

22-28 ANN STREET AND 78 PARK STREET EAST

MISSISSAUGA, ON

PEDESTRIAN WIND STUDY

RWDI # 1900768

May 16, 2019

SUBMITTED TO

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EXECUTIVE SUMMARY

RWDI was retained to conduct a pedestrian wind assessment for the proposed 22-28 Ann Street and 78 Park Street East in Mississauga, ON (Image 1). Based on our wind-tunnel testing for the proposed development under the Existing and Proposed configurations (Images 2A and 2B), and the local wind records (Image 3), the potential wind comfort and safety conditions are predicted as shown on site plans in Figures 1A through 3B, while the associated wind speeds are listed in Table 1. These results can be summarized as follows:

Wind Comfort

- Existing conditions are comfortable for sitting or standing in the summer and standing or walking in the winter at most locations, with conditions to the south of the site being comfortable for walking in the summer and typically uncomfortable during the winter months. These conditions are typical around high-rise buildings in this area of Mississauga.
- With the addition of the proposed building, grade-level wind speeds in the summer are expected to be comfortable for sitting or standing close to the building and walking or better elsewhere on and around the project site, which is appropriate for the intended use.
- During the winter months, the addition of the proposed building is predicted to result in conditions comfortable for walking or better close to the building and uncomfortable or comfortable for walking elsewhere on and around the site. Uncomfortable conditions are expected to the north and east of the building. Higher-than-desired wind speeds are also predicted at the east entrance.
- On the Level 14 Outdoor Amenity, suitable wind conditions, comfortable for sitting or standing, are anticipated in the summer. Elevated wind speeds expected in the winter, comfortable for standing or walking, may not be a concern as the outdoor terrace would be used less frequently during that time.

Wind Safety

- Existing wind speeds meet the wind safety criterion at most locations on and around the site. Wind speeds that do not meet the wind safety criterion occur at two locations between the proposed building and the existing building to south, as well as at a third location to the south of that existing building.
- With the addition of the proposed building, the number of locations that do not meet the wind safety criterion is anticipated to reduce from three to one. The remaining location is pre-existing and is a marginal exceedance of the safety criterion.
- Wind speeds that meet the wind safety criterion are anticipated at all locations on the Level 14 Outdoor Amenity.



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1 INTRODUCTION

RWDI was retained to conduct a pedestrian wind assessment for the proposed 22-28 Ann Street and 78 Park Street East in Mississauga, ON. This report presents the project objectives, background and approach, discusses the results from RWDI's assessment, and provides conceptual wind control measures, where necessary.

1.1 Project Description

The project (site shown in Image 1) is located on the south side of Ann Street, between Queen Street East to the west and Park Street East to the east. The proposed 22-storey building is 80 m tall and consists of a 14-storey podium.

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 appropriate criteria for gauging wind comfort and safety in pedestrian areas. The assessment focused on critical pedestrian areas, including building entrances, outdoor amenity areas, and adjacent sidewalks and walkways.



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



2 BACKGROUND AND APPROACH

2.1 Wind Tunnel Study Model

To assess the wind environment around the proposed project, a 1:300 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, including local wind control measures such as existing winter deciduous trees, proposed winter deciduous trees, proposed coniferous trees, solid screen walls, guardrails, and a porous trellis (Image 2B).

The wind tunnel model included all relevant surrounding buildings and topography within an approximate 360 m radius of 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 62 wind speed sensors (i.e., 57 sensors at grade and 5 sensors on the building) 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. 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. The placement of wind measurement locations was based on our experience and understanding of the pedestrian usage for this site.

**PEDESTRIAN WIND STUDY
22-28 ANN STREET AND 78 PARK STREET EAST**

**RWDI #1900768
May 16, 2019**

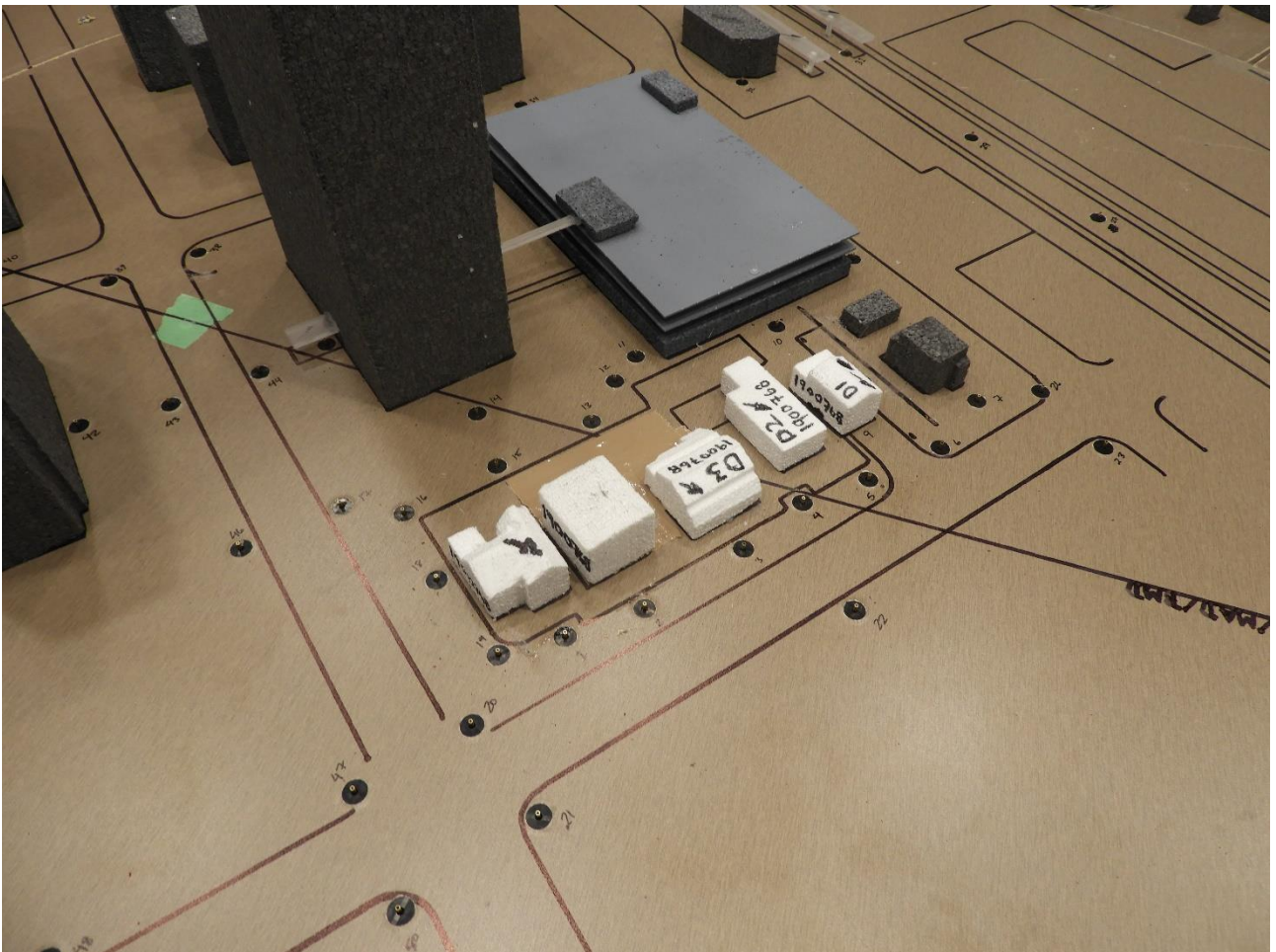
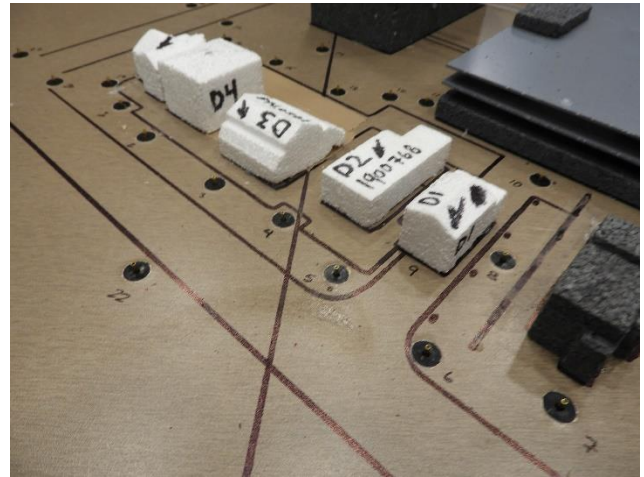


