REPORT

3403-3445 FIELDGATE DRIVE

MISSISSAUGA, ONTARIO

PEDESTRIAN WIND STUDY
RWDI # 2406207
August 9, 2024

SUBMITTED TO

Morgan Dundas
Senior Planner
Morgan@sajeckiplanning.com

Sajecki Planning Inc.

SUBMITTED BY

Kristine Lamont, M.Eng.
Technical Coordinator
Kristine.Lamont@rwdi.com

Rose Babaei, Ph.D.
Senior Technical Coordinator
Rose.Babaei@rwdi.com

Kathryn Kim, P.Eng.
Senior Project Manager
Kathryn.Kim@rwdi.com

RWDI – Head Office
600 Southgate Drive
Guelph, ON N1G 4P6

RWDI – Toronto Office
625 Queen Street West
Toronto, ON M5V 2B7

EXECUTIVE SUMMARY

RWDI was retained to conduct a pedestrian wind assessment for the proposed development at 3403-3445 Fieldgate Drive in Mississauga, Ontario. The assessment was based on the wind-tunnel testing conducted for the proposed development under the Existing and Proposed configurations of the site and surroundings. The results were analysed using the regional wind climate records and evaluated against the Mississauga Pedestrian Wind Criteria for pedestrian comfort (pertaining to common wind speeds conducive to different levels of human activity) and pedestrian safety (pertaining to infrequent but strong gusts that could affect a person's footing). The predicted wind conditions are presented in Figures 1A through 2B and Table 1, and are summarized as follows:

Existing Configuration

- Wind conditions at all areas assessed on and around the existing site are comfortable for pedestrian use throughout the year and meet the wind safety criterion.

Proposed Configuration

- With the proposed development in place, wind speeds at most areas on and around the site, including the adjacent and nearby sidewalks, are predicted to be suitable for pedestrian use throughout the year. Uncomfortable wind conditions are predicted at an isolated area near the southwest corner of Building B during the winter.
- In the summer, wind speeds around the main entrances to the proposed buildings are predicted to be suitable for the intended use. While appropriate conditions are expected near the main entrance of Buildings A and B in the winter, elevated wind speeds are anticipated at the main entrance to Building C.
- Wind conditions on the Level 2 and Level 6 amenity areas are predicted to be higher than desirable for passive uses such as lounging in the summer. In the winter, due to the seasonally stronger wind speeds, elevated wind activity is generally predicted on these amenity areas. Note that the increased wind speeds during the winter season may not be a concern as outdoor areas would not be used frequently during the cold winter days.
- Wind speeds that meet the pedestrian wind safety criterion are anticipated at all areas assessed at grade and on the amenity areas.
- Recommendations for wind control have been provided for the design team's consideration. RWDI can provide advice on the specific placement and selection of wind control features as the design advances.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

RWDI was retained to conduct a pedestrian wind assessment for the proposed development at 3403-3445 Fieldgate Drive in Mississauga, Ontario. This report presents the project objectives, approach and the main results from RWDI's assessment and provides conceptual wind control measures, where necessary. Our Statement of Limitations as it pertains to this study can be found in Section 4 of this report.

1.1 Project Description

The proposed development site is located on the northeast corner of Fieldgate Drive and Ponytail Drive, in Mississauga, Ontario (Image 1). The proposed development consists of three buildings: 19-storey Building A, 16-storey Building B, and 13-storey Building C. Buildings A and B are connected through a shared podium with outdoor amenity terraces proposed on the 2nd and 6th floors.

1.2 Objectives

The objective of the study was to assess the effect of the proposed development on local conditions in pedestrian areas on and around the study site and provide recommendations for minimizing adverse effects, if needed. This quantitative assessment was based on wind speed measurements on a scale model of the project and its surroundings in one of RWDI's boundary-layer wind tunnels. These measurements were combined with the local wind records and compared to the Mississauga criteria for gauging wind comfort and safety in pedestrian areas. The assessment focused on critical pedestrian areas, including main building entrances, public sidewalks and outdoor amenity areas.

Image 1: Aerial View of Site and Surroundings (Photo Credit: Google™ Earth)

2 BACKGROUND AND APPROACH

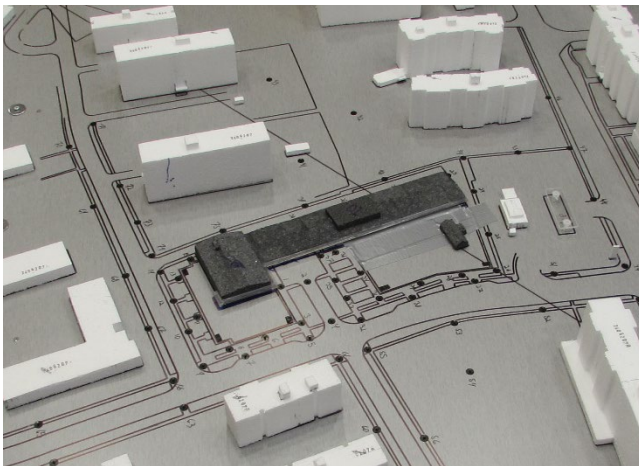
2.1 Wind Tunnel Study Model

To assess the wind environment around the proposed project, a 1:400 scale model of the project site and surroundings was constructed for the wind tunnel tests of the following configurations:

A - Existing: Existing site with existing surroundings (Image 2A), and

B - Proposed: Proposed project with existing surroundings (Image 2B).

The wind tunnel model included all relevant surrounding buildings and topography within an approximate 480 m radius around the study site. The wind and turbulence profiles in the atmospheric boundary layer beyond the modelled area were also simulated in RWDI's wind tunnel. The wind tunnel model was instrumented with 89 specially designed wind speed sensors to measure mean and gust speeds at a full-scale height of approximately 1.5 m above local grade in pedestrian areas throughout the study site. The placement of wind measurement locations was based on our experience and understanding of the pedestrian usage for this site and was reviewed by the project team. Wind speeds were measured for 36 directions in 10-degree increments. The measurements at each sensor location were recorded in the form of ratios of local mean and gust speeds to the mean wind speed at a reference height above the model.



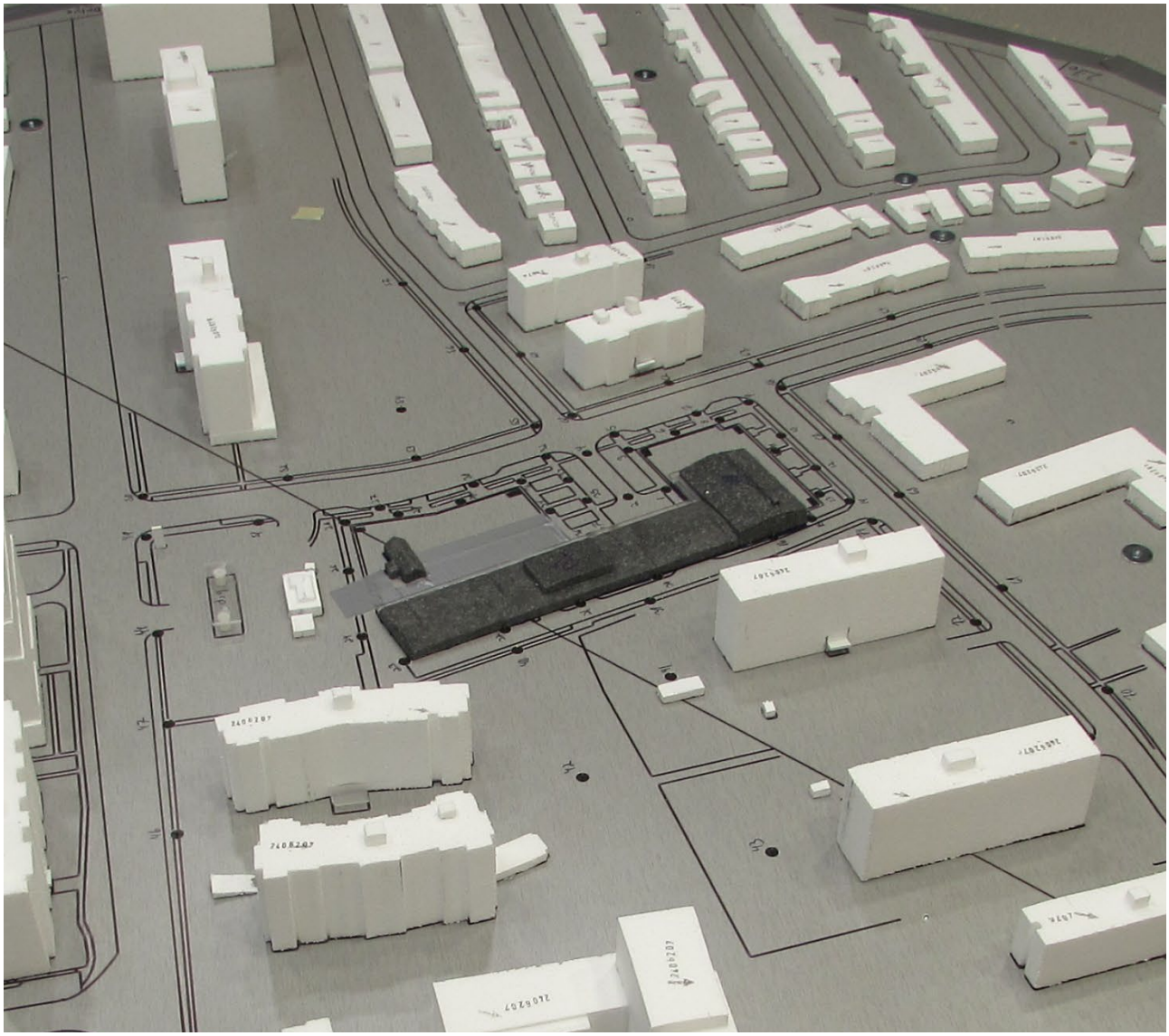
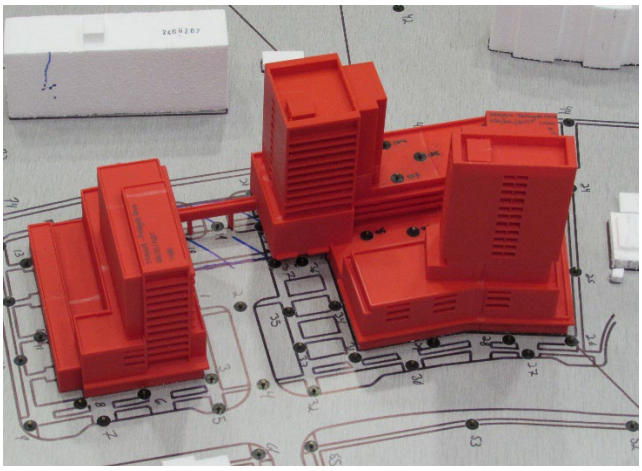


