REPORT

LOT 175 PORTAGE ROAD

NIAGARA FALLS, ON

PEDESTRIAN WIND STUDY

RWDI # 2203060

JULY 12, 2022

SUBMITTED TO

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EXECUTIVE SUMMARY

RWDI was retained to conduct a pedestrian wind assessment for the proposed Lot 175 Portage Road development in Niagara Falls, ON. The assessment was based on the wind-tunnel testing conducted for the proposed development site 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 RWDI 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 3B, and Table 1, and are summarized as follows:

EXISTING CONFIGURATION

- Wind speeds at all locations assessed are expected to meet the pedestrian wind safety criterion.
- Wind speeds at most of the locations tested are expected to be comfortable for strolling or walking during the summer.
- During the winter season, uncomfortable conditions are present on and around the site.

PROPOSED CONFIGURATION

- Wind speeds at most locations assessed meet the pedestrian wind safety criterion, while safety exceedances are expected in the areas between the towers, and at the northern corners of Tower B podium.
- Uncomfortable wind conditions are also predicted in these areas during the summer, with additional uncomfortable locations in the winter, including the southern corners of Tower A podium and several off-site locations.
- The potential wind impact of the proposed project is found to be localized to on-site areas and no significant wind impact is expected for off-site areas.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

RWDI was retained to conduct a pedestrian wind assessment for the proposed Lot 175 Portage Road development in Niagara Falls, ON. This report presents the project objectives, approach and the main results from RWDI's assessment. 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 west side of Portage Road between McLeod Road to the north and Marineland Parkway to the south (Image 1). The development will consist of two high-rise residential buildings on a shared low podium. The proposed Tower A and Tower B are 123.75 m, and 91.70 m tall, consisting of 38 and 21 storeys, respectively. Podium and outdoor terraces are located on Levels 3 through 6 for Tower A and on Levels 2 and 4 for Tower B.

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

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 RWDI Criteria for gauging wind comfort and safety in pedestrian areas.

2 BACKGROUND AND APPROACH

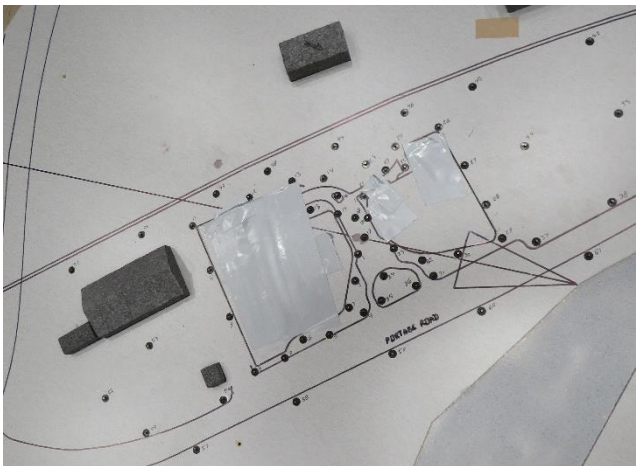
2.1 Wind Tunnel Study Model

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).

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

The wind tunnel model included all relevant surrounding buildings and topography within an approximately 1600 ft 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 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. 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.



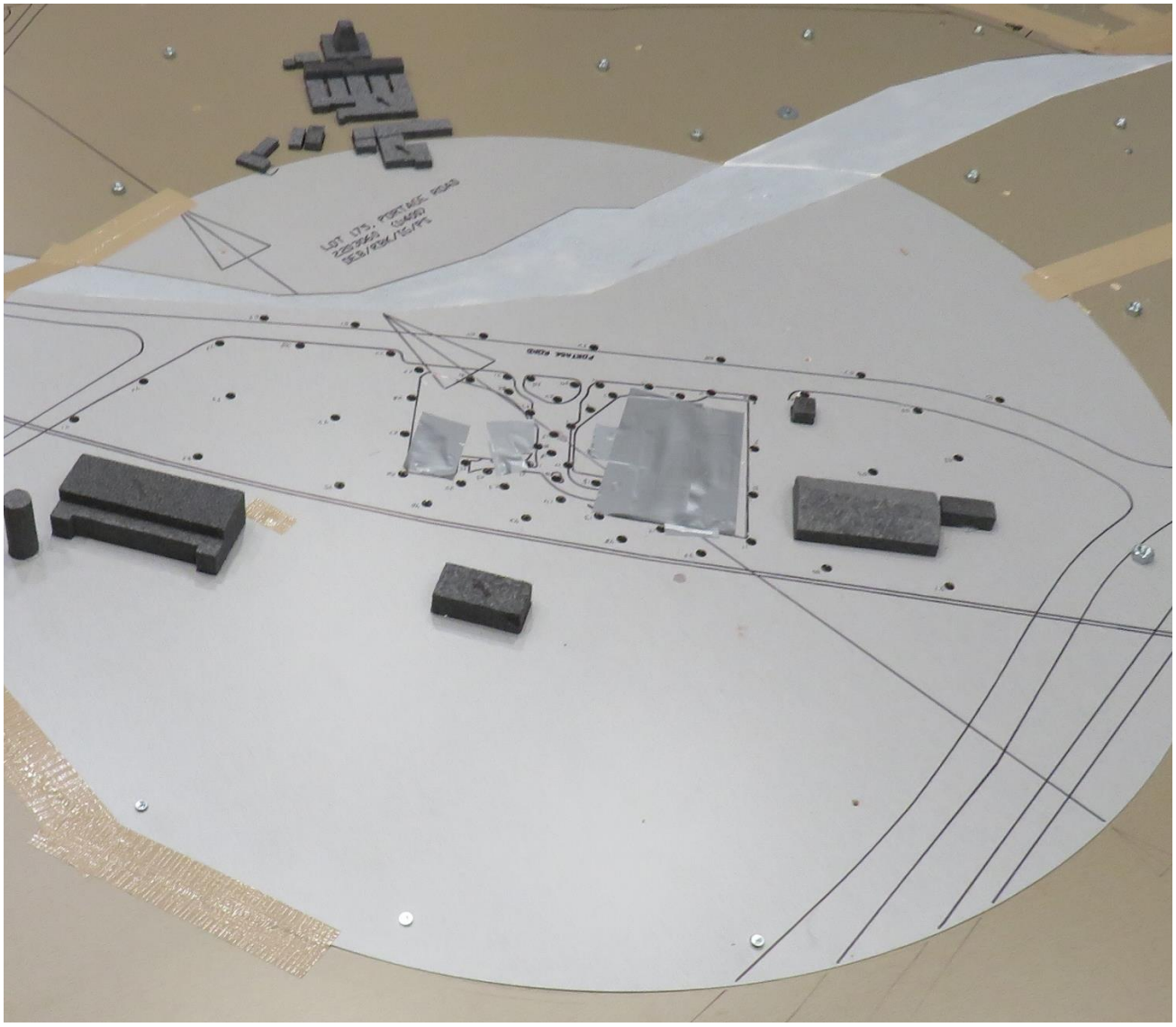
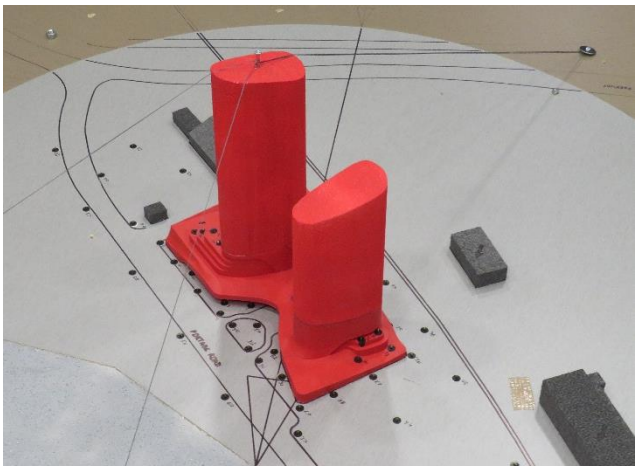