Image 2A: Wind Tunnel Study Model - Existing Configuration

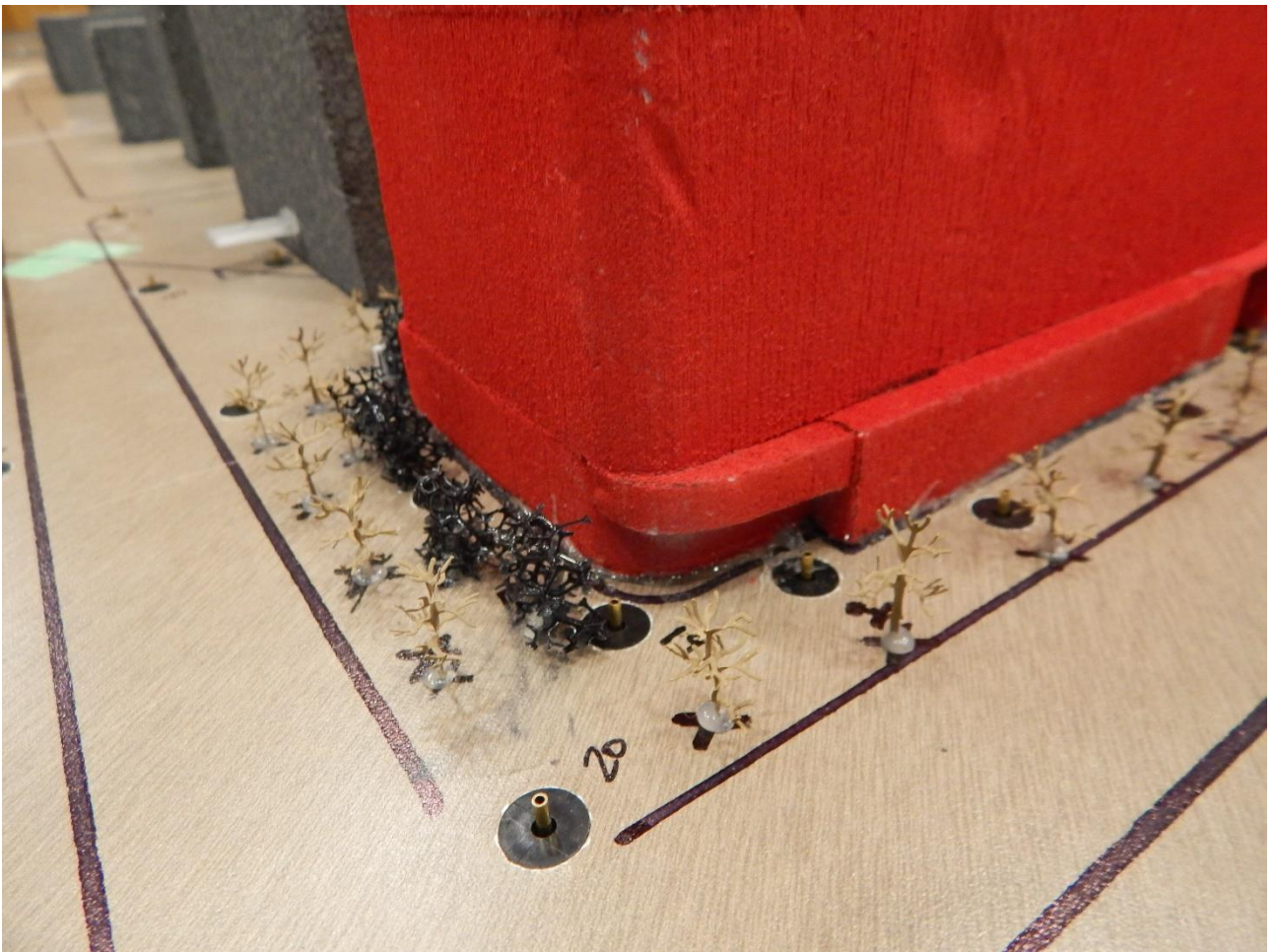
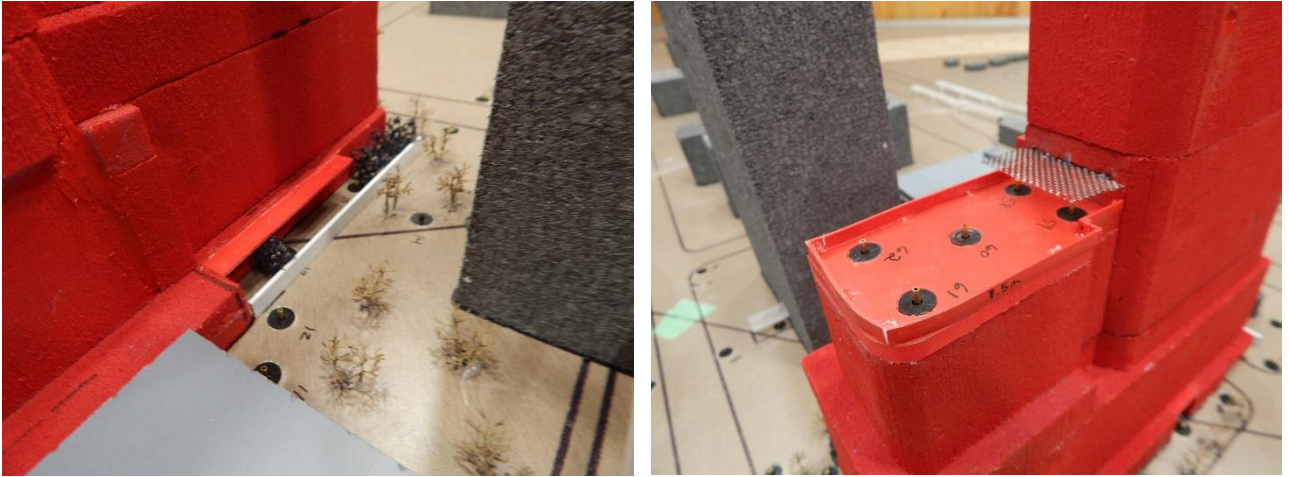


Image 2B: Wind Tunnel Study Model – Proposed Configuration

2.2 Meteorological Data

Wind statistics recorded at Billy Bishop Toronto City Airport between 1987 and 2017, inclusive, were analyzed for the summer (May to October) and winter (November to April) seasons. Image 3 graphically depicts the directional distributions of wind frequencies and speeds for these two seasons. Winds from the southwest, west, northwest, and east directions are predominant during both summer and winter. During the winter season, the prevailing winds from these directions are expected to be stronger, as indicated by the wind roses. Strong winds of a mean speed greater than 30 km/h measured at the airport (at an anemometer height of 10 m) occur for 4.2% and 17.1% of the time during the summer and winter seasons, respectively.

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.