Image 2A: Wind Tunnel Study Model – Existing Configuration



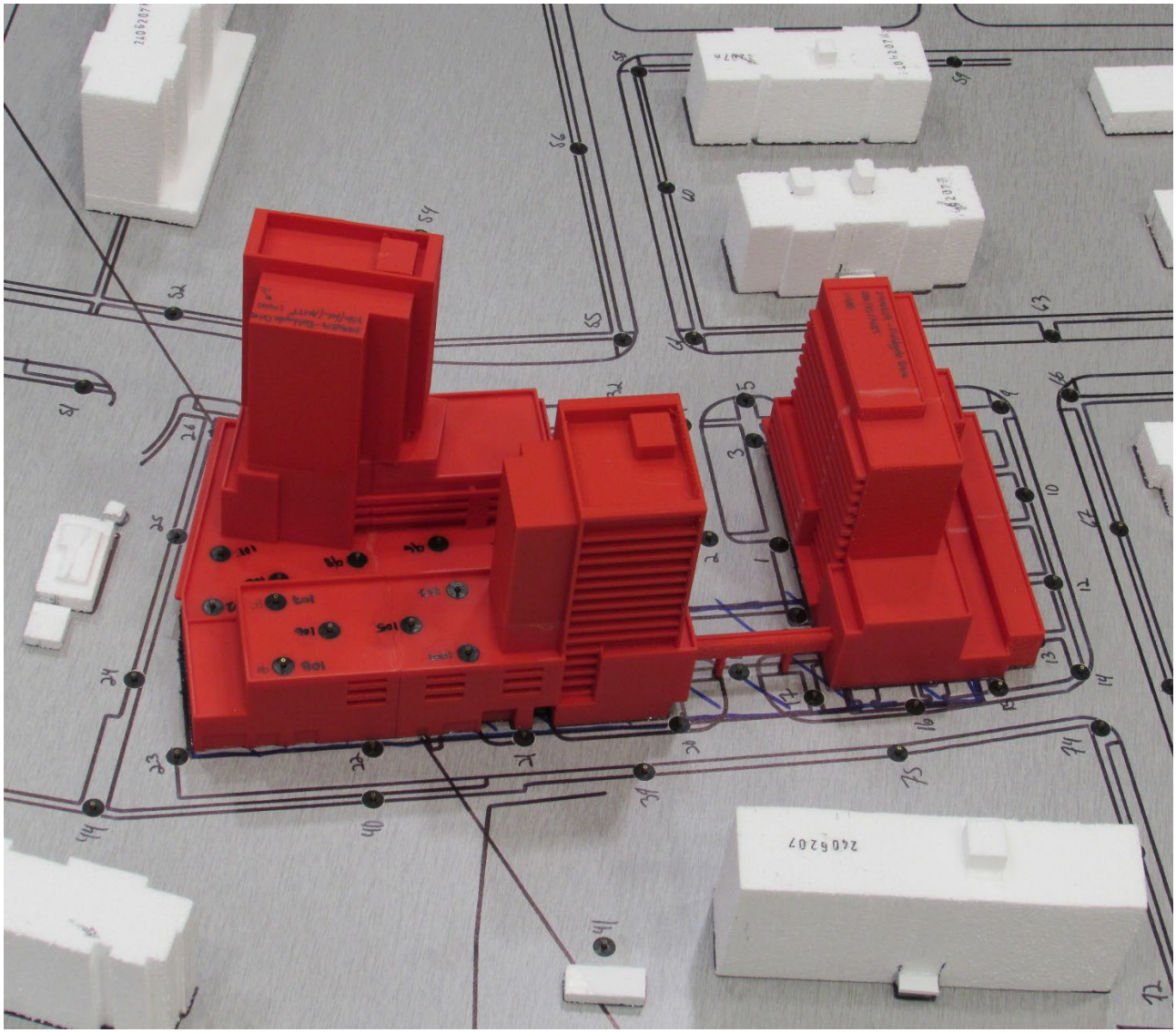
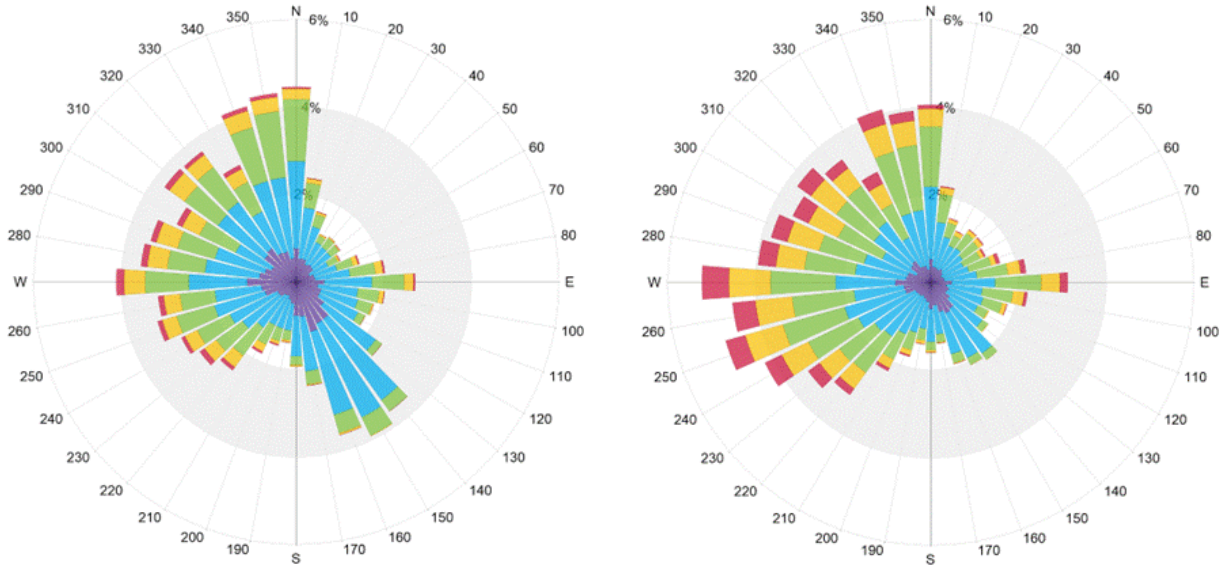


Image 2B: Wind Tunnel Study Model – Proposed Configuration

2.2 Wind Climate Data

Wind statistics recorded at Toronto Pearson International Airport between 1993 and 2023, inclusive, were analyzed for the Summer (May through October) and Winter (November through April) seasons. Image 3 graphically depicts the directional distributions of wind frequencies and speeds for these two seasons. Winds from the southwest through north and the east are predominant throughout the year. Calm winds from the southeast direction are also frequent in summer. Strong winds of a mean speed greater than 30 km/h measured at the airport (at an anemometer height of 10 m) occur primarily from the westerly directions and are most common in the winter.