Image 2A: Wind Tunnel Study Model – Existing Configuration



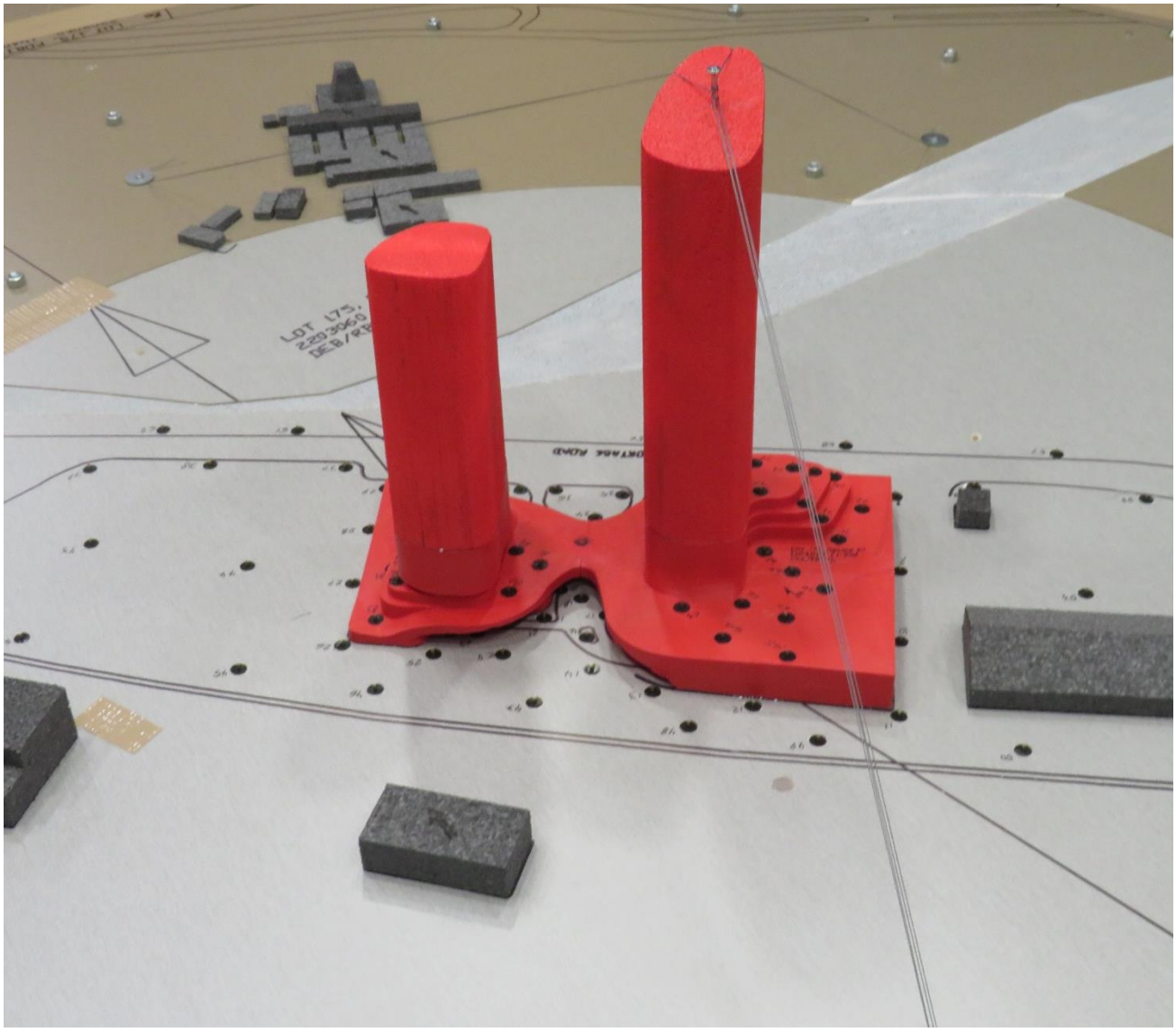
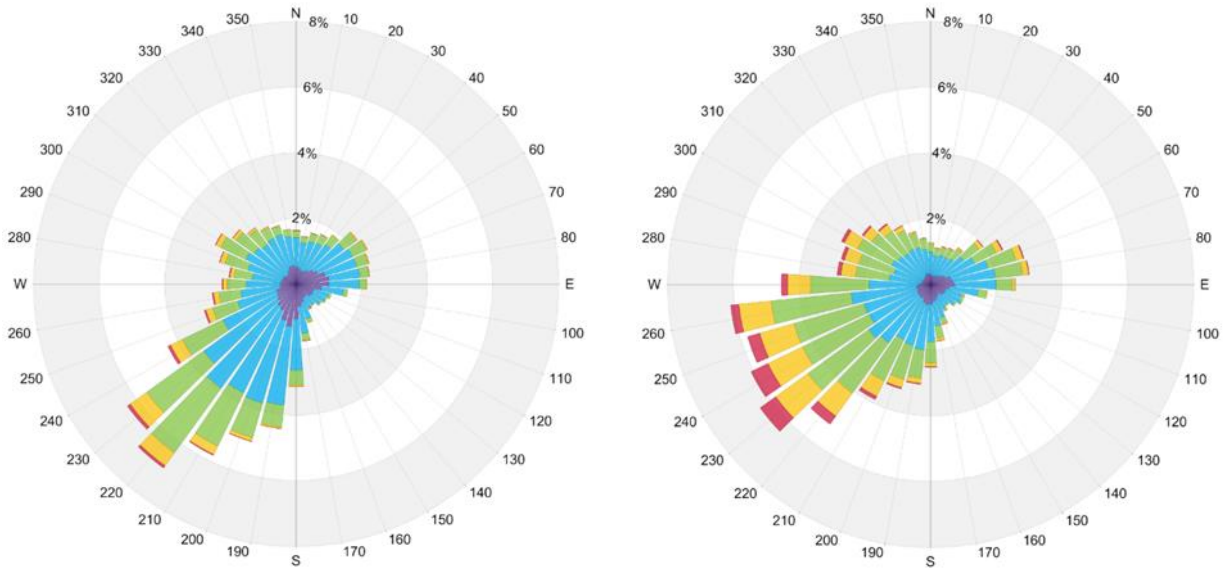