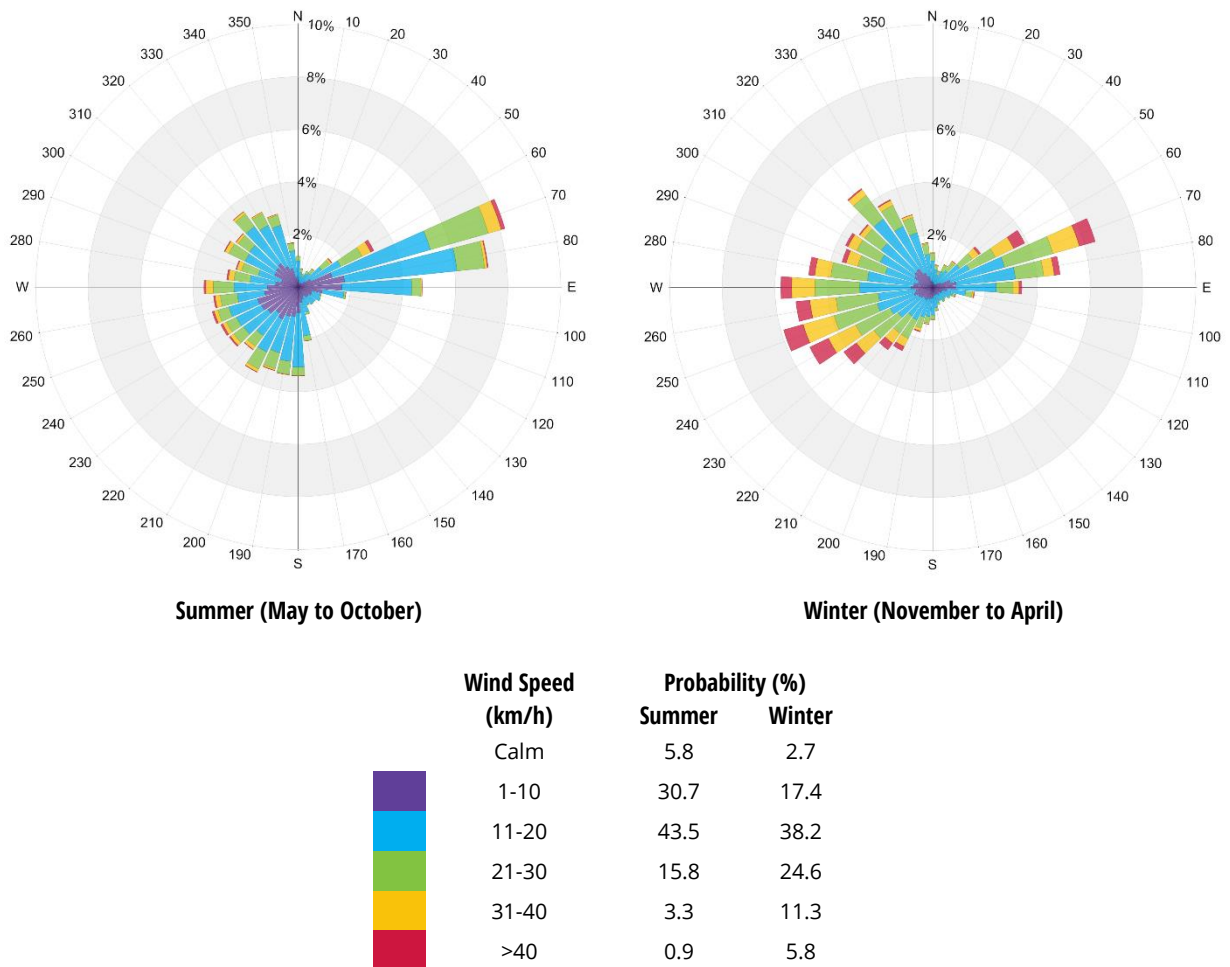


Image 3: Directional Distribution of Winds Approaching Billy Bishop Toronto City Airport from 1987 to 2017



2.3 Mississauga Pedestrian Wind Criteria

The Mississauga pedestrian wind criteria, developed in June 2014, are specified in the Urban Design Terms of Reference, "Pedestrian Wind Comfort and Safety Studies". The following defines the criterion in detail.

Comfort Category	GEM Speed (km/h)	Description
Sitting	≤ 10	Calm or light breezes desired for outdoor restaurants and seating areas where one can read a paper without having it blown away
Standing	≤ 15	Gentle breezes suitable for main building entrances and bus stops
Walking	≤ 20	Relatively high speeds that can be tolerated if one's objective is to walk, run or cycle without lingering
Uncomfortable	> 20	Strong winds of this magnitude are considered a nuisance for most activities, and wind mitigation is typically recommended

Notes:

- (1) GEM speed = max (mean speed, gust speed/1.85);
- (2) GEM speeds listed above are based on a seasonal exceedance of 20% of the time between 6:00 and 23:00.

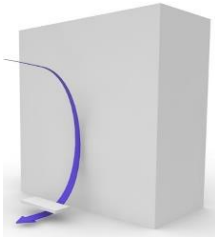
Safety Criterion	Gust Speed (km/h)	Description
Exceeded	> 90	Excessive gust speeds that can adversely affect a pedestrian's balance and footing. Wind mitigation is typically required.

Notes:

- (1) Based on an annual exceedance of 9 hours or 0.1% of the time for 24 hours a day.

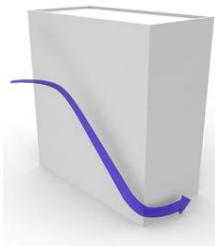
2.4 Generalized Wind Flows

In our discussion of wind conditions, reference may be made to the following generalized wind flows (Image 4):



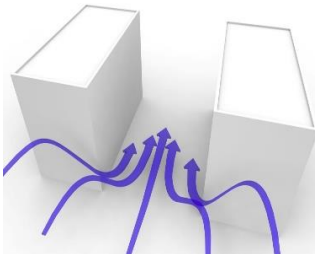
DOWNWASHING

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 winds approach at an oblique angle to a tall façade and are deflected down, a localized increase in the wind activity or corner acceleration can be expected around the exposed building corners at pedestrian level.



CHANNELING EFFECT

When two buildings are situated side by side, wind flow tends to accelerate through the space between the buildings due to channeling effect caused by the narrow gap.

Image 4: Generalized Wind Flows

3 RESULTS AND DISCUSSION

The predicted wind conditions are shown on site plans in Figures 1A through 3B, located in the “Figures” section of this report. These conditions and the associated wind speeds are also represented in Table 1, located in the “Tables” section of this report. The following is a detailed discussion of the suitability of the predicted wind conditions for the anticipated pedestrian use of each area of interest.

3.1 Grade Level (Locations 1 through 57)

Wind conditions comfortable for walking are appropriate for sidewalks and walkways on and around the project site 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 or standing are preferred for areas intended for passive activities, such as the grade-level outdoor amenity area along the south building façade.



3.1.1 Existing Configuration

The existing site is characterized by strong winds throughout the year which is typical around high-rise buildings in this area of Mississauga. In the summer, existing wind speeds are typically comfortable for walking to the south and sitting or standing elsewhere on and around the site (Figure 1A). During the winter months, existing wind speeds are generally uncomfortable to the south and comfortable for standing or walking elsewhere (Figure 2A). Existing wind speeds that do not meet the wind safety criterion occur at three locations on and around the site (Locations 15, 16, and 37, Figure 3A).

3.1.2 Proposed Configuration

With the addition of the proposed development, wind conditions are anticipated to improve to the south and wind speeds are expected to increase slightly to the north of the site throughout the year. In the summer, wind speeds are expected to be comfortable for sitting or standing close to the building perimeter and comfortable for standing or walking elsewhere on and around the site (Figure 1B). These conditions can be considered appropriate for the intended pedestrian use of these areas. Seasonally higher wind speeds during the winter months are predicted to result in conditions typically comfortable for standing or walking close to the building perimeter as well as uncomfortable conditions to the south, east, and north of the building (Figure 2B).

Uncomfortable conditions stem primarily from westerly and east-northeasterly prevailing winds downwashing off the proposed building façades, accelerating around building corners, and channeling between the building itself and the existing building to the south.

The main entrances to the proposed building are situated near Locations 1 and 4 in Figures 1B, 2B, and 3B. Wind speeds at the entrances are anticipated to be comfortable for sitting or standing in the summer (Locations 4 and 1, respectively, Figure 1B) and predicted to be comfortable for standing or walking in the winter (Locations 4 and 1, respectively, Figure 2B). Recessing the entrance at Location 1 into the building façade or adding screens on either side of the entrance would provide further wind protection. Examples of recessed entrances and windscreens near entrances are shown in Image 5.

With the addition of the proposed development to the site, the number of locations where wind speeds are not expected to meet the wind safety criterion is anticipated to be reduced from three locations to one location (Location 37, Figure 3B). Additionally, the exceeding location is pre-existing and is a marginal exceedance of the safety criterion, i.e., by 1 km/h (see Table 1).

