park land to the east.*
17:12	*Minor impact on dedicated park land to the east.*
17:48	*Impact on playground located to the south-east at 3175 Kirwin Ave. Minor impact on dedicated park land to the east.*

DECEMBER 21:

TIME	AREA OF IMPACT
9:19	*Minor impact on dedicated park land to the east.*
10:17	*Increased impact on dedicated park land to the east.*
11:17	*Increased impact on dedicated park land to the east.*
12:17	*Significant impact on dedicated park land to the east.*
13:17	*Significant impact on dedicated park land to the east.*
14:17	*Significant impact on dedicated park land to the east.*
15:15	*Impact on playground located to the east at 3175 Kirwin Ave. Increased impact on dedicated park land to the east.*

To aid in the analysis of the "Sun Access Factor" it is worth noting that the December shadow, due to the low angle of the sun produce long drawn-out shadows. This means that even small/short buildings and objects cast very long shadows. Thus, the proposal creates long shadows that cover a larger swath of area. Moreover, the low angle also contributes to larger penumbra shadows dictating that the shadows during the December times, while lengthy, are not hard or harsh shadows. These shadows are rather softer and form a gradient over the future parkland to the east. Therefore, based on the analysis of the December shadow falling short of the recommended "Sun Access Factor" of 50% by a mere 9% which seems to be within a reasonable and acceptable range of impact. Note that even designs such as the "As of Right" that have been documented in previous submissions would yield similar results during the December months despite its significant reduction in building height.
NOTE: There is no significant change to this impact.

3.3 PUBLIC REALM CRITERIA: SUN ON THE OPPOSITE BOULEVARD

(3a - Low and Medium Density Residential Streets)
The proposed shadow must allow for full sunlight on the opposite boulevard including the full width of the sidewalk on Sept 21, for a total of at least four hours between 9:12 to 11:12 and between 15:12 and 17:12

SEPTEMBER 21: ***3a Low and Medium Density Residential Streets***

09:12 - Clear
10:12 - Clear
11:12 - Clear
15:12 - Clear
16:12 - Shadow occurs on the north and partially the south side of John Street/Sidewalks.
17:12 - Shadow occurs on the north and south sides of John Street/Sidewalks.

When analyzing the shadow in conformity with Criteria 3.2, the proposals shadow does not impede any portion of the public realm as per the city's terms of reference. Looking at the suggested times, the opposite boulevard and sidewalks are clear between the hours of 9:12am to 11:12am. It is also noted that the opposite boulevard and sidewalks are clear between the hours of 12:12pm to 2:12pm. These test periods suggest that the proposal and its shadows meet the criteria set out by section 3.2. Not only does the proposal meet the set-out criteria but also exceeds the recommendations by providing a clear boulevard through 3:12pm. Moving to the following test interval, it is noted that the initial 3:12pm test time is clear but the following two test times are impeded by a minor shadow. This occurs during the 4:12pm and 5:12pm test times. However, this impact is negligible as it allows for full sunlight for a total of five hours between the suggested interval times.
NOTE: The revised design has essentially an identical impact on the sidewalk on the south side of John Street

3.4 TURF AND FLOWER GARDENS IN PUBLIC PARKS

Requires turf and flower gardens in public parks to have direct sunlight for 7 test times during the Sept 21 test period.

SEPTEMBER 21:

There are no distinguished Public Parks within the immediate vicinity that will be impacted by the shadow of the proposed development. The only zones of impact that could be considered yet are not Public Parks are the playground/park amenity spaces located at 3175 Kirwin Ave. and 180 Mississauga Vly Blvd. However these zones have access to adequate sunlight for at least 9 or 10 test times. 3175 Kirwin Ave. has direct sunlight between the hours of 8:35 to 17:12. Whereas 180 Mississauga Vly Blvd. has direct sunlight between the hours of 10:12 to 17:48. This exceeds the recommended terms for maintaining direct sunlight for at least 7 test times.

NOTE: There have been no significant changes with the new design.

3.5 BUILDING FACES TO ALLOW FOR POSSIBILITY OF USING SOLAR ENERGY

Shadow impacts from proposed developments should not exceed 1hr in duration on the roofs, front, rear and exterior side walls of adjacent low rise (1-4 storeys) residential buildings on Sept 21 to allow for possibility of harvesting solar energy. The "no impact zone" shall be 3m offset from the exterior walls of said residential properties.