Image 2B: Wind Tunnel Study Model – Proposed Configuration

2.2 Wind Climate Data

Wind statistics recorded at Niagara Falls International Airport between 1990 and 2020, 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 directions are predominant in both the summer and winter 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 4.0% and 12.9% of the time during the summer and winter seasons, respectively, and they are primarily from the southwest directions.

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	10.2	5.7
1-10	23.2	15.8
11-20	42.8	36.4
21-30	19.8	29.1
31-40	3.4	9.9
>40	0.6	3.0

Image 3: Directional Distribution of Winds Approaching Niagara Falls International Airport between 1990 and 2020

2.3 RWDI Pedestrian Wind Criteria

The RWDI pedestrian wind criteria, which have been developed by RWDI through research and consulting practice since 1974, are used in the current study. These criteria have been widely accepted by municipal authorities as well as by the building design and city planning community. Regional differences in wind climate and thermal conditions as well as variations in age, health, clothing, etc. can affect a person's perception of the wind climate. Therefore, comparisons of wind speeds for the existing and proposed building configurations are the most objective way in assessing local pedestrian wind conditions. In general, the combined effect of mean and gust speeds on pedestrian comfort can be quantified by a Gust Equivalent Mean (GEM).

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	≤ 14	Gentle breezes suitable for main building entrances, bus stops, and other places where pedestrians may linger
Strolling	≤ 17	Moderate winds that would be appropriate for window shopping and strolling along a downtown street, plaza or park
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 all pedestrian activities, and wind mitigation is typically recommended

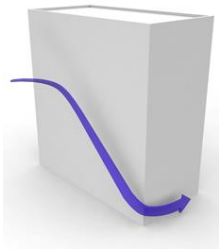
Notes:
(1) GEM Speed = max (Mean Speed, Gust Speed/1.85) and *Gust Speed = Mean Speed + 3*RMS Speed*;
(2) Wind conditions are considered to be comfortable if the predicted GEM speeds are within the respective thresholds for at least 80% of the time between 6:00 and 23:00. Nightly hours between 0:00 and 5:00 are excluded from the wind analysis for comfort since limited usage of outdoor spaces is anticipated; and,
(3) Instead of standard four seasons, two periods of summer (May to October) and winter (November to April) are adopted in the wind analysis, because in a cold climate such as that found in Niagara Falls, ON, there are distinct differences in pedestrian outdoor behaviours between these two-time periods.

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; and,
(2) Only gust speeds need to be considered in the wind safety criterion. These are usually rare events but deserve special attention in city planning and building design due to their potential safety impact on pedestrians.

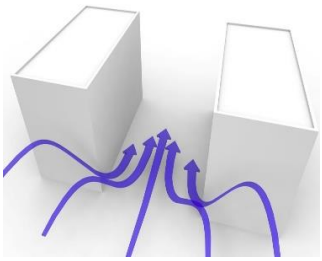
2.4 General Wind Flow Mechanisms

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



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

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 and the associated wind speeds are presented 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 Existing Configuration

During the summer, wind conditions are predicted to be mostly comfortable for strolling or walking (Figure 1A), which is appropriate for sidewalks and walkways, as pedestrians will be active, and less likely to remain in an area for prolonged periods of time.

During the winter, wind conditions are expected to be mostly uncomfortable (Figure 2A), which can be attributed to the local climate and site exposure.

Wind conditions that meet the safety criterion are predicted at all locations for the Existing configuration.

3.2 Proposed Configuration

With the proposed development in place, wind conditions on-site are expected to change significantly.

During the summer, at most on-site locations wind conditions comfortable for standing and strolling occur (Figure 1B), which is appropriate in areas where patrons are expected to be active. Uncomfortable wind speeds are shown in the area between the towers (Locations 1 and 17-20 in Figure 1B) and around the northern corners of Tower B podium (Locations 26 and 29), which can be attributed to the channelling effect and corner acceleration that occur at these locations.

In the winter, uncomfortable wind conditions occur at additional on-site areas between the towers (Locations 1, 16-21 and 34 in Figure 2B), around the southern corners of Tower A podium (Locations 8 and 11) and along the north façade of Tower B façade (Locations 26-29). For the off-site areas, the future wind conditions (Figures 1B and 2B) are found to be similar to or slightly improved from those that currently exist (Figures 1A and 2A). The proposed development does not have a negative wind impact on the surrounding areas.

Wind conditions that meet the safety criterion are shown at most locations for the proposed configuration with a few exceptions between the towers (Locations 19-21 in Figure 3B) and the near the northern corners of Tower B podium (Locations 26 and 29).

The proposed development includes several positive design features for wind control, such as curved tower plans/corners, and large podiums. The uncomfortable and unsafe wind conditions are primarily caused by local wind climate and site exposure. To improve these wind conditions, potential wind control measures may include:

- Re-configuration of the breezeway between the towers so that it is not aligned with the prevailing southwest winds;
- Locate the main entrances to sheltered/recessed areas where lower wind speeds are expected;
- Consider local wind screens and trellises for entrances, pick-up/drop-off and other pedestrian areas; and
- Include landscaping or other features around the southern corners of Tower A podium and the northern corners of Tower B podium to keep pedestrians away from these windy areas.

Additional wind studies can be conducted as the project advances to evaluate and refine any feasible wind control measures.