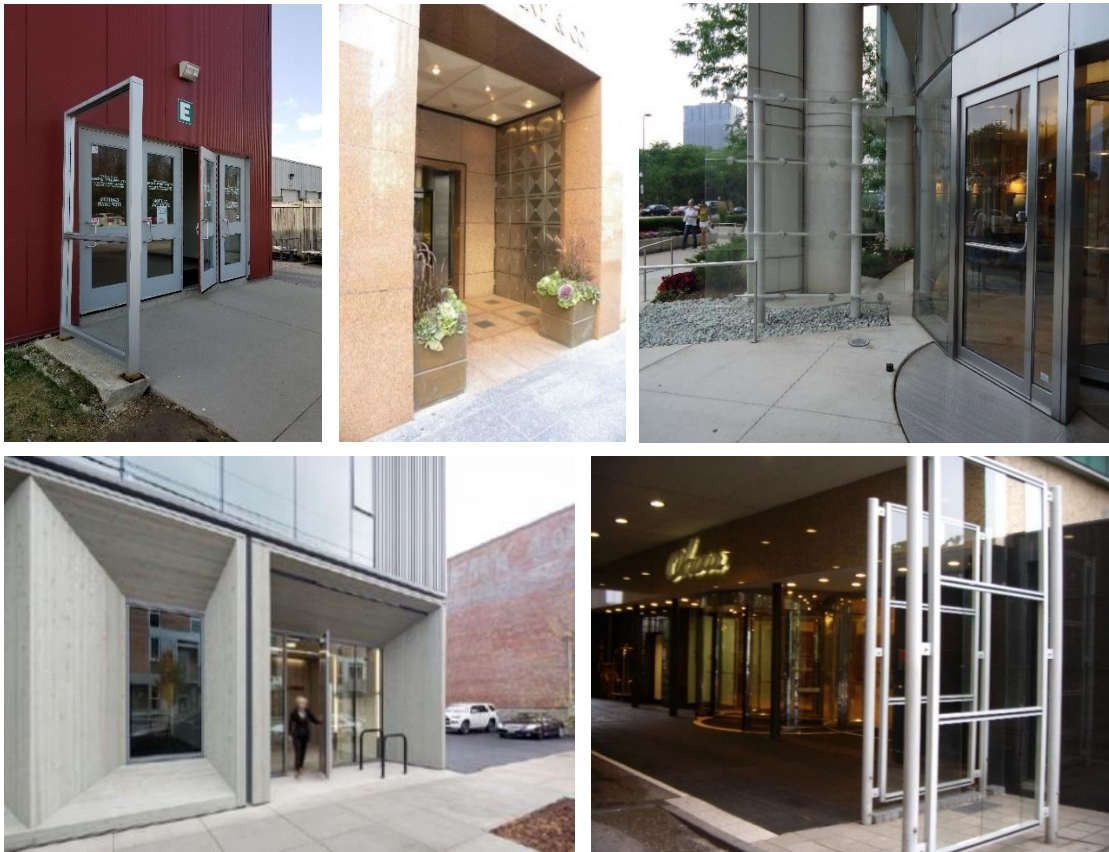


Image 5: Examples of Recessed Entrances and Windscreens near Entrances

3.2 Level 14 Outdoor Amenity (Locations 58 through 62)

It is generally desirable for wind conditions on outdoor terraces intended for passive pedestrian activities to be comfortable for sitting or standing more than 80% of the time in the summer. During the winter months, this area would not be used frequently, and increased wind activity could be considered appropriate.

In the summer and in the presence of a 1.5 m tall, solid guardrail and 70% solid trellis, wind speeds on the Level 14 Outdoor Amenity are anticipated to be comfortable for sitting or standing (Figure 1B), which is acceptable for the intended use of the space. Elevated wind speeds predicted during the winter months, comfortable for standing or walking (Figure 2B), may also be considered appropriate as this area would not be used frequently during that time.

Wind speeds that meet the wind safety criterion are anticipated at all locations on the Level 14 Outdoor Amenity (Figure 3B).



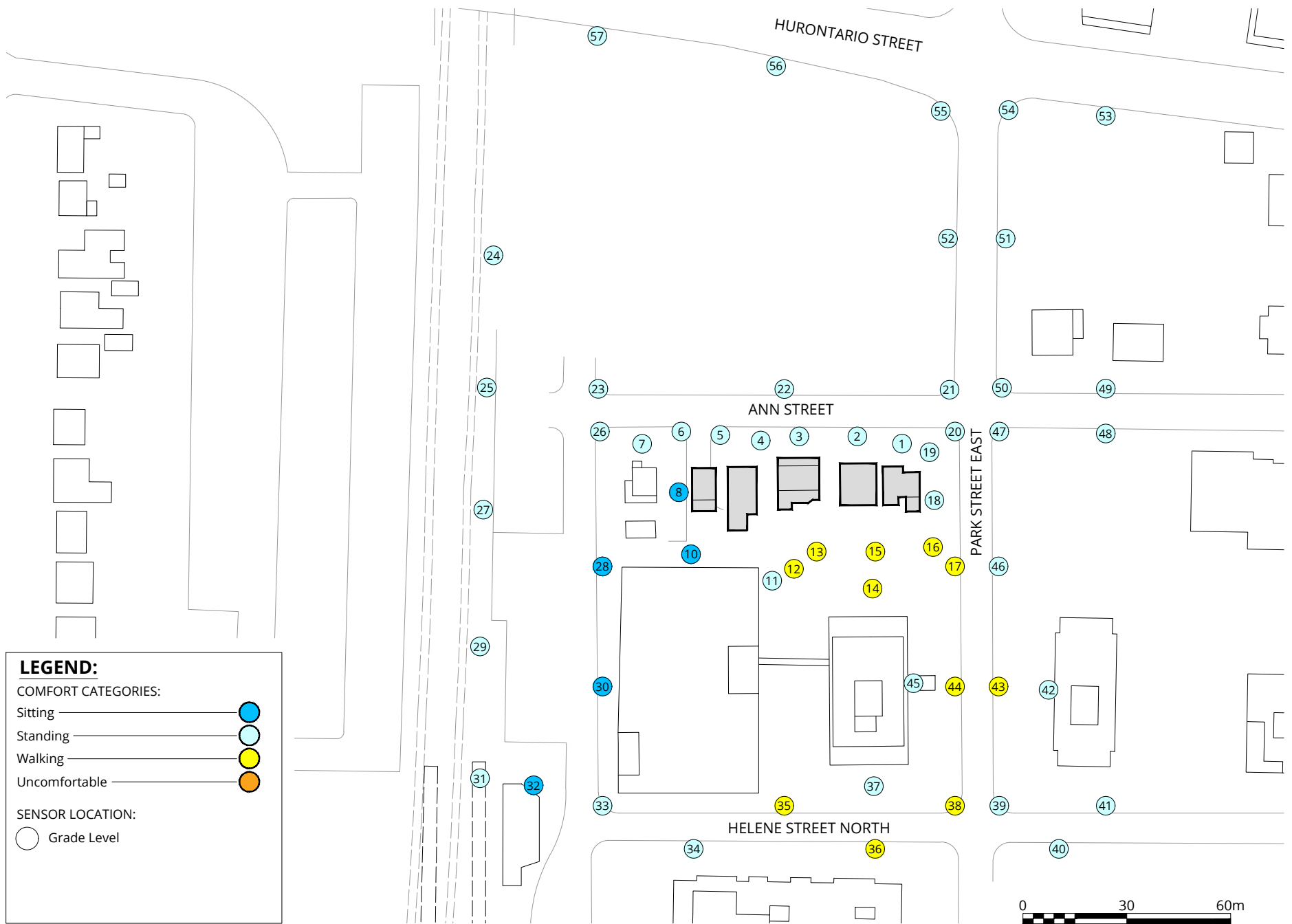
4 APPLICABILITY OF RESULTS

The drawings and information listed below were received from Edenshaw Ann Developments Limited and were used to construct the scale model of the proposed 22-28 Ann Street and 78 Park Street East. The wind conditions presented in this report pertain to the proposed building as detailed in the architectural design drawings listed in the table below. Should there be any design changes that deviate from this list of drawings, the wind predictions presented may change. Therefore, if changes in the design are made, it is recommended that RWDI be contacted and requested to review their potential effects on wind conditions.