Wind statistics were combined with the wind tunnel data to predict the frequency of occurrence of full-scale wind speeds. The full-scale wind predictions were then compared with the wind criteria for pedestrian comfort and safety.



Wind Speed (km/h)	Probability (%) Summer	Winter
Calm	4.5	3.1
1-10	23.8	16.9
11-20	40.8	34.9
21-30	22.0	26.9
31-40	7.0	12.3
>40	1.9	5.9

Image 3: Directional Distribution of Winds Approaching Toronto Pearson International Airport between 1993 and 2023.

2.3 Pedestrian Wind Criteria

The criteria specified in the *Pedestrian Wind Comfort and Safety Studies – Urban Design Terms of Reference (February 2023)* prepared by the City of Mississauga are used in the current study and are presented below. The criteria consider pedestrian comfort (pertaining to common wind speeds conducive to different levels of human activity) and safety (pertaining to infrequent but strong gusts that could affect a person's footing).

COMFORT CATEGORY	GEM SPEED (km/h)	DESCRIPTION	AREA OF APPLICATION
Sitting	**≤ 10** at least 80% of the time	Light breezes desired for outdoor seating areas where one can read a paper without having it blown away.	Park benches, restaurant and café seating, balconies, amenity terraces, children's areas, etc. intended for relaxed, and usually seated activities.
Standing	**≤ 15** at least 80% of the time	Gentle breezes suitable for passive pedestrian activities where a breeze may be tolerated	Areas where seated activities are not expected but would be used for passive activities such as bus-stops, dog areas and main entrances.
Walking	**≤ 20** at least 80% of the time	Relatively high speeds that can be tolerated during intentional walking, running and other active movements.	Sidewalks, parking lots, alleyways and areas where pedestrian activity is primarily for walking.
Uncomfortable	**> 20** more than 20% of the time	Strong winds, considered a nuisance for most activities.	Not acceptable in areas with pedestrian access.

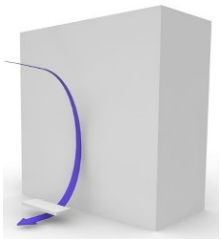
NOTES:
1) Gust Equivalent Mean (GEM) speed = maximum of either mean speed or gust speed/1.85.
2) Gust speed has been estimated as mean speed + (3 x RMS speed).
3) Comfort calculations are applied to each season and based on wind events recorded between 6:00 and 23:00 daily.

SAFETY CRITERION	GUST SPEED (km/h)	DESCRIPTION	AREA OF APPLICATION
Exceeded	> 90 At least 0.1 % of the time annually (9 hours in a year)	Excessive gust speeds that can adversely affect a pedestrian's balance and footing. Wind mitigation is typically required.	Not acceptable in any area of interest

NOTES:
4) Safety calculations are applied to an annual period and based on wind events recorded for 24 hours a day.

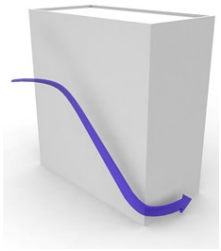
2.4 General Wind Flow Mechanisms

In the discussion of wind conditions, reference is made to the following wind flow mechanisms (Image 4):



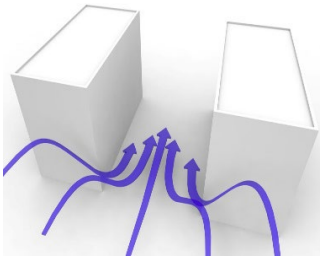
DOWNWASHING

Tall buildings tend to intercept the stronger winds at higher elevations and redirect them to the ground level. This is often the main cause for wind accelerations around large buildings at the pedestrian level.



CORNER ACCELERATION

When wind moves around the buildings a localized increase in the wind activity or corner acceleration can be expected around the exposed building corners at pedestrian level. The effect is intensified when the wind approaches at an oblique angle to a tall façade and are deflected down and around the exposed corners.



CHANNELLING EFFECT

Wind flow tends to accelerate through the space between buildings, under bridges or in passages through buildings due to channelling effect caused by the narrow gap. The effect is intensified if the channel is aligned with the predominant wind direction.

Image 4: General Wind Flow Mechanisms

If these building/wind combinations occur for prevailing winds, there is a greater potential for increased wind activity. Design details such as setting back a tall tower from the edges of a podium, deep canopies close to ground level, wind screens, tall trees with dense landscaping, etc. (Image 5) can help reduce wind speeds. The choice and effectiveness of these measures would depend on the exposure and orientation of the site with respect to the prevailing wind directions and the size and massing of the proposed buildings.

Podium/tower setback, canopy, landscaping and wind screens (left to right)

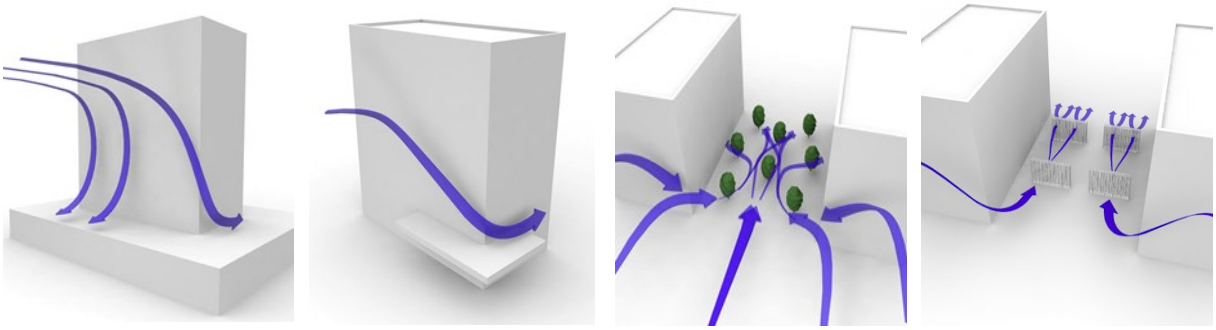


Image 5: Common Wind Control Measures

3 RESULTS AND DISCUSSION

The predicted wind conditions are shown on site plans in Figures 1A through 2B located in the "Figures" section of this report and the associated wind speeds are presented in Table 1, located in the "Tables" section of this report.

Wind conditions comfortable for walking are appropriate for sidewalks and walkways as pedestrians will be active and less likely to remain in one area for prolonged periods of time. Lower wind speeds conducive to standing are preferred at main entrances where pedestrians are apt to linger. Wind speeds comfortable for sitting are preferred for areas intended for passive activities in the summer season, such as outdoor amenity areas. The following is a detailed discussion of the suitability of the predicted wind conditions for the anticipated pedestrian use of each area of interest.

Wind conditions that meet the safety criterion are predicted at all locations assessed for both the Existing and Proposed Configurations (Table 1).

3.1 Existing Configuration

Wind conditions on and around the existing site are generally comfortable for standing in the summer and for standing or walking in the winter (Figures 1A and 2A). These wind speeds are considered comfortable for the intended use of public sidewalks.

3.2 Proposed Configuration

The proposed buildings, taller than the existing structures on the site and most surrounding buildings, are expected to intercept winds at higher elevations and redirect them (Image 4). The proposed stepped podium structures are positive design aspects which would help reduce the wind impact of the tall buildings by deflecting the wind downdrafts away from the ground level (see Image 5). Thus, the overall wind impact of the project is expected to be moderate.

3.2.1 Sidewalks and Nearby Properties

In the summer, wind speeds conducive to standing are anticipated at most areas assessed, with slightly elevated wind speeds and conditions comfortable for walking along the opening between Buildings A and B and Building C (Figure 1B). These wind conditions are appropriate for the pedestrian use of sidewalks and walkways.