4 STATEMENT OF LIMITATIONS

Limitations

This report entitled "Lot 175 Portage Road Pedestrian Wind Study, July 12, 2022" was prepared by Rowan Williams Davies & Irwin, Inc. ("RWDI") for Rudenko 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 Giannone Petricone Associates Inc. Architects and used to construct the scale model of the proposed Lot 175 Portage Road **("Project Data**")

File Name	File Type	Date Received (dd/mm/yyyy)
22-05-10_Portage_Massing Model	3D model	05/10/2022

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 up on 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

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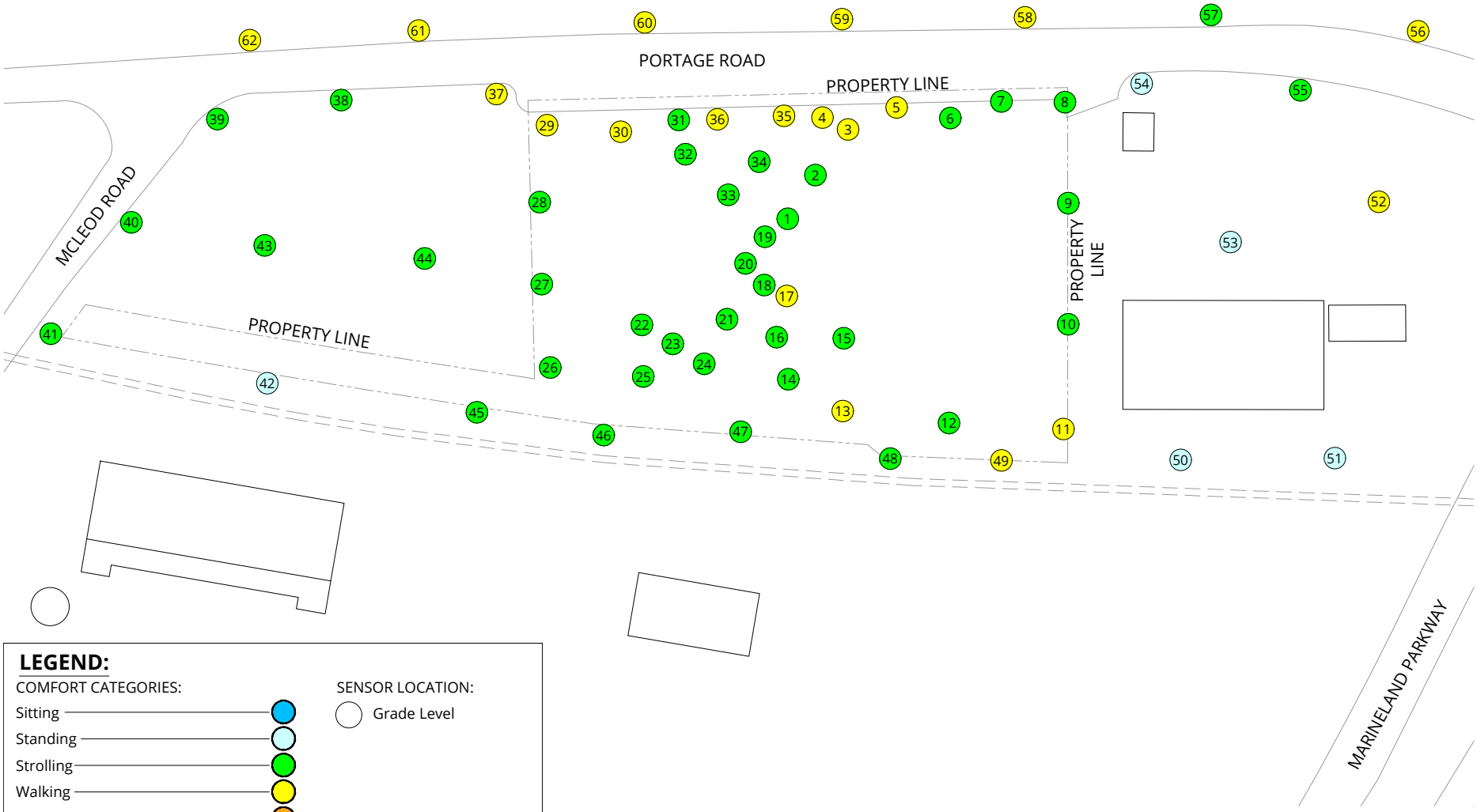
FIGURES



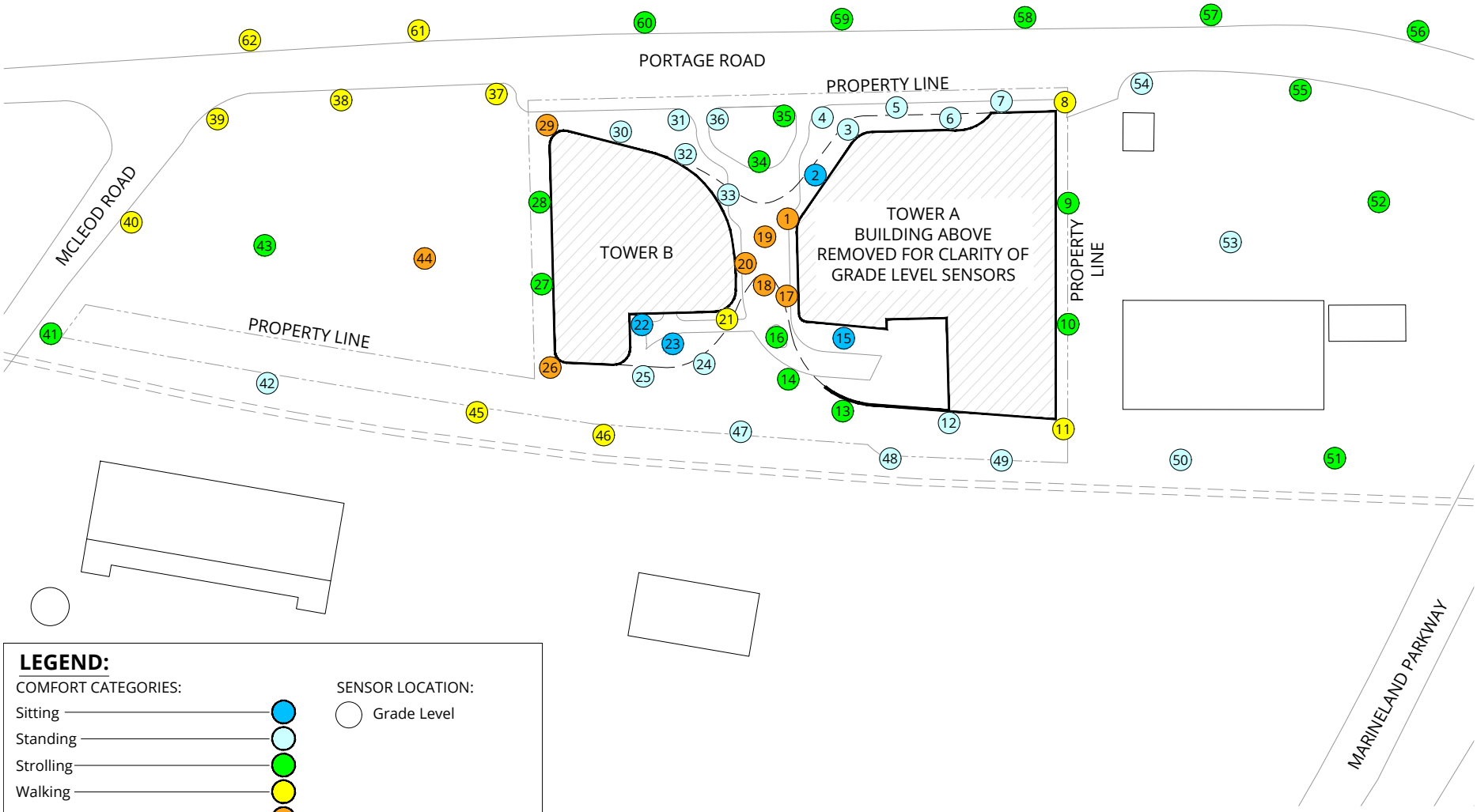
Pedestrian Wind Comfort Conditions
Existing Configuration
Summer (May to October, 6:00 to 23:00)