The North-Western Townhouse Complex (180 Mississauga Vly Blvd.) and Semi-Detached Homes (along Voltarie Crescent) will be impacted by the proposed developments shadows during September 21. These shadows however only span between the test times of 8:35 to 10:12 during which time the shadows move quickly. Thus, it is not posing a major impairment towards the potential for harvesting solar energy. Most of these regions may already be shaded or impeded by shadows due to the proximity of trees, fences and other neighboring structures. Similar occurrences take place for the Easterly Townhouse Complex (3175 Kirwin Ave.) between the test times of 17:12 and 19:18. The Townhouse Complex to the immediate east is impacted as the initial shadow at 16:12 is within 3 meters offset. However, this shadow passes over within the 1-hour duration.

NOTE: There are no changes this as the hours of cast shadows are very early in the morning

CONCLUSION:

For the purpose of fulfilling the application of this proposal, the Mississauga Official Plan necessitates a Shadow Study. The assessment above has followed the Urban Design Terms of Reference: Standards for Shadow Studies (February 2023) to analyze the proposed development's shadowing and its impact on the surrounding area. This study assessed the 'new' shadow impacts on the recommended test periods of June 21, September 21 and December 21, conducted at Solar Noon, and at hourly intervals before and after Solar Noon, up to and including 1.5hrs after sunrise and 1.5hrs before sunset, as indicated.

The latitude and longitude used for the site in shadow drawings, and the astronomic north was determined using SketchUp 2023. The base plan, building mass and terrain were cross referenced from Sketchup, Land Surveys and CAD Mapper to provide a closely accurate depiction of the site and its conditions.

Upon reviewing the information above, the shadow impact of the proposed development has a minimal impact on the surrounding context primarily during the later test times of the June 21, on private outdoor amenity spaces. However as discussed previously, the orientation and configuration of some of these properties do not introduce any significant new shadow in addition to self-imposed shading or shadowing. Mitigating these shadow impact factors has been a foremost concern to the design team in approaching the design of the structure. Sculpting the architectural massing of the building was primarily based on controlling and mitigating the shadow impact. It is with this forethought and consideration that the design team has come to the proposed design resolution. It is also important to note that the "As of Right" building massing also contributes to a similar shadow impact over similar test times. This indicated that although the proposed building exceeds some of the zoning conditions, the shadows casted do not differ in terms of negatively impacting the surrounding context.

Further, as part of analyzing the community outdoor amenity areas, the shadow impact on the proposed park land to the east (Area E) does indicate a sun access factor less than 0.5 during the Dec 21 test times. However, it is important to note that the shadows in this area are casted by the first 6-8 storeys of the building due to the low sun angle. This causes longer shadows at the early hours between sunrise and shortly before solar noon, covering a greater area. The sun access factor during the June 21 and Sept 21 test times are far greater than 0.5. Providing greater sun access to the proposed park during the more functional and active periods/seasons of the year. Moreover, if an "As of Right" building massing is held to the same criterial, the shadow impact would not only impact the "Sun Access Factor" in the June and September months more but also contribute to a lower December "Sun Access Factor". Therefore, the proposal for 69 & 117 John Street has undergone a vigorous design process in order to tailor its form and massing it hopes of respecting the existing context and minimizing its implications on the surrounding areas.

The proposed heights of the towers on the lot are 32, 31 and 24 storeys, with the eastern portion of the site seeing a gradual stepping downward. In the scenario of the building design, height limitations were assessed to drastically mitigate shadowing of neighboring properties, therefore, various design studies with varying tower heights and cutbacks led the to the proposed massing being presented here. These studies have allowed the design team to assess which shadowing criteria were affected and informed the design decision making process and dictated an appropriate resolution for the tower heights.

The proposed heights and massing respect the terms of reference set forth by adapting solutions and considerations to resolve or minimize any probable shadow impact. Gradual reduction in floor plate sizes was also evaluated, to strategically carve away corners and edges of the building to minimize the resulting shadows. These alterations to the initial built form have given the proposal its distinct shape. A structure that gently crescendos from east to west. Growing to meet the ever-evolving skyline of Mississauga's Downtown core. While setbacks and notches respectfully grace the context, respecting the privacy of neighboring residential units without impeding their access to natural sunlight.

It is then the goal of this proposal to articulate its design to work alongside the city of Mississauga's vision of the downtown core and its growth plan to create a rich, diverse and vibrant community for living.

NOTE: The new design adds no significant changes to the minimal impacts noted above.