During the winter, wind conditions on and around the proposed project are comfortable for walking or calmer at all locations assessed (Figure 2B), which is suitable for sidewalks and walkways. One exception is an isolated area near the southwest corner of Building B, where uncomfortable wind conditions are predicted (Location 37). The high wind activity at this corner can be attributed to the direct exposure of Building B to the predominant northwesterly winds. These winds are expected to be deflected down by the west building façade and subsequently accelerate around the exposed southwest building corner (see Image 4). To improve the uncomfortable conditions at this area, vertical wind control measures in the form of landscaping and screens can be considered to help diffuse the energy of accelerating wind flows. Note that for vertical wind control elements to be effective, a minimum height of 2 m

and a porosity that is no more than 30% open are recommended. For effective wind control, trees should retain their foliage during the winter months (coniferous/marcescent species). Examples of the use of such mitigation solutions are shown in Image 6.

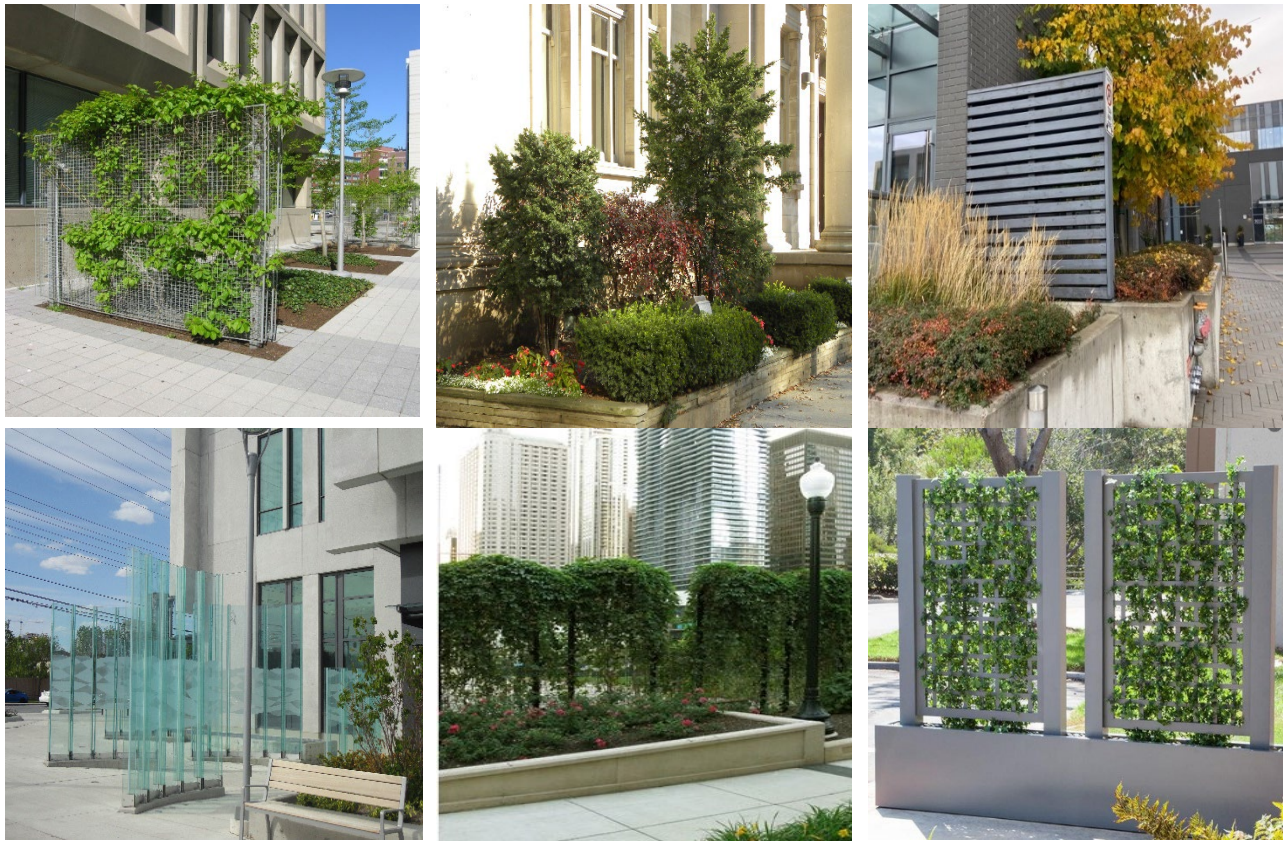


Image 6: Vertical Wind Control Measures Applicable to the Building Corner Area

3.2.2 Building Entrances

Main entrances of the proposed buildings are situated near Locations 1 and 36 in Figures 1B and 2B. Wind conditions comfortable for sitting or standing are expected at these locations in the summer which is suitable for the intended pedestrian use (Figure 1B). In the winter, wind speeds at the entrance to Buildings A and B are comfortable for standing which is suitable (Location 36 in Figure 2B), however, higher than desirable wind conditions, comfortable for walking, are predicted at the main entrance to Building C (Location 1 in Figure 2B). To improve the wind conditions at this entrance location, it is recommended to either install wind screens on both sides of the doors or recess the entrance behind the façade to create a sheltered zone. Examples are shown in Image 7.

Appropriate wind conditions, comfortable for standing, are predicted at the commercial entrances in the summer. In the winter, higher-than-desired wind speeds are predicted at some of these entrance locations. The above-discussed wind control solutions can be used for any entry area with elevated wind speeds.

Image 7: Wind Mitigation Solutions Applicable to the Building Entrances

3.2.3 Above Grade Amenity Terraces (Locations 75 through 89)

It is generally desirable for wind conditions on areas intended for passive activities such as lounging or dinning to be comfortable for sitting more than 80% of the time in the summer.

Wind conditions on the outdoor amenity areas on Level 2 and Level 6 are suitable for standing or walking during the summer (Figure 1B). These higher-than-desired wind speeds can be primarily attributed to the acceleration of wind flows downwashing off the façades of Buildings A and B on the podium roofs as well as the wind flow channelling between the buildings.

In the winter, elevated wind conditions, mostly comfortable for walking, are predicted on the Level 2 and Level 6 terraces. During the winter, the area would not be used frequently, and increased wind activity would be considered acceptable.

To improve the summer wind conditions on the amenity terraces, vertical wind control measures such as an increased parapet height, partitions, planters and screens can be considered. These elements should be at least 2 m in height and no more than 30% open. Horizontal features in the form of canopies and trellises can also be considered close to the building façades to help divert the wind downdrafts. Examples are provided in Image 8. RWDI can provide advice on the specific placement and selection of wind control features as the design advances and programming is determined for the amenity terraces.