Lot 175, Portage Road - Niagara Falls, ON

True North

Project #2203060

Drawn by: DAR	Figure: 1A
Approx. Scale:	1:1500
Date Revised:	Jul. 8, 2022



LEGEND:

COMFORT CATEGORIES:
- Sitting
- Standing
- Strolling
- Walking
- Uncomfortable

SENSOR LOCATION:
- Grade Level

Pedestrian Wind Comfort Conditions

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

Lot 175, Portage Road - Niagara Falls, ON

True North

Project #2203060

Drawn by: DAR	Figure: 1B
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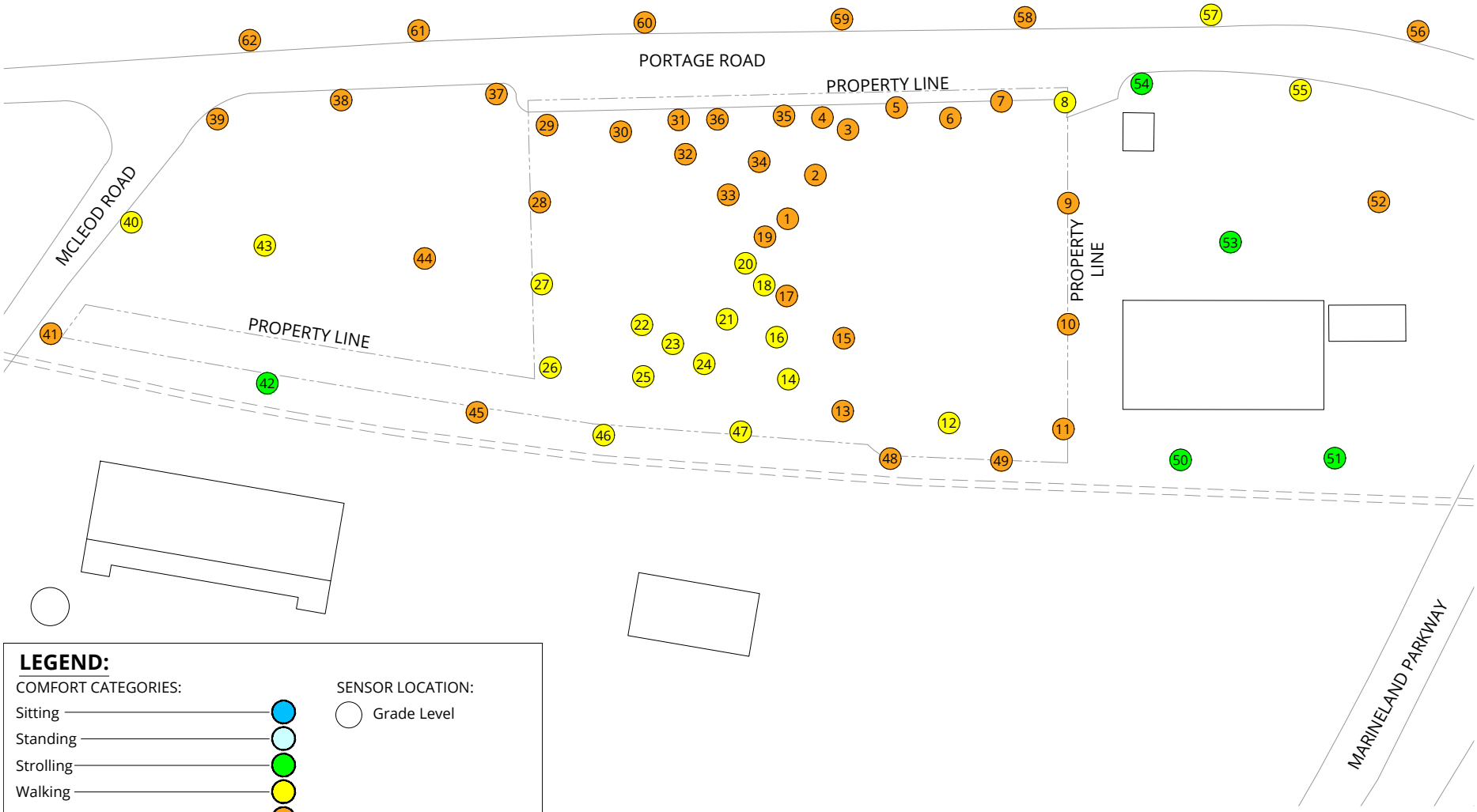

LEGEND:

COMFORT CATEGORIES:

- Sitting
- Standing
- Strolling
- Walking
- Uncomfortable

SENSOR LOCATION:

- Grade Level

Pedestrian Wind Comfort Conditions

Existing Configuration

Winter (November to April, 6:00 to 23:00)