File Name	File Type	Date Received (dd/mm/yyyy)
2019-02-25_AnnStreet-CAD.dwg	AutoCAD	25/02/2019

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FIGURES



Pedestrian Wind Comfort Conditions
 Existing Configuration
 Summer (May to October, 6:00 to 23:00)

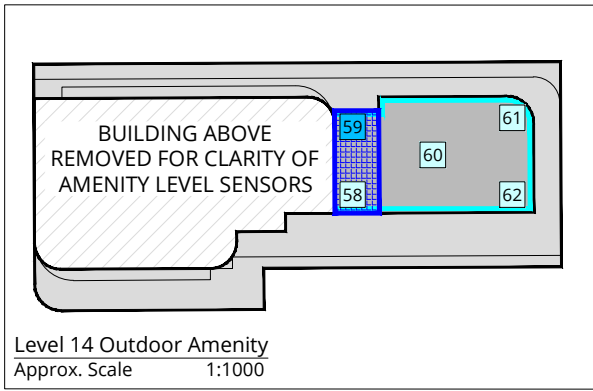
22-28 Ann Street and 78 Park Street East - Mississauga, ON



Project #1900768

Drawn by:	SR	Figure: 1A
Approx. Scale:	1:1500	
Date Revised:	Apr. 3, 2019	





LEGEND:

COMFORT CATEGORIES:

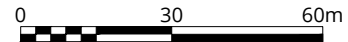
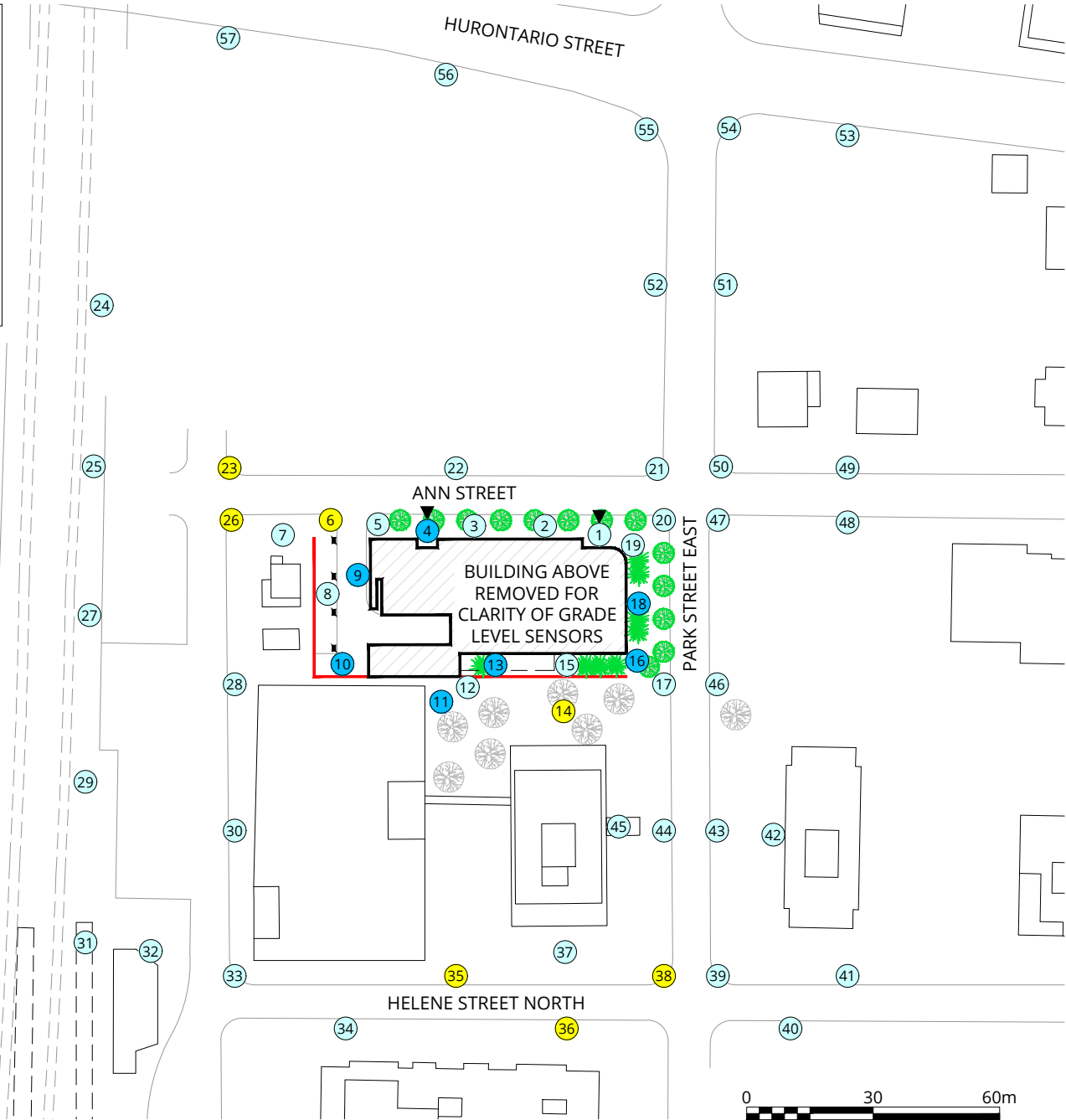
- Sitting
- Standing
- Walking
- Uncomfortable

SENSOR LOCATION:

- Grade Level
- Amenity Area
- Main Entrance Location

MITIGATION:

- Existing Winter Tree
- Proposed Winter Deciduous Tree
- Proposed Winter Coniferous Tree
- 2.5 m Tall Solid Wall
- 1.5 m Tall Solid Guardrail
- 70% Solid Trellis Above Terrace

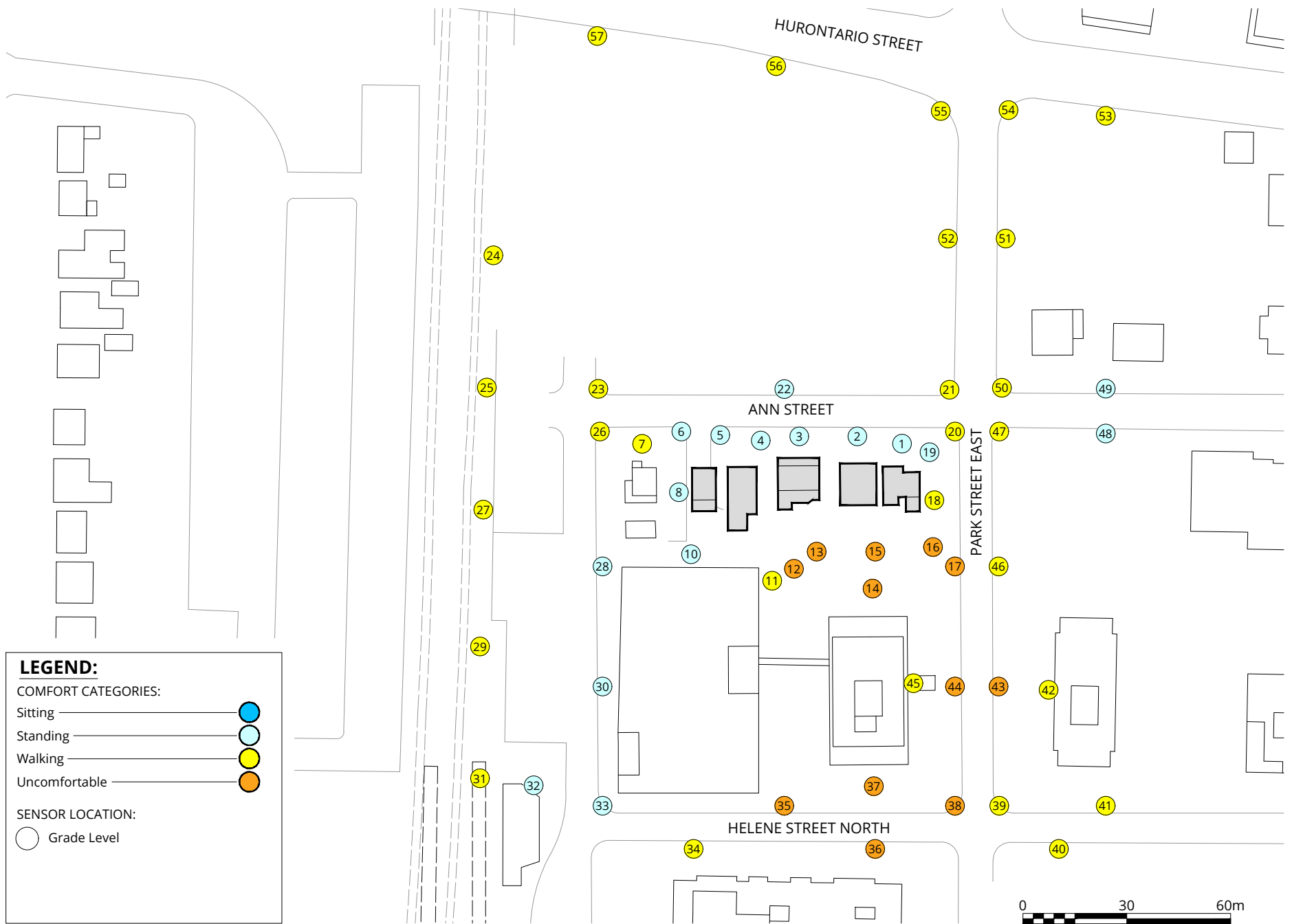


Pedestrian Wind Comfort Conditions
 Proposed Configuration
 Summer (May to October, 6:00 to 23:00)
 22-28 Ann Street and 78 Park Street East - Mississauga, ON