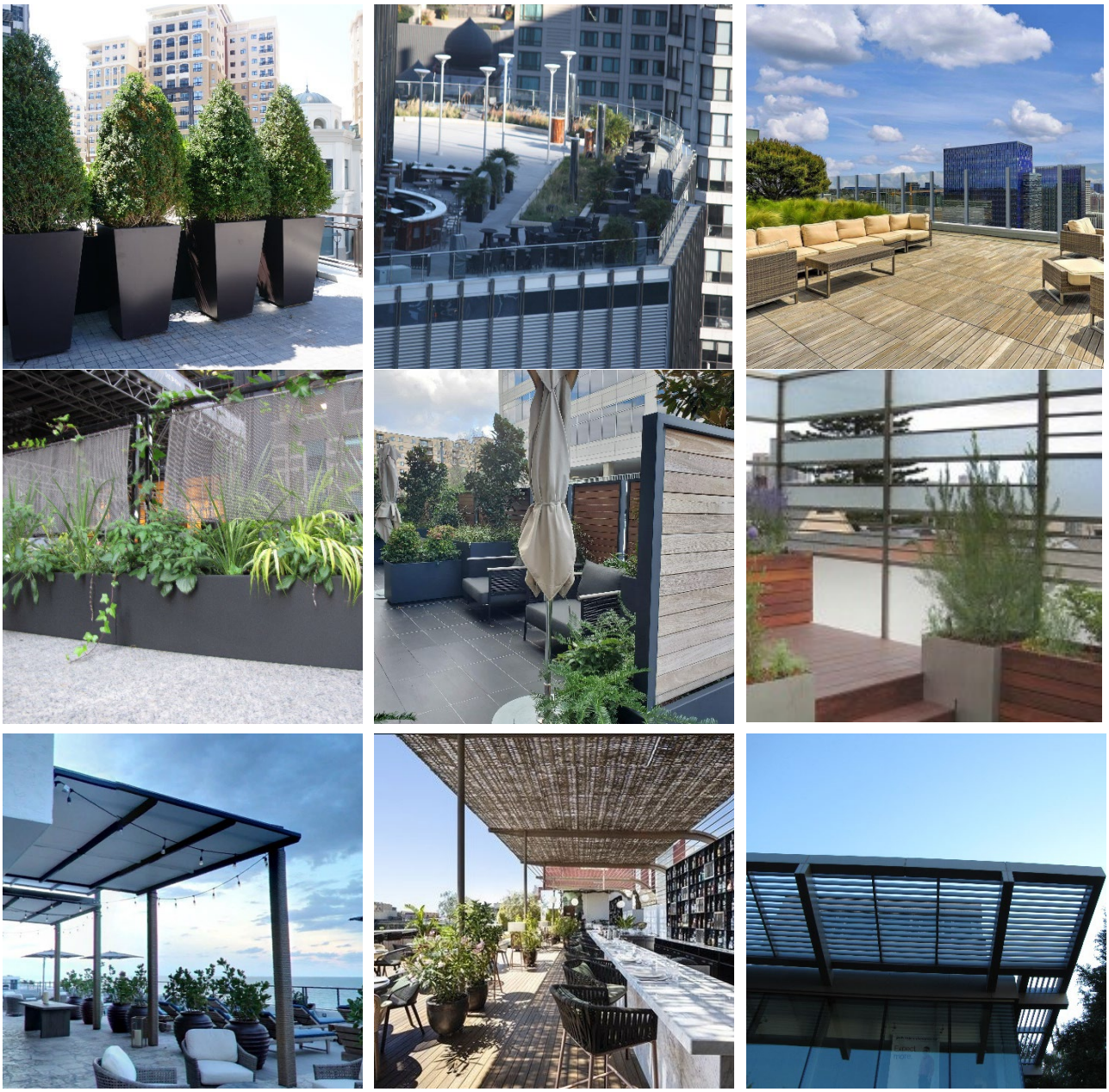


Image 8: Vertical Wind Control Measures Applicable to the Level 2 and Level 6 Amenity Areas

3.3 Impact of Updated Building Design

Following the wind-tunnel test, RWDI received updated drawings on August 8, 2024 regarding changes to the proposed heights of Buildings A and B. The key features of these buildings in the new design would remain similar to those in the original design, with Building A increased to 22 storeys (3 additional storeys) and Building B increased to 18 storeys (2 additional storeys). The proposed changes could slightly increase wind speeds in the adjacent areas, however, the overall comfort conditions would remain unchanged, and the findings presented in this report continue to be relevant.

4 STATEMENT OF LIMITATIONS

Limitations

This report was prepared by Rowan Williams Davies & Irwin, Inc. ("RWDI") for Sajecki Planning Inc. ("Client"). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein ("Project"). The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared.

The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this report carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.

Design Assumptions

RWDI confirms that the pedestrian wind assessment (the "**Assessment**") discussed herein was performed by RWDI in accordance with generally accepted professional standards at the time when the Assessment was performed and in the location of the Project. No other representations, warranties, or guarantees are made with respect to the accuracy or completeness of the information, findings, recommendations, or conclusions contained in this Report. This report is not a legal opinion regarding compliance with applicable laws.

The findings and recommendations set out in this report are based on the following information disclosed to RWDI. Drawings and information listed below were received from Sajecki Planning Inc. and used to construct the scale model of the proposed development at 3403-3445 Fieldgate Drive ("**Project Data**").

File Name	File Type	Date Received (dd/mm/yyyy)
23063- 3403-3445 Fieldgate Drive_2024-06-10 3D CAD.dwg	AutoCAD drawing	10/06/2024
23063- 3403-3445 Fieldgate Drive - Progress Set 2024-08-08	PDF	08/08/2024

The recommendations and conclusions are based on the assumption that the Project Data and Climate Data are accurate and complete. RWDI assumes no responsibility for any inaccuracy or deficiency in information it has received from others. In addition, the recommendations and conclusions in this report are partially based on historical data and can be affected by a number of external factors, including but not limited to Project design, quality of materials and construction, site conditions, meteorological events, and climate change. As such, the conclusions and recommendations contained in this report do not list every possible outcome.

The opinions in this report can only be relied upon to the extent that the Project Data and Project Specific Conditions have not changed. Any change in the Project Data or Project Specific Conditions not reflected in this report can impact and/or alter the recommendations and conclusions in this report. Therefore, it is incumbent upon the Client and/or any other third party reviewing the recommendations and conclusions in this report to contact RWDI in the event of any change in the Project Data and Project Specific Conditions in order to determine

whether any such change(s) may impact the assumptions upon which the recommendations and conclusions were made.

5 REFERENCES

1. ASCE Task Committee on Outdoor Human Comfort (2004). *Outdoor Human Comfort and Its Assessment*, 68 pages, American Society of Civil Engineers, Reston, Virginia, USA.

2. Williams, C.J., Hunter, M.A. and Waechter, W.F. (1990). "Criteria for Assessing the Pedestrian Wind Environment," *Journal of Wind Engineering and Industrial Aerodynamics*, Vol.36, pp.811-815.

3. Williams, C.J., Soligo M.J. and Cote, J. (1992). "A Discussion of the Components for a Comprehensive Pedestrian Level Comfort Criteria," *Journal of Wind Engineering and Industrial Aerodynamics*, Vol.41-44, pp.2389-2390.

4. Soligo, M.J., Irwin, P.A., and Williams, C.J. (1993). "Pedestrian Comfort Including Wind and Thermal Effects," *Third Asia-Pacific Symposium on Wind Engineering*, Hong Kong.

5. Soligo, M.J., Irwin, P.A., Williams, C.J. and Schuyler, G.D. (1998). "A Comprehensive Assessment of Pedestrian Comfort Including Thermal Effects," *Journal of Wind Engineering and Industrial Aerodynamics*, Vol.77&78, pp.753-766.

6. Williams, C.J., Wu, H., Waechter, W.F. and Baker, H.A. (1999). "Experiences with Remedial Solutions to Control Pedestrian Wind Problems," *Tenth International Conference on Wind Engineering*, Copenhagen, Denmark.

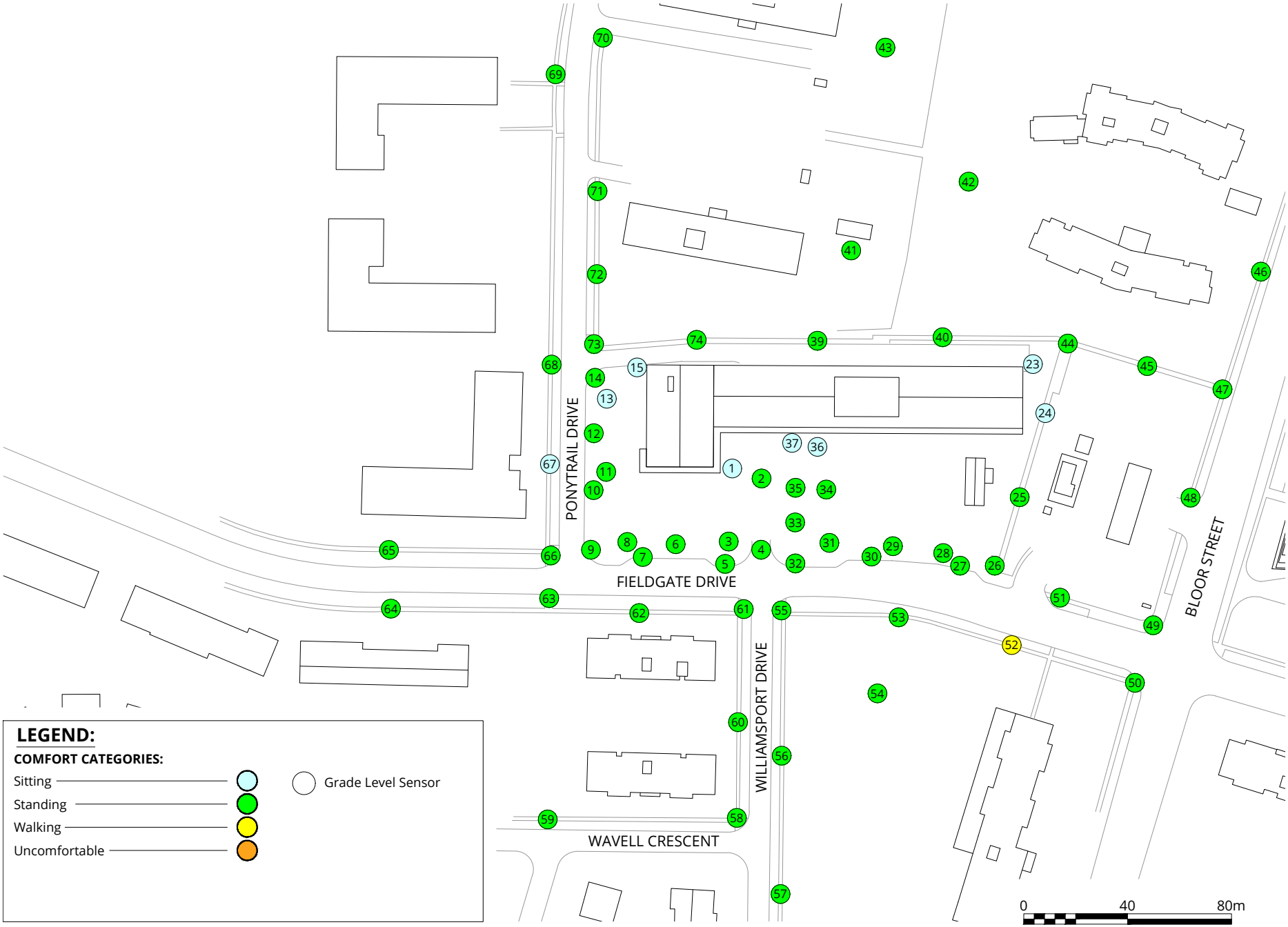
7. Lawson, T.V. (1973). "Wind Environment of Buildings: A Logical Approach to the Establishment of Criteria", *Report No. TVL 7321*, Department of Aeronautic Engineering, University of Bristol, Bristol, England.