Lot 175, Portage Road - Niagara Falls, ON

True North

Project #2203060

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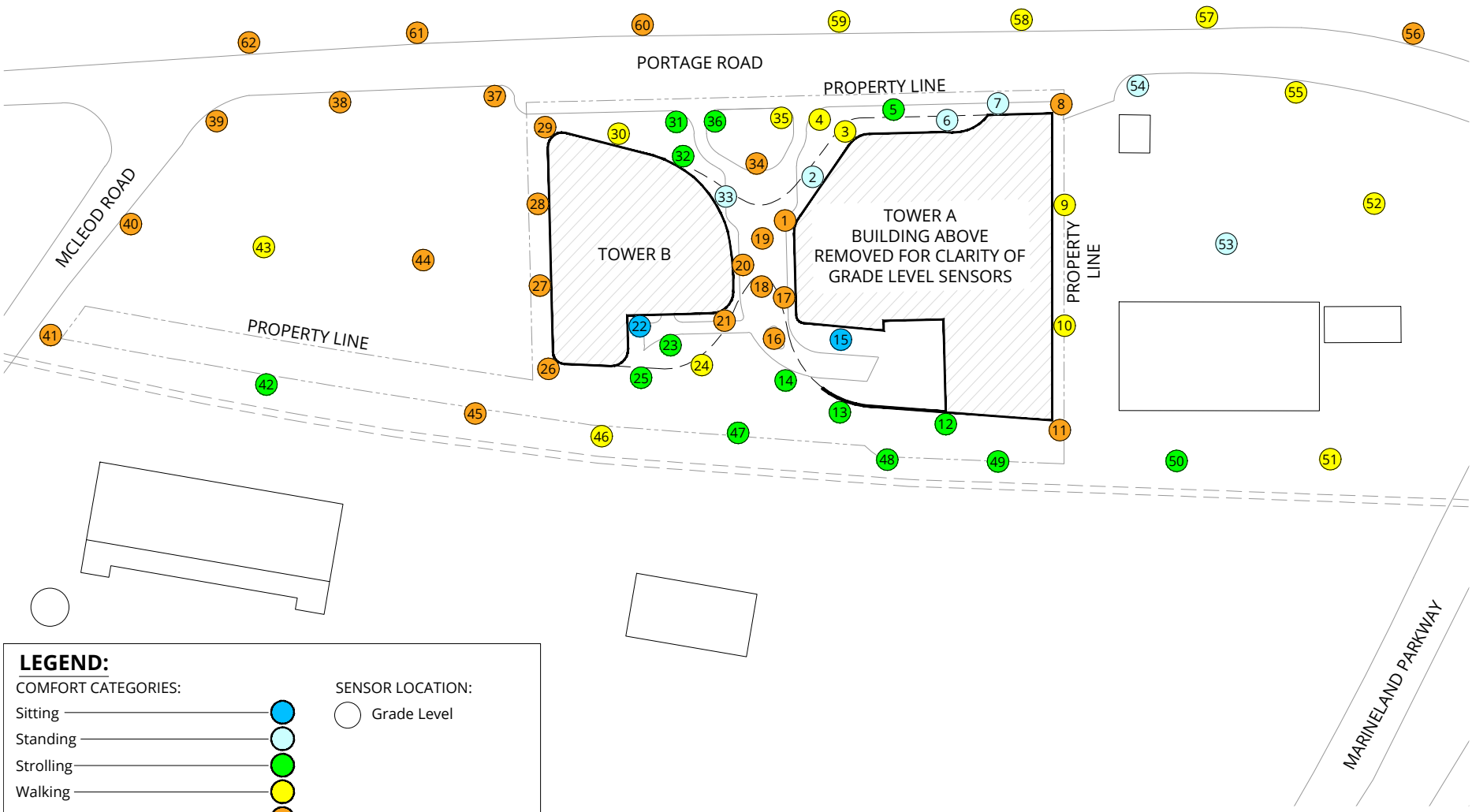


LEGEND:

COMFORT CATEGORIES:
- Sitting
- Standing
- Strolling
- Walking
- Uncomfortable

SENSOR LOCATION:
- Grade Level

Pedestrian Wind Comfort Conditions

Proposed Configuration

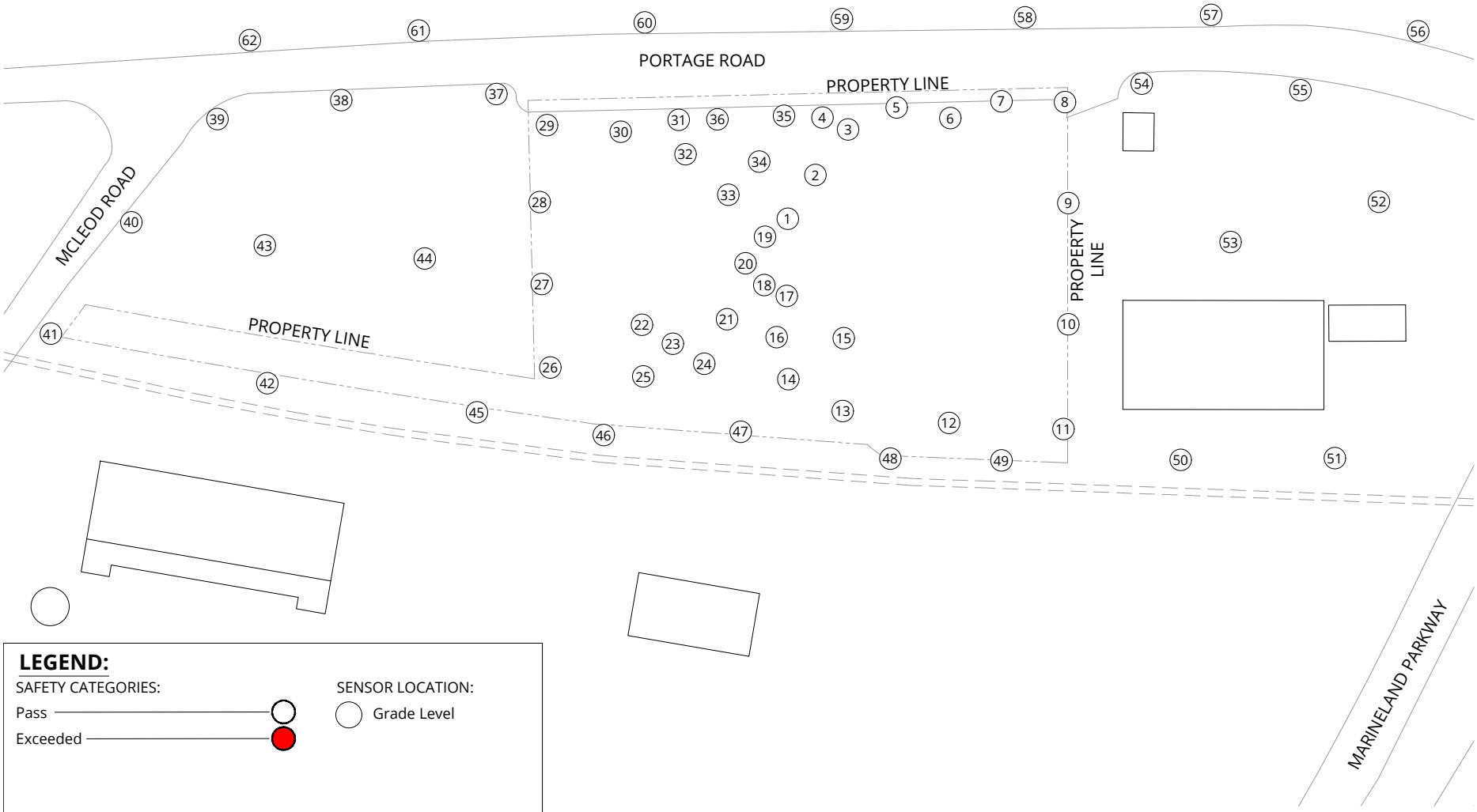
Winter (November to April, 6:00 to 23:00)

