REPORT

RIVERFRONT COMMUNITY PHASE II

NIAGARA FALLS, ONTARIO

PEDESTRIAN WIND STUDY
RWDI # 2206772
September 13, 2023

SUBMITTED TO

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EXECUTIVE SUMMARY

RWDI was retained to conduct a pedestrian wind assessment for the proposed Riverfront Community Phase II in Niagara Falls, ON (Image 1). Based on our wind-tunnel testing for the proposed development under the Existing, and Proposed configurations (Images 2A and 2B) in accordance with the requirements in the Pedestrian Level Wind Study Terms of Reference Guide (the Guide) prepared by Urban Design and Landscape Architecture Planning and Development Services for Niagara Region in July 2022. The results were analysed using wind records from Niagara Falls International Airport (Image 3) and evaluated against the Wind Criteria for Pedestrian Comfort and Safety specified in the Guide. The predicted conditions are shown on site plans in Figures 1A through 2B, while the associated wind speeds are listed in Table 1. These results can be summarized as follows:

- Wind speeds at all areas assessed for both configurations are expected to meet the wind safety criterion.
- Wind speeds at the existing project site are moderate during the summer; during the winter wind speeds are elevated due to the seasonal climate, but still appropriate for active pedestrian use.
- With the proposed development in place, reduced wind speeds are predicted in the semi-enclosed area for the main entrance, while increased wind speeds are expected near the exposed western building corners. Wind conditions are predicted to be appropriate for pedestrian use across the site during the summer, but potentially uncomfortable wind conditions are expected at the aforementioned windier areas during winter.
- Wind speeds on the above grade terraces are expected to be higher than desired for passive use during the summer.
- No landscaping elements on-site were included in the wind tunnel model to establish base line wind conditions as is the norm for these studies.
- Examples of wind control measures applicable to each area have been provided in the body of the report. As the design advances, RWDI can help guide the placement of wind control features, including landscaping, to achieve appropriate levels of wind comfort based on the programming of the various outdoor spaces.

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1 INTRODUCTION

RWDI was retained to conduct a pedestrian wind assessment for the proposed Riverfront Community Phase II in Niagara Falls, Ontario. This report presents the project objectives, background and approach, and discusses of the 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 project site (site shown in Image 1) seats on a currently undeveloped land to the east side of Dorchester Road and north side of the Conrail Drain. The study building is a 12-storey tall condo/hotel building which is part of a master plan that includes shorter condo and retail buildings to the south through east of the study building. The proposed building is L-shaped and two large terraces are proposed at Level 8.

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 entrance, sidewalks and above grade terraces.