8. Durgin, F. H. (1997). "Pedestrian Level Wind Criteria Using the Equivalent average", *Journal of Wind Engineering and Industrial Aerodynamics*, Vol. 66, pp.215-226.

9. Wu, H. and Kriksic, F. (2012). "Designing for Pedestrian Comfort in Response to Local Climate", *Journal of Wind Engineering and Industrial Aerodynamics*, Vol.104-106, pp.397-407.

10. Wu, H., Williams, C.J., Baker, H.A. and Waechter, W.F. (2004), "Knowledge-based Desk-Top Analysis of Pedestrian Wind Conditions", *ASCE Structure Congress 2004,* Nashville, Tennessee.

FIGURES



Pedestrian Wind Comfort Conditions

Existing Configuration

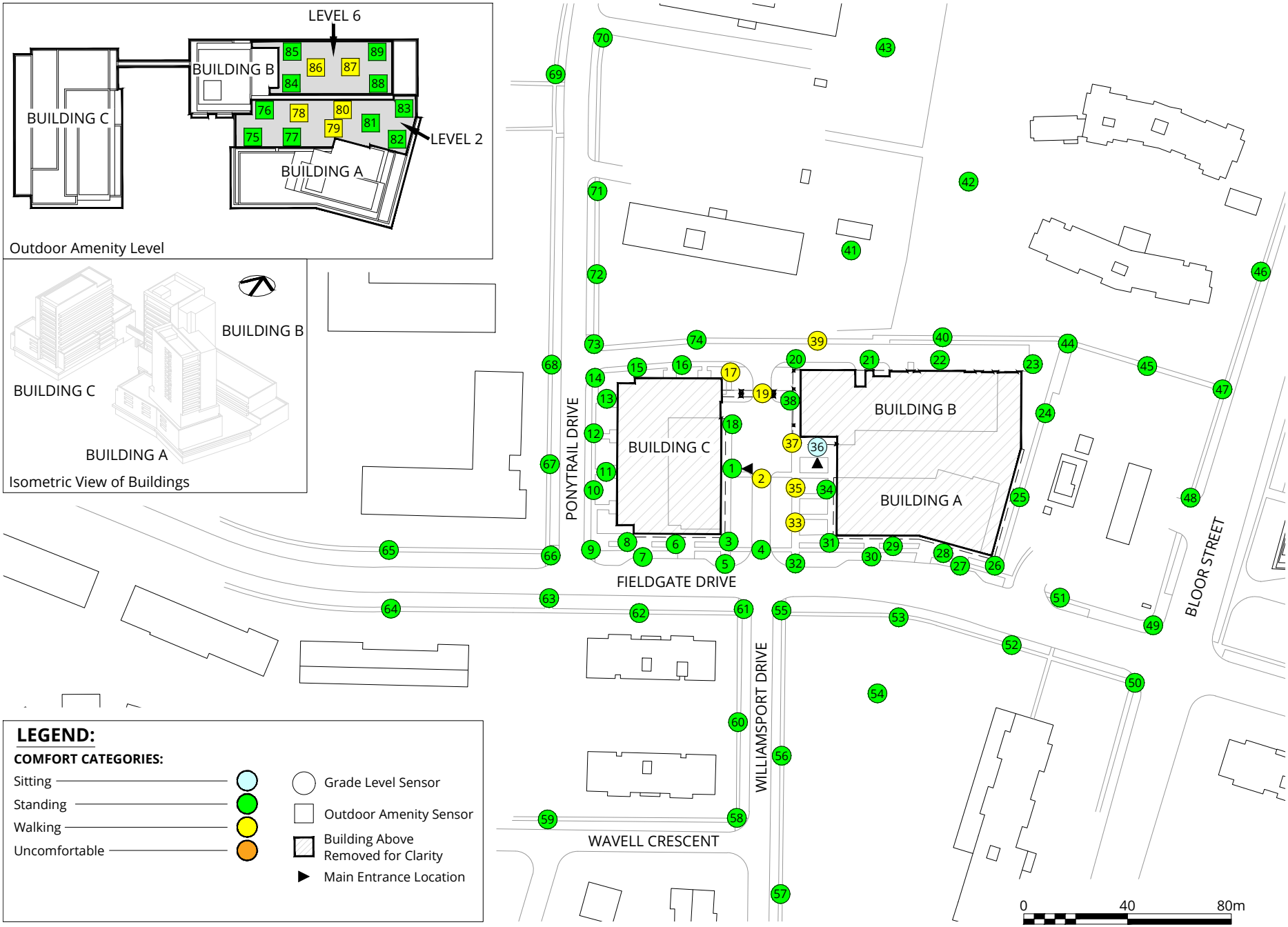
Summer (May to October, 6:00 to 23:00)

3403-3445 Fieldgate Drive - Mississauga, ON

True North

Project #2406207

Drawn by:	DUC	Figure:	1A
Approx. Scale:	1:2000		
Date Revised:	Jul. 3, 2024		



Pedestrian Wind Comfort Conditions

Proposed Configuration

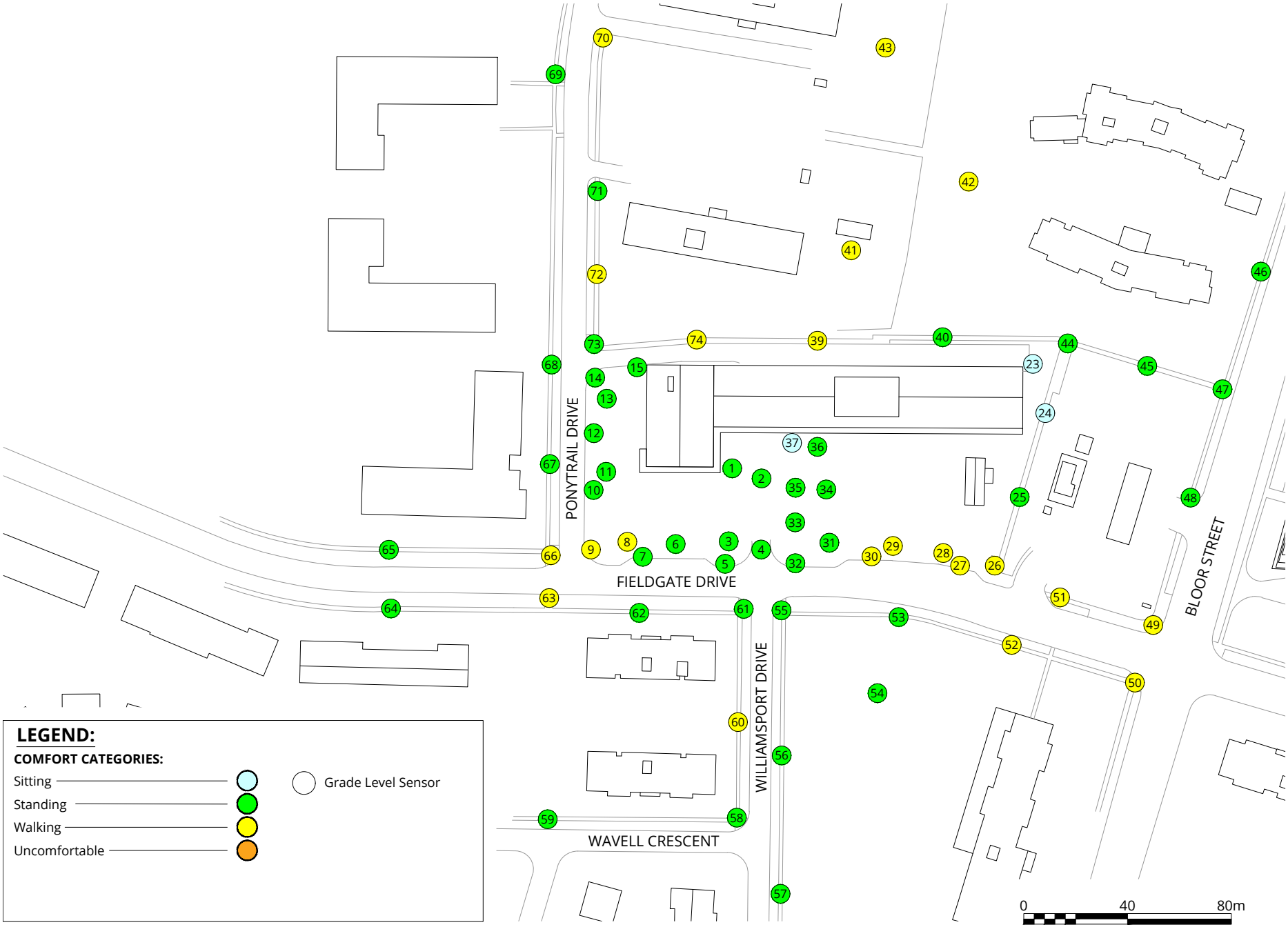
Summer (May to October, 6:00 to 23:00)