Lot 175, Portage Road - Niagara Falls, ON

True North

Project #2203060

Drawn by: DAR	Figure: 2B
Approx. Scale:	1:1500
Date Revised:	Jul. 8, 2022



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

Lot 175, Portage Road - Niagara Falls, ON

True North

Project #2203060

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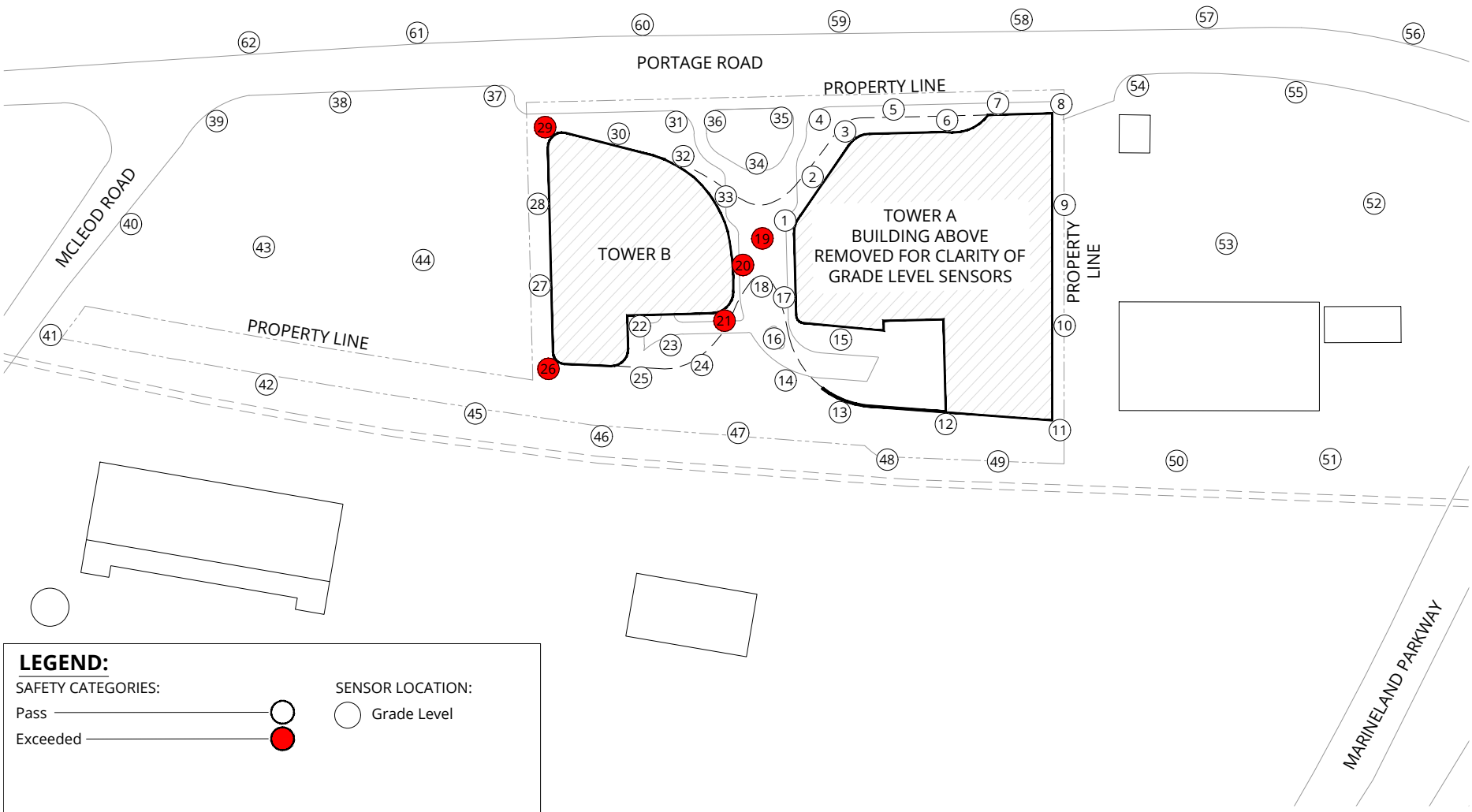

LEGEND:

SAFETY CATEGORIES:
- Pass
- Exceeded

SENSOR LOCATION:
- Grade Level

Pedestrian Wind Safety Conditions

Proposed Configuration
Annual (January to December, 0:00 to 23:00)