True North

Drawn by: GRE	Figure: 1B
Approx. Scale: 1:1500	
Date Revised: May 15, 2019	

Project #1900768



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

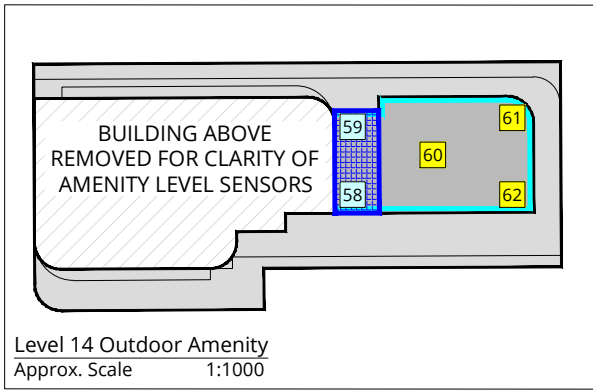
22-28 Ann Street and 78 Park Street East - Mississauga, ON



Project #1900768

Drawn by:	SR	Figure: 2A
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Date Revised:	Apr. 3, 2019	





LEGEND:

COMFORT CATEGORIES:

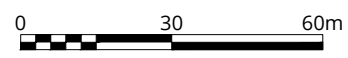
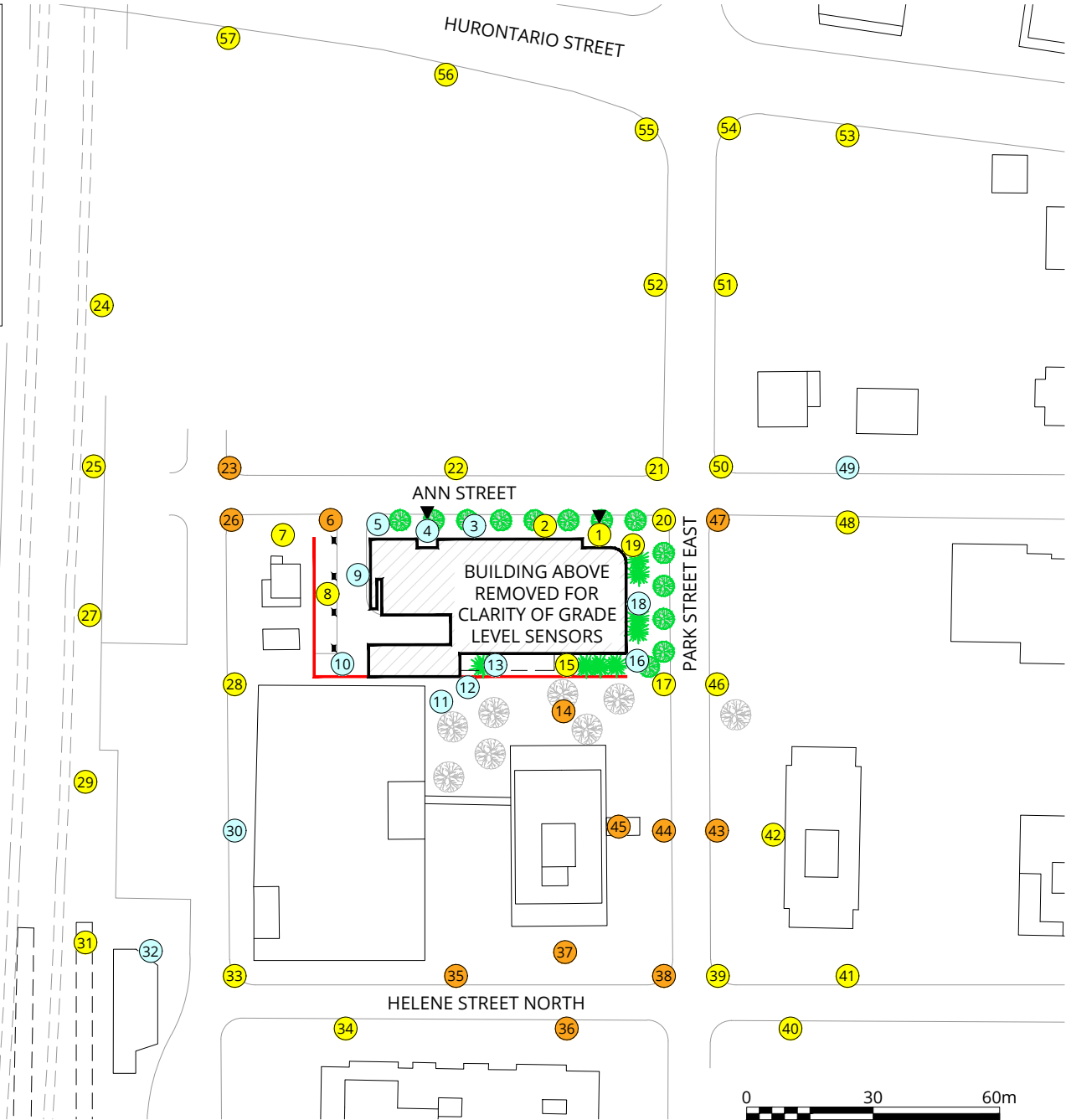
- Sitting
- Standing
- Walking
- Uncomfortable

SENSOR LOCATION:

- Grade Level
- Amenity Area
- Main Entrance Location

MITIGATION:

- Existing Winter Tree
- Proposed Winter Deciduous Tree
- Proposed Winter Coniferous Tree
- 2.5 m Tall Solid Wall
- 1.5 m Tall Solid Guardrail
- 70% Solid Trellis Above Terrace