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

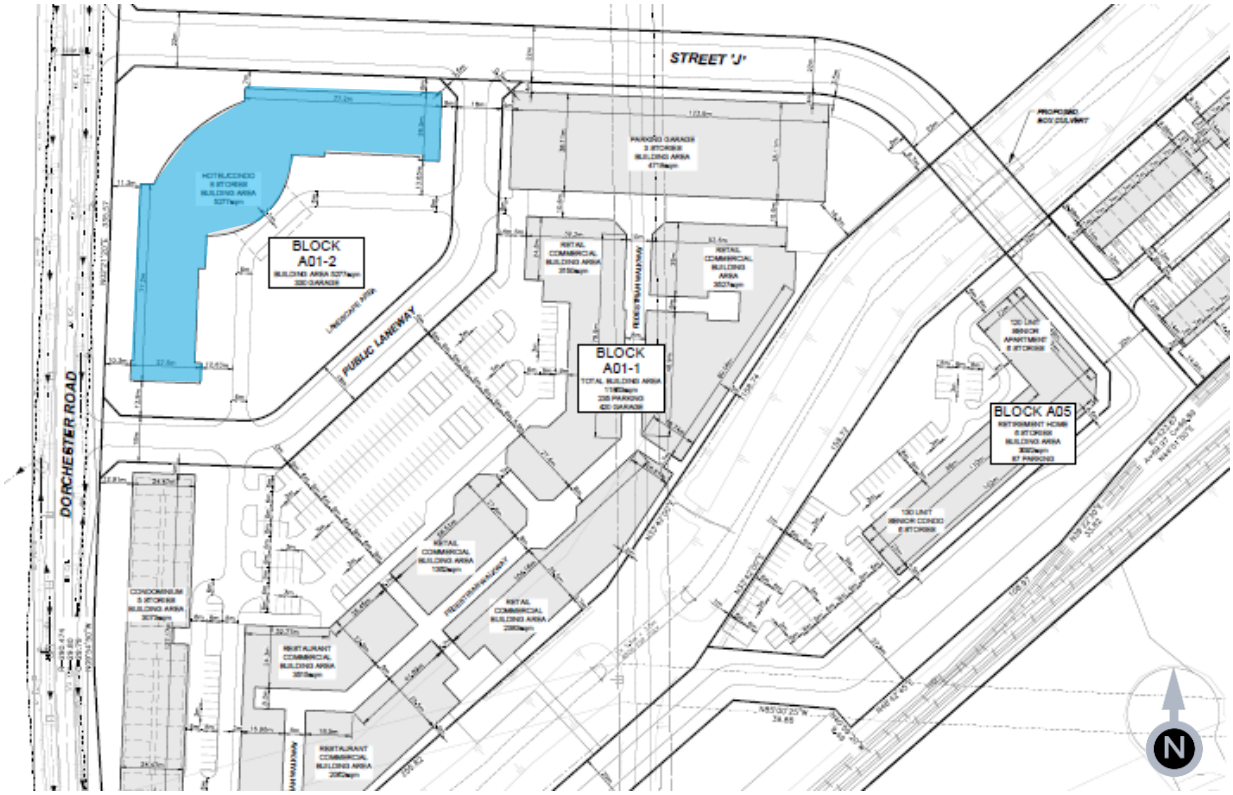


Image 2: Project Site Plan (Courtesy: GR-GP)

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 (Image 2B).

The wind tunnel model included all relevant surrounding buildings and topography within an approximately 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 73 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 a 10-degree increment. 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.