3403-3445 Fieldgate Drive - Mississauga, ON

True North

Project #2406207

Drawn by:	DUC	Figure:	1B
Approx. Scale:	1:2000		
Date Revised:	Jul. 3, 2024		



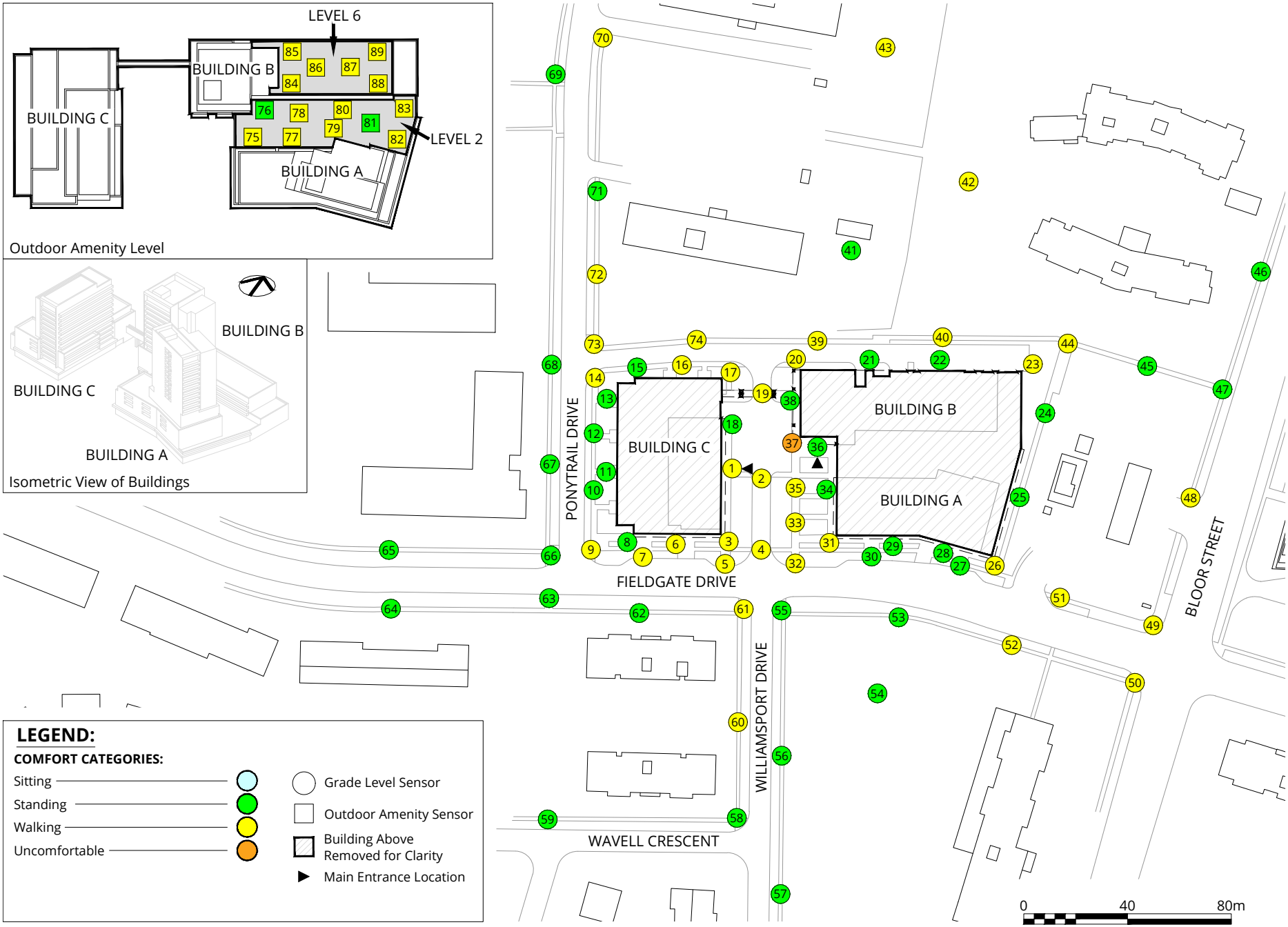
Pedestrian Wind Comfort Conditions
Existing Configuration
Winter (November to April, 6:00 to 23:00)

3403-3445 Fieldgate Drive - Mississauga, ON

True North

Project #2406207

Drawn by: DUC	Figure: 2A	
Approx. Scale: 1:2000		
Date Revised: Jul. 3, 2024		



Pedestrian Wind Comfort Conditions
Proposed Configuration
Winter (November to April, 6:00 to 23:00)