Lot 175, Portage Road - Niagara Falls, ON

True North

Project #2203060

Drawn by: DAR	Figure: 3B
Approx. Scale:	1:1500
Date Revised:	Jul. 8, 2022

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	17	Strolling	21	Uncomfortable	64	Pass
	Proposed	23	Uncomfortable	29	Uncomfortable	90	Pass
2	Existing	17	Strolling	21	Uncomfortable	66	Pass
	Proposed	10	Sitting	12	Standing	54	Pass
3	Existing	18	Walking	21	Uncomfortable	67	Pass
	Proposed	14	Standing	18	Walking	71	Pass
4	Existing	18	Walking	22	Uncomfortable	67	Pass
	Proposed	14	Standing	18	Walking	67	Pass
5	Existing	18	Walking	22	Uncomfortable	69	Pass
	Proposed	13	Standing	16	Strolling	69	Pass
6	Existing	17	Strolling	21	Uncomfortable	69	Pass
	Proposed	11	Standing	13	Standing	50	Pass
7	Existing	17	Strolling	22	Uncomfortable	67	Pass
	Proposed	12	Standing	14	Standing	57	Pass
8	Existing	16	Strolling	20	Walking	67	Pass
	Proposed	20	Walking	21	Uncomfortable	77	Pass
9	Existing	17	Strolling	21	Uncomfortable	69	Pass
	Proposed	16	Strolling	19	Walking	66	Pass
10	Existing	17	Strolling	22	Uncomfortable	72	Pass
	Proposed	15	Strolling	19	Walking	66	Pass
11	Existing	18	Walking	22	Uncomfortable	69	Pass
	Proposed	20	Walking	27	Uncomfortable	89	Pass
12	Existing	17	Strolling	20	Walking	62	Pass
	Proposed	12	Standing	15	Strolling	64	Pass
13	Existing	18	Walking	21	Uncomfortable	69	Pass
	Proposed	15	Strolling	17	Strolling	65	Pass
14	Existing	17	Strolling	20	Walking	68	Pass
	Proposed	15	Strolling	17	Strolling	59	Pass
15	Existing	17	Strolling	21	Uncomfortable	68	Pass
	Proposed	6	Sitting	8	Sitting	36	Pass
16	Existing	17	Strolling	20	Walking	65	Pass
	Proposed	17	Strolling	21	Uncomfortable	64	Pass
17	Existing	19	Walking	23	Uncomfortable	66	Pass
	Proposed	22	Uncomfortable	27	Uncomfortable	87	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	17	Strolling	20	Walking	65	Pass
	Proposed	24	Uncomfortable	30	Uncomfortable	84	Pass
19	Existing	17	Strolling	21	Uncomfortable	66	Pass
	Proposed	27	Uncomfortable	34	Uncomfortable	96	Exceeded
20	Existing	17	Strolling	20	Walking	65	Pass
	Proposed	25	Uncomfortable	29	Uncomfortable	98	Exceeded
21	Existing	17	Strolling	20	Walking	68	Pass
	Proposed	18	Walking	24	Uncomfortable	94	Exceeded
22	Existing	17	Strolling	20	Walking	67	Pass
	Proposed	5	Sitting	7	Sitting	28	Pass
23	Existing	16	Strolling	20	Walking	64	Pass
	Proposed	10	Sitting	15	Strolling	64	Pass
24	Existing	16	Strolling	19	Walking	62	Pass
	Proposed	13	Standing	18	Walking	69	Pass
25	Existing	16	Strolling	20	Walking	66	Pass
	Proposed	13	Standing	16	Strolling	65	Pass
26	Existing	17	Strolling	20	Walking	67	Pass
	Proposed	23	Uncomfortable	25	Uncomfortable	92	Exceeded
27	Existing	16	Strolling	20	Walking	67	Pass
	Proposed	17	Strolling	21	Uncomfortable	81	Pass
28	Existing	17	Strolling	21	Uncomfortable	68	Pass
	Proposed	17	Strolling	22	Uncomfortable	84	Pass
29	Existing	18	Walking	22	Uncomfortable	69	Pass
	Proposed	21	Uncomfortable	27	Uncomfortable	92	Exceeded
30	Existing	18	Walking	22	Uncomfortable	70	Pass
	Proposed	14	Standing	19	Walking	83	Pass
31	Existing	17	Strolling	21	Uncomfortable	64	Pass
	Proposed	13	Standing	16	Strolling	61	Pass
32	Existing	17	Strolling	21	Uncomfortable	66	Pass
	Proposed	12	Standing	15	Strolling	68	Pass
33	Existing	17	Strolling	21	Uncomfortable	66	Pass
	Proposed	12	Standing	14	Standing	55	Pass
34	Existing	17	Strolling	21	Uncomfortable	66	Pass
	Proposed	17	Strolling	21	Uncomfortable	76	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	21	Uncomfortable	65	Pass
	Proposed	15	Strolling	19	Walking	71	Pass
36	Existing	18	Walking	21	Uncomfortable	67	Pass
	Proposed	13	Standing	15	Strolling	60	Pass
37	Existing	18	Walking	21	Uncomfortable	69	Pass
	Proposed	19	Walking	24	Uncomfortable	89	Pass
38	Existing	17	Strolling	21	Uncomfortable	68	Pass
	Proposed	19	Walking	23	Uncomfortable	78	Pass
39	Existing	17	Strolling	21	Uncomfortable	69	Pass
	Proposed	18	Walking	22	Uncomfortable	76	Pass
40	Existing	16	Strolling	20	Walking	66	Pass
	Proposed	18	Walking	22	Uncomfortable	73	Pass
41	Existing	16	Strolling	21	Uncomfortable	66	Pass
	Proposed	17	Strolling	22	Uncomfortable	71	Pass
42	Existing	12	Standing	15	Strolling	54	Pass
	Proposed	13	Standing	15	Strolling	59	Pass
43	Existing	16	Strolling	19	Walking	63	Pass
	Proposed	17	Strolling	20	Walking	71	Pass
44	Existing	17	Strolling	21	Uncomfortable	69	Pass
	Proposed	21	Uncomfortable	25	Uncomfortable	83	Pass
45	Existing	17	Strolling	21	Uncomfortable	70	Pass
	Proposed	19	Walking	23	Uncomfortable	74	Pass
46	Existing	16	Strolling	20	Walking	67	Pass
	Proposed	18	Walking	20	Walking	72	Pass
47	Existing	15	Strolling	18	Walking	59	Pass
	Proposed	14	Standing	17	Strolling	62	Pass
48	Existing	17	Strolling	21	Uncomfortable	65	Pass
	Proposed	13	Standing	17	Strolling	69	Pass
49	Existing	18	Walking	22	Uncomfortable	69	Pass
	Proposed	12	Standing	16	Strolling	66	Pass
50	Existing	14	Standing	17	Strolling	56	Pass
	Proposed	12	Standing	16	Strolling	62	Pass
51	Existing	12	Standing	16	Strolling	51	Pass
	Proposed	15	Strolling	20	Walking	64	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	18	Walking	21	Uncomfortable	70	Pass
	Proposed	17	Strolling	20	Walking	70	Pass
53	Existing	13	Standing	17	Strolling	60	Pass
	Proposed	11	Standing	14	Standing	59	Pass
54	Existing	14	Standing	17	Strolling	62	Pass
	Proposed	12	Standing	14	Standing	54	Pass
55	Existing	17	Strolling	20	Walking	69	Pass
	Proposed	17	Strolling	20	Walking	70	Pass
56	Existing	19	Walking	22	Uncomfortable	72	Pass
	Proposed	17	Strolling	21	Uncomfortable	71	Pass
57	Existing	17	Strolling	20	Walking	65	Pass
	Proposed	16	Strolling	19	Walking	64	Pass
58	Existing	18	Walking	22	Uncomfortable	69	Pass
	Proposed	15	Strolling	18	Walking	69	Pass
59	Existing	18	Walking	22	Uncomfortable	70	Pass
	Proposed	15	Strolling	19	Walking	76	Pass
60	Existing	19	Walking	23	Uncomfortable	72	Pass
	Proposed	16	Strolling	21	Uncomfortable	78	Pass
61	Existing	19	Walking	23	Uncomfortable	71	Pass
	Proposed	19	Walking	24	Uncomfortable	84	Pass
62	Existing	18	Walking	22	Uncomfortable	75	Pass
	Proposed	19	Walking	24	Uncomfortable	81	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)		Safety Speed (km/h)	
(20% Seasonal Exceedance)		(0.1% Annual Exceedance)	
≤ 10	Sitting	≤ 90	Pass
11 - 14	Standing	> 90	Exceeded
15 - 17	Strolling		
18 - 20	Walking		
> 20	Uncomfortable		