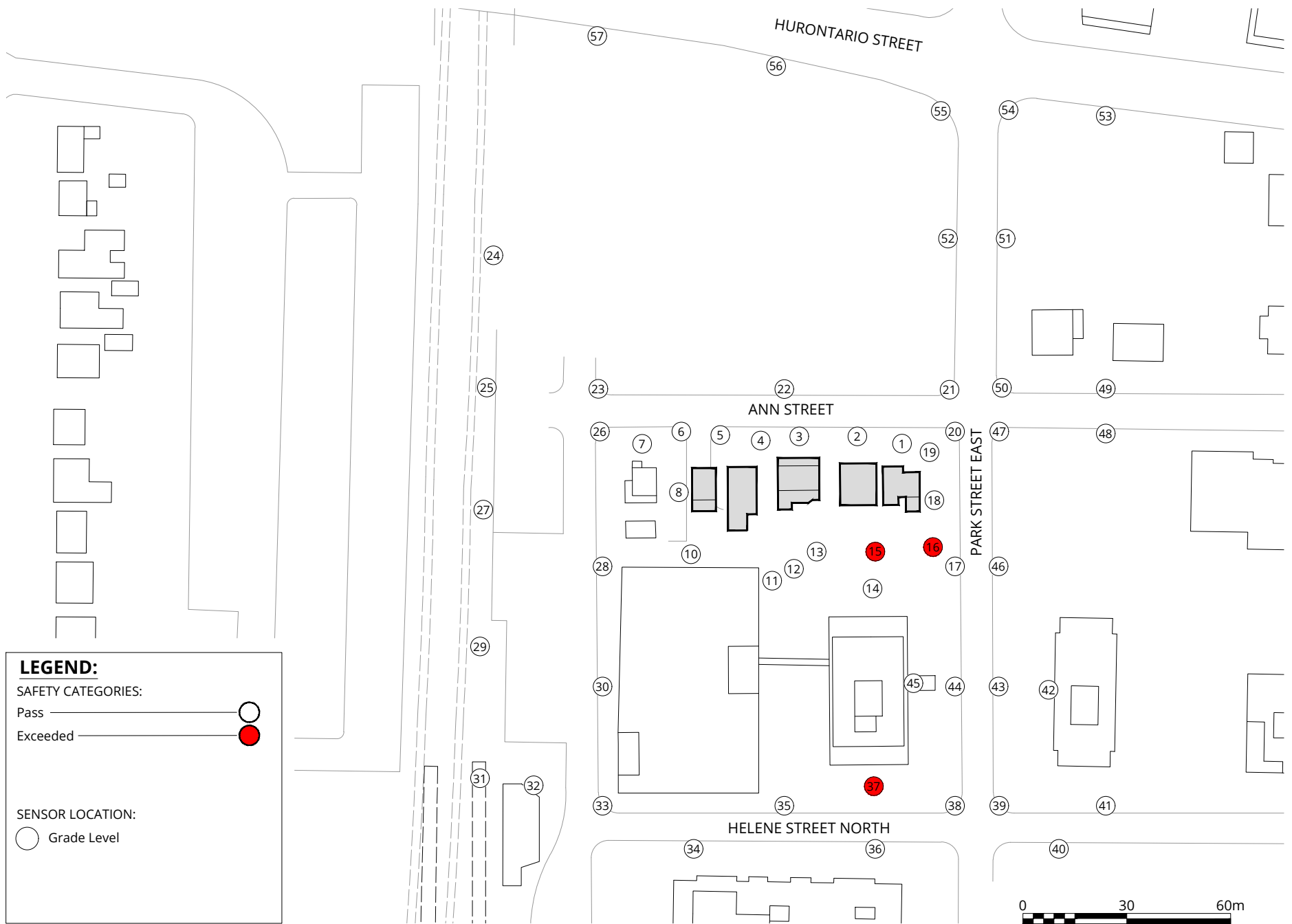


Pedestrian Wind Comfort Conditions
 Proposed Configuration
 Winter (November to April, 6:00 to 23:00)
 22-28 Ann Street and 78 Park Street East - Mississauga, ON

True North

Drawn by: GRE	Figure: 2B
Approx. Scale: 1:1500	
Date Revised: May 15, 2019	

Project #1900768



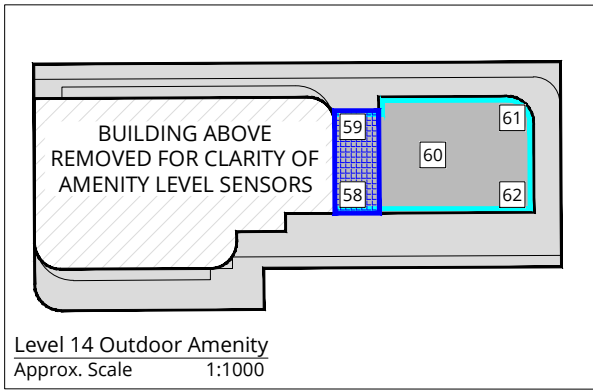
Pedestrian Wind Safety Conditions
 Existing Configuration
 Annual (January to December, 0:00 to 23:00)

22-28 Ann Street and 78 Park Street East - Mississauga, ON



Project #1900768

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Approx. Scale: 1:1500		
Date Revised: Apr. 3, 2019		

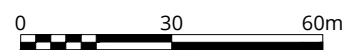
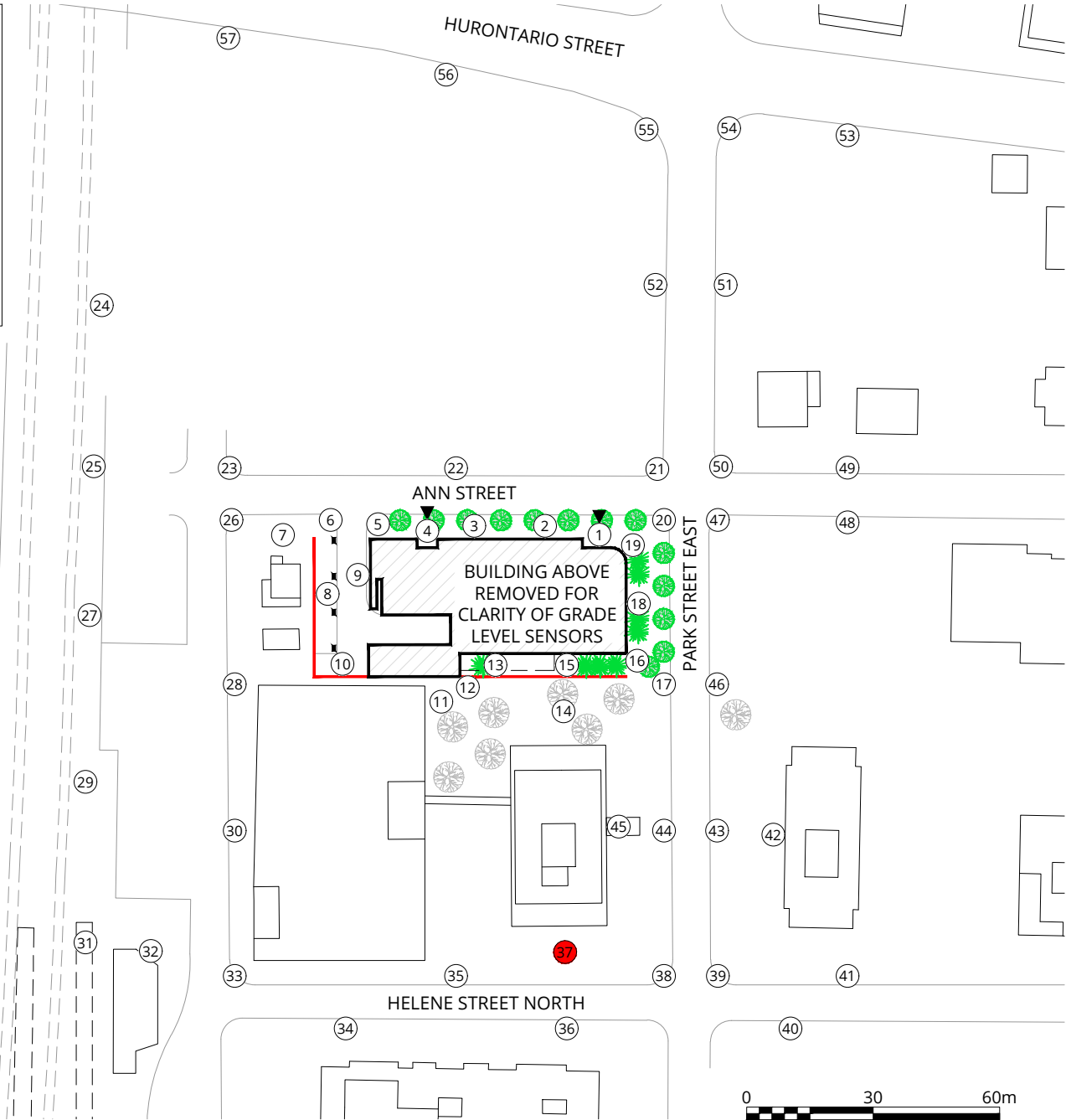


LEGEND:

SAFETY CATEGORIES:
 Pass
 Exceeded

SENSOR LOCATION:
 Grade Level
 Amenity Area
 Main Entrance Location

MITIGATION:
 Existing Winter Tree
 Proposed Winter Deciduous Tree
 Proposed Winter Coniferous Tree
 2.5 m Tall Solid Wall
 1.5 m Tall Solid Guardrail
 70% Solid Trellis Above Terrace



Pedestrian Wind Safety Conditions
 Proposed Configuration
 Annual (January to December, 0:00 to 23:00)
 22-28 Ann Street and 78 Park Street East - Mississauga, ON