3403-3445 Fieldgate Drive - Mississauga, ON

True North

Project #2406207

Drawn by:	DUC	Figure:	2B
Approx. Scale:	1:2000		
Date Revised:	Jul. 3, 2024		

TABLES

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating
1	Existing	9	Sitting	11	Standing	46	Pass
	Proposed	14	Standing	16	Walking	72	Pass
2	Existing	11	Standing	13	Standing	51	Pass
	Proposed	16	Walking	20	Walking	80	Pass
3	Existing	12	Standing	14	Standing	57	Pass
	Proposed	13	Standing	17	Walking	79	Pass
4	Existing	13	Standing	15	Standing	58	Pass
	Proposed	15	Standing	18	Walking	73	Pass
5	Existing	13	Standing	15	Standing	60	Pass
	Proposed	13	Standing	16	Walking	68	Pass
6	Existing	12	Standing	15	Standing	63	Pass
	Proposed	13	Standing	16	Walking	66	Pass
7	Existing	13	Standing	15	Standing	61	Pass
	Proposed	15	Standing	17	Walking	74	Pass
8	Existing	13	Standing	16	Walking	61	Pass
	Proposed	13	Standing	15	Standing	67	Pass
9	Existing	13	Standing	16	Walking	62	Pass
	Proposed	14	Standing	16	Walking	67	Pass
10	Existing	12	Standing	14	Standing	58	Pass
	Proposed	13	Standing	15	Standing	59	Pass
11	Existing	12	Standing	13	Standing	59	Pass
	Proposed	11	Standing	13	Standing	54	Pass
12	Existing	11	Standing	13	Standing	54	Pass
	Proposed	12	Standing	14	Standing	56	Pass
13	Existing	10	Sitting	12	Standing	47	Pass
	Proposed	11	Standing	13	Standing	60	Pass
14	Existing	11	Standing	13	Standing	50	Pass
	Proposed	14	Standing	17	Walking	69	Pass
15	Existing	10	Sitting	12	Standing	49	Pass
	Proposed	12	Standing	14	Standing	68	Pass
16	Existing	-	-	-	-	-	-
	Proposed	14	Standing	18	Walking	77	Pass
17	Existing	-	-	-	-	-	-
	Proposed	16	Walking	19	Walking	74	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating
18	Existing	-	-	-	-	-	-
	Proposed	12	Standing	14	Standing	67	Pass
19	Existing	-	-	-	-	-	-
	Proposed	16	Walking	19	Walking	74	Pass
20	Existing	-	-	-	-	-	-
	Proposed	15	Standing	18	Walking	69	Pass
21	Existing	-	-	-	-	-	-
	Proposed	13	Standing	15	Standing	62	Pass
22	Existing	-	-	-	-	-	-
	Proposed	12	Standing	14	Standing	70	Pass
23	Existing	9	Sitting	10	Sitting	44	Pass
	Proposed	15	Standing	17	Walking	67	Pass
24	Existing	9	Sitting	10	Sitting	44	Pass
	Proposed	11	Standing	12	Standing	57	Pass
25	Existing	12	Standing	14	Standing	53	Pass
	Proposed	12	Standing	13	Standing	59	Pass
26	Existing	14	Standing	17	Walking	61	Pass
	Proposed	15	Standing	18	Walking	78	Pass
27	Existing	14	Standing	16	Walking	61	Pass
	Proposed	13	Standing	15	Standing	65	Pass
28	Existing	14	Standing	16	Walking	60	Pass
	Proposed	12	Standing	14	Standing	61	Pass
29	Existing	13	Standing	16	Walking	59	Pass
	Proposed	11	Standing	13	Standing	55	Pass
30	Existing	13	Standing	16	Walking	59	Pass
	Proposed	12	Standing	13	Standing	53	Pass
31	Existing	13	Standing	15	Standing	59	Pass
	Proposed	14	Standing	16	Walking	66	Pass
32	Existing	13	Standing	15	Standing	57	Pass
	Proposed	15	Standing	18	Walking	72	Pass
33	Existing	13	Standing	15	Standing	58	Pass
	Proposed	16	Walking	19	Walking	83	Pass
34	Existing	12	Standing	14	Standing	57	Pass
	Proposed	12	Standing	15	Standing	66	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating
35	Existing	12	Standing	14	Standing	56	Pass
	Proposed	16	Walking	19	Walking	74	Pass
36	Existing	9	Sitting	11	Standing	45	Pass
	Proposed	9	Sitting	11	Standing	55	Pass
37	Existing	9	Sitting	10	Sitting	45	Pass
	Proposed	18	Walking	21	Uncomfortable	81	Pass
38	Existing	-	-	-	-	-	-
	Proposed	12	Standing	14	Standing	60	Pass
39	Existing	13	Standing	16	Walking	63	Pass
	Proposed	16	Walking	19	Walking	76	Pass
40	Existing	13	Standing	15	Standing	61	Pass
	Proposed	15	Standing	18	Walking	78	Pass
41	Existing	14	Standing	16	Walking	71	Pass
	Proposed	12	Standing	15	Standing	64	Pass
42	Existing	15	Standing	18	Walking	70	Pass
	Proposed	15	Standing	18	Walking	72	Pass
43	Existing	14	Standing	18	Walking	82	Pass
	Proposed	14	Standing	17	Walking	80	Pass
44	Existing	12	Standing	15	Standing	61	Pass
	Proposed	15	Standing	17	Walking	72	Pass
45	Existing	12	Standing	14	Standing	58	Pass
	Proposed	13	Standing	15	Standing	63	Pass
46	Existing	12	Standing	14	Standing	58	Pass
	Proposed	11	Standing	13	Standing	58	Pass
47	Existing	13	Standing	15	Standing	58	Pass
	Proposed	13	Standing	15	Standing	58	Pass
48	Existing	12	Standing	14	Standing	55	Pass
	Proposed	13	Standing	16	Walking	63	Pass
49	Existing	14	Standing	17	Walking	64	Pass
	Proposed	14	Standing	16	Walking	65	Pass
50	Existing	15	Standing	18	Walking	68	Pass
	Proposed	14	Standing	17	Walking	66	Pass
51	Existing	15	Standing	17	Walking	64	Pass
	Proposed	15	Standing	17	Walking	71	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating
52	Existing	16	Walking	18	Walking	67	Pass
	Proposed	15	Standing	17	Walking	66	Pass
53	Existing	13	Standing	15	Standing	58	Pass
	Proposed	13	Standing	15	Standing	61	Pass
54	Existing	13	Standing	15	Standing	58	Pass
	Proposed	13	Standing	15	Standing	63	Pass
55	Existing	13	Standing	15	Standing	59	Pass
	Proposed	13	Standing	15	Standing	61	Pass
56	Existing	13	Standing	15	Standing	62	Pass
	Proposed	13	Standing	15	Standing	61	Pass
57	Existing	13	Standing	15	Standing	55	Pass
	Proposed	13	Standing	14	Standing	56	Pass
58	Existing	13	Standing	15	Standing	61	Pass
	Proposed	12	Standing	15	Standing	60	Pass
59	Existing	12	Standing	14	Standing	52	Pass
	Proposed	12	Standing	14	Standing	52	Pass
60	Existing	15	Standing	18	Walking	77	Pass
	Proposed	15	Standing	17	Walking	74	Pass
61	Existing	13	Standing	15	Standing	61	Pass
	Proposed	14	Standing	16	Walking	66	Pass
62	Existing	12	Standing	14	Standing	60	Pass
	Proposed	13	Standing	15	Standing	59	Pass
63	Existing	13	Standing	16	Walking	60	Pass
	Proposed	13	Standing	15	Standing	58	Pass
64	Existing	12	Standing	14	Standing	56	Pass
	Proposed	11	Standing	13	Standing	53	Pass
65	Existing	12	Standing	15	Standing	63	Pass
	Proposed	11	Standing	13	Standing	58	Pass
66	Existing	13	Standing	17	Walking	64	Pass
	Proposed	13	Standing	15	Standing	59	Pass
67	Existing	10	Sitting	11	Standing	53	Pass
	Proposed	13	Standing	15	Standing	59	Pass
68	Existing	12	Standing	13	Standing	51	Pass
	Proposed	13	Standing	15	Standing	61	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating
69	Existing	13	Standing	15	Standing	59	Pass
	Proposed	13	Standing	15	Standing	59	Pass
70	Existing	14	Standing	16	Walking	63	Pass
	Proposed	14	Standing	16	Walking	58	Pass
71	Existing	12	Standing	14	Standing	61	Pass
	Proposed	12	Standing	15	Standing	64	Pass
72	Existing	15	Standing	17	Walking	67	Pass
	Proposed	14	Standing	17	Walking	63	Pass
73	Existing	13	Standing	15	Standing	57	Pass
	Proposed	14	Standing	16	Walking	66	Pass
74	Existing	14	Standing	17	Walking	64	Pass
	Proposed	15	Standing	19	Walking	72	Pass
75	Existing	-	-	-	-	-	-
	Proposed	13	Standing	16	Walking	68	Pass
76	Existing	-	-	-	-	-	-
	Proposed	13	Standing	15	Standing	80	Pass
77	Existing	-	-	-	-	-	-
	Proposed	13	Standing	16	Walking	74	Pass
78	Existing	-	-	-	-	-	-
	Proposed	16	Walking	19	Walking	76	Pass
79	Existing	-	-	-	-	-	-
	Proposed	16	Walking	19	Walking	85	Pass
80	Existing	-	-	-	-	-	-
	Proposed	17	Walking	20	Walking	88	Pass
81	Existing	-	-	-	-	-	-
	Proposed	13	Standing	15	Standing	61	Pass
82	Existing	-	-	-	-	-	-
	Proposed	14	Standing	16	Walking	70	Pass
83	Existing	-	-	-	-	-	-
	Proposed	15	Standing	18	Walking	77	Pass
84	Existing	-	-	-	-	-	-
	Proposed	13	Standing	16	Walking	67	Pass
85	Existing	-	-	-	-	-	-
	Proposed	15	Standing	18	Walking	84	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating
86	Existing	-	-	-	-	-	-
	Proposed	17	Walking	20	Walking	89	Pass
87	Existing	-	-	-	-	-	-
	Proposed	17	Walking	20	Walking	87	Pass
88	Existing	-	-	-	-	-	-
	Proposed	14	Standing	17	Walking	68	Pass
89	Existing	-	-	-	-	-	-
	Proposed	14	Standing	17	Walking	69	Pass

Season	Months	Hours
Summer	May - October	6:00 - 23:00 for comfort
Winter	November - April	6:00 - 23:00 for comfort
Annual	January - December	0:00 - 23:00 for safety
Configurations		
Existing	Existing site and surroundings	
Proposed	Project with existing surroundings	

Comfort Speed (km/h)	
(20% Seasonal Exceedance)	
≤ 10	Sitting
11 - 15	Standing
16 - 20	Walking
> 20	Uncomfortable

Safety Speed (km/h)	
(0.1% Annual Exceedance)	
≤ 90	Pass
> 90	Exceeded