True North

 Project #1900768

Drawn by: GRE	Figure: 3B
Approx. Scale: 1:1500	
Date Revised: May 15, 2019	



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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	11	Standing	14	Standing	53	Pass
	Proposed	14	Standing	18	Walking	77	Pass
2	Existing	11	Standing	14	Standing	58	Pass
	Proposed	12	Standing	16	Walking	57	Pass
3	Existing	11	Standing	13	Standing	61	Pass
	Proposed	11	Standing	15	Standing	58	Pass
4	Existing	11	Standing	15	Standing	60	Pass
	Proposed	9	Sitting	11	Standing	50	Pass
5	Existing	11	Standing	13	Standing	60	Pass
	Proposed	11	Standing	13	Standing	66	Pass
6	Existing	12	Standing	15	Standing	62	Pass
	Proposed	17	Walking	24	Uncomfortable	78	Pass
7	Existing	12	Standing	16	Walking	64	Pass
	Proposed	14	Standing	18	Walking	81	Pass
8	Existing	10	Sitting	14	Standing	54	Pass
	Proposed	11	Standing	16	Walking	71	Pass
9	Existing	-	-	-	-	-	-
	Proposed	10	Sitting	15	Standing	58	Pass
10	Existing	10	Sitting	12	Standing	57	Pass
	Proposed	8	Sitting	12	Standing	44	Pass
11	Existing	14	Standing	19	Walking	66	Pass
	Proposed	10	Sitting	12	Standing	49	Pass
12	Existing	16	Walking	23	Uncomfortable	79	Pass
	Proposed	11	Standing	14	Standing	52	Pass
13	Existing	16	Walking	23	Uncomfortable	77	Pass
	Proposed	10	Sitting	12	Standing	60	Pass
14	Existing	17	Walking	23	Uncomfortable	90	Pass
	Proposed	19	Walking	27	Uncomfortable	90	Pass
15	Existing	17	Walking	25	Uncomfortable	91	Exceeded
	Proposed	11	Standing	16	Walking	56	Pass
16	Existing	16	Walking	22	Uncomfortable	92	Exceeded
	Proposed	9	Sitting	11	Standing	45	Pass
17	Existing	16	Walking	21	Uncomfortable	85	Pass
	Proposed	14	Standing	19	Walking	69	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	12	Standing	16	Walking	60	Pass
	Proposed	8	Sitting	11	Standing	42	Pass
19	Existing	11	Standing	15	Standing	55	Pass
	Proposed	13	Standing	16	Walking	73	Pass
20	Existing	13	Standing	16	Walking	59	Pass
	Proposed	14	Standing	20	Walking	75	Pass
21	Existing	13	Standing	16	Walking	59	Pass
	Proposed	15	Standing	20	Walking	79	Pass
22	Existing	13	Standing	15	Standing	63	Pass
	Proposed	15	Standing	20	Walking	81	Pass
23	Existing	13	Standing	18	Walking	66	Pass
	Proposed	16	Walking	22	Uncomfortable	84	Pass
24	Existing	14	Standing	19	Walking	64	Pass
	Proposed	14	Standing	20	Walking	69	Pass
25	Existing	13	Standing	19	Walking	65	Pass
	Proposed	14	Standing	20	Walking	72	Pass
26	Existing	13	Standing	18	Walking	67	Pass
	Proposed	16	Walking	21	Uncomfortable	87	Pass
27	Existing	13	Standing	18	Walking	65	Pass
	Proposed	15	Standing	20	Walking	76	Pass
28	Existing	10	Sitting	15	Standing	61	Pass
	Proposed	12	Standing	16	Walking	82	Pass
29	Existing	13	Standing	18	Walking	65	Pass
	Proposed	14	Standing	17	Walking	79	Pass
30	Existing	9	Sitting	15	Standing	63	Pass
	Proposed	11	Standing	15	Standing	65	Pass
31	Existing	12	Standing	17	Walking	65	Pass
	Proposed	11	Standing	16	Walking	66	Pass
32	Existing	10	Sitting	13	Standing	53	Pass
	Proposed	11	Standing	14	Standing	59	Pass
33	Existing	11	Standing	15	Standing	55	Pass
	Proposed	12	Standing	16	Walking	58	Pass
34	Existing	14	Standing	17	Walking	70	Pass
	Proposed	14	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
35	Existing	18	Walking	24	Uncomfortable	86	Pass
	Proposed	17	Walking	23	Uncomfortable	85	Pass
36	Existing	17	Walking	23	Uncomfortable	79	Pass
	Proposed	17	Walking	23	Uncomfortable	79	Pass
37	Existing	15	Standing	21	Uncomfortable	91	Exceeded
	Proposed	15	Standing	21	Uncomfortable	91	Exceeded
38	Existing	17	Walking	23	Uncomfortable	84	Pass
	Proposed	17	Walking	24	Uncomfortable	85	Pass
39	Existing	14	Standing	20	Walking	73	Pass
	Proposed	15	Standing	20	Walking	74	Pass
40	Existing	15	Standing	20	Walking	78	Pass
	Proposed	15	Standing	20	Walking	76	Pass
41	Existing	14	Standing	19	Walking	76	Pass
	Proposed	14	Standing	19	Walking	72	Pass
42	Existing	13	Standing	20	Walking	76	Pass
	Proposed	13	Standing	19	Walking	73	Pass
43	Existing	17	Walking	23	Uncomfortable	81	Pass
	Proposed	15	Standing	21	Uncomfortable	79	Pass
44	Existing	16	Walking	23	Uncomfortable	87	Pass
	Proposed	15	Standing	21	Uncomfortable	84	Pass
45	Existing	15	Standing	20	Walking	78	Pass
	Proposed	15	Standing	21	Uncomfortable	82	Pass
46	Existing	14	Standing	19	Walking	75	Pass
	Proposed	14	Standing	20	Walking	71	Pass
47	Existing	13	Standing	17	Walking	63	Pass
	Proposed	15	Standing	22	Uncomfortable	78	Pass
48	Existing	12	Standing	15	Standing	64	Pass
	Proposed	13	Standing	17	Walking	64	Pass
49	Existing	11	Standing	15	Standing	65	Pass
	Proposed	11	Standing	15	Standing	56	Pass
50	Existing	12	Standing	17	Walking	61	Pass
	Proposed	14	Standing	20	Walking	73	Pass
51	Existing	13	Standing	17	Walking	66	Pass
	Proposed	13	Standing	18	Walking	65	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	13	Standing	18	Walking	66	Pass
	Proposed	14	Standing	18	Walking	68	Pass
53	Existing	13	Standing	16	Walking	64	Pass
	Proposed	13	Standing	17	Walking	65	Pass
54	Existing	13	Standing	16	Walking	64	Pass
	Proposed	13	Standing	18	Walking	67	Pass
55	Existing	13	Standing	17	Walking	64	Pass
	Proposed	14	Standing	18	Walking	70	Pass
56	Existing	11	Standing	16	Walking	56	Pass
	Proposed	13	Standing	18	Walking	68	Pass
57	Existing	12	Standing	17	Walking	56	Pass
	Proposed	13	Standing	19	Walking	62	Pass
58	Existing	-	-	-	-	-	-
	Proposed	11	Standing	15	Standing	64	Pass
59	Existing	-	-	-	-	-	-
	Proposed	10	Sitting	12	Standing	53	Pass
60	Existing	-	-	-	-	-	-
	Proposed	13	Standing	18	Walking	74	Pass
61	Existing	-	-	-	-	-	-
	Proposed	13	Standing	17	Walking	66	Pass
62	Existing	-	-	-	-	-	-
	Proposed	12	Standing	17	Walking	62	Pass

Seasons	Hours	Comfort Speed (km/h)	Safety Speed (km/h)
Summer	May - October	6:00 - 23:00 for comfort	(20% Seasonal Exceedance)
Winter	November - April	0:00 - 23:00 for safety	(> 0.1% Annual Exceedance)
Configurations		≤ 10	Sitting
Existing	Existing site with existing surroundings	11 - 15	Standing
Proposed	Proposed building with existing surroundings	16 - 20	Walking
		> 20	Uncomfortable
			≤ 90 Pass
			> 90 Exceeded