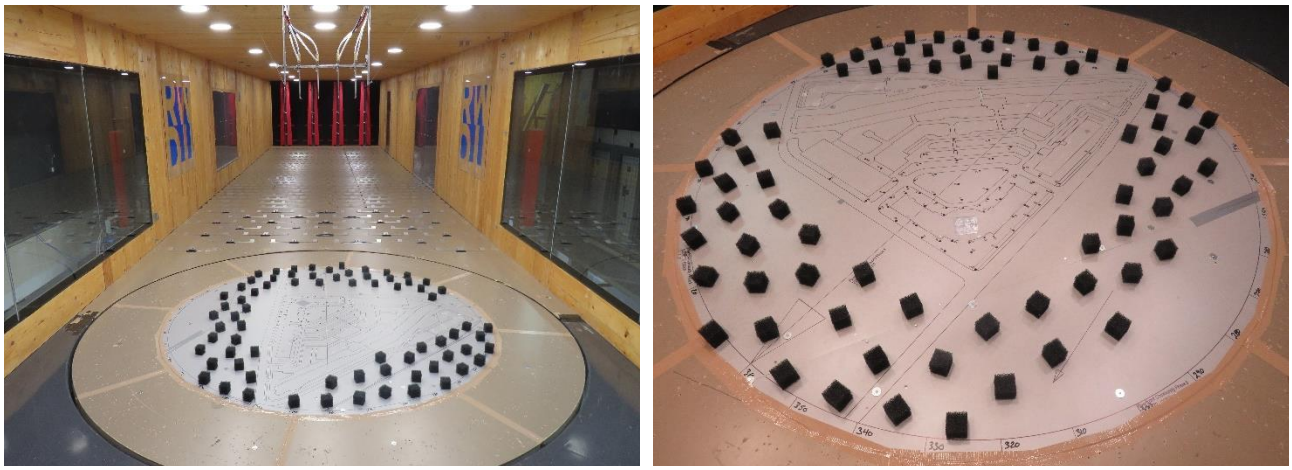


Image 2A: Wind Tunnel Study Model – Existing Configuration

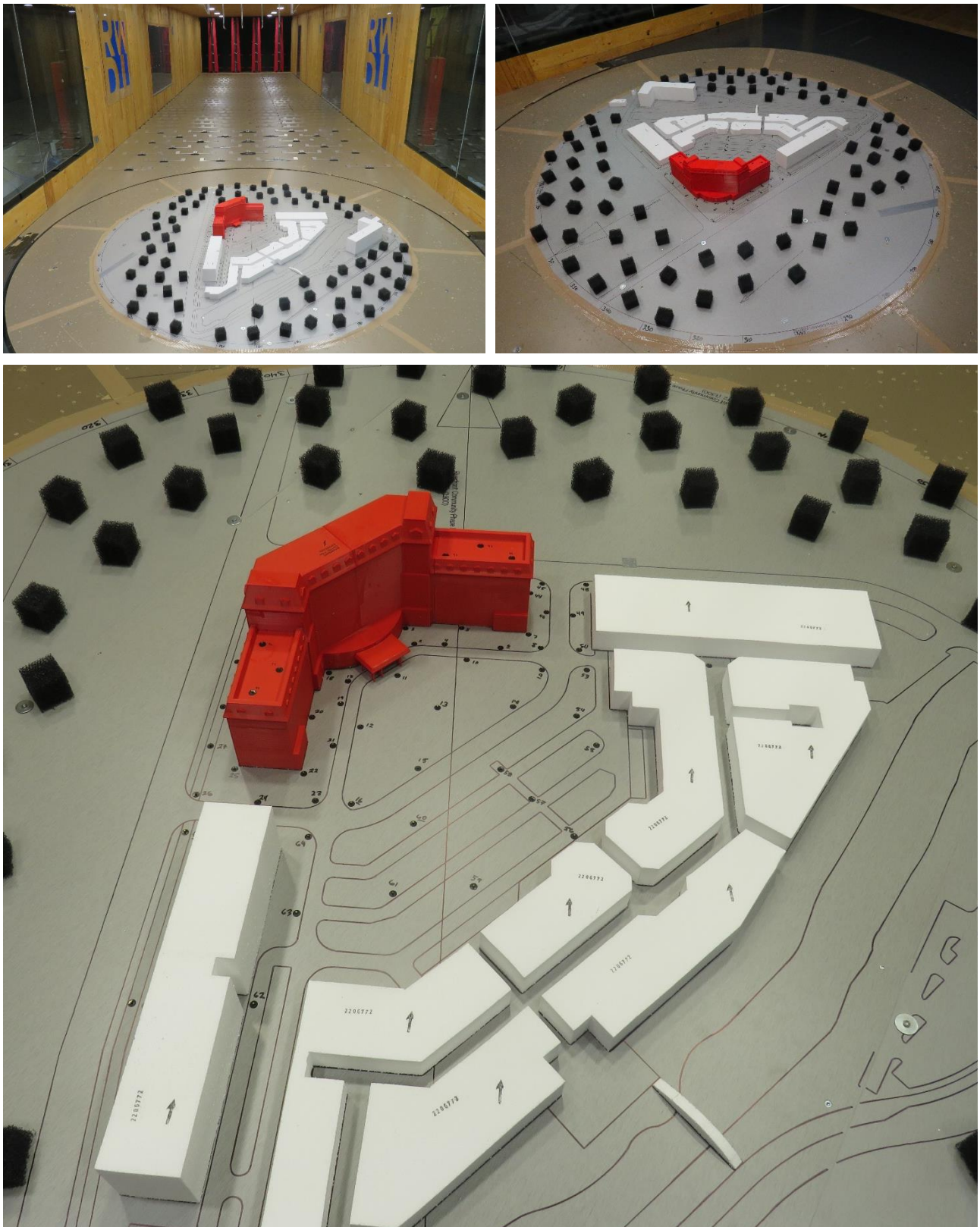
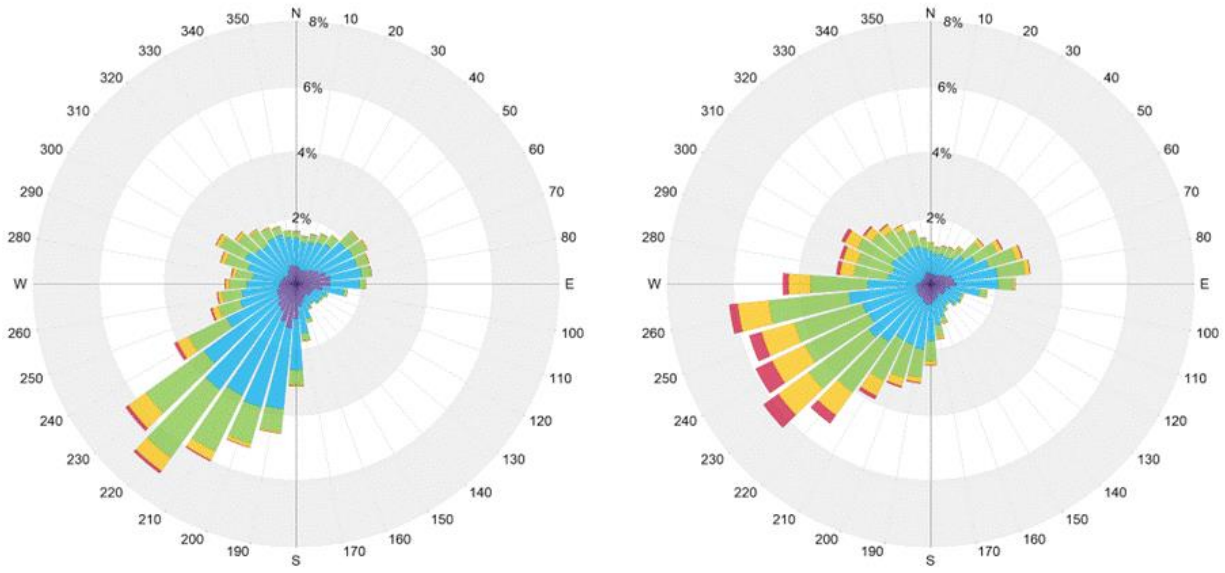


Image 2B: Wind Tunnel Study Model – Proposed Configuration

2.2 Meteorological Data

Wind statistics recorded at Niagara International Airport in NY between 1991 and 2021, 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 quadrant are predominant throughout the year as indicated by the wind roses, with secondary winds from the northeast and northwest quadrants. Strong winds of a mean speed greater than 30 km/h measured at the airport (at an anemometer height of 10 m) occur for 3.9% and 12.8% of the time during the summer and winter seasons, respectively, and they are primarily from the southwest direction.

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	10.4	5.9
1-10	23.4	16.1
11-20	42.6	36.3
21-30	19.7	28.9
31-40	3.3	9.8
>40	0.6	3.0

Image 3: Directional Distribution of Winds Approaching Niagara Falls International Airport, NY between 1991 and 2021

2.3 Pedestrian Wind Criteria for Niagara Region

Based on pedestrian level wind study terms of reference guide for Niagara Region (dated July 2022), the public realm, streetscapes and public/private outdoor open spaces related to the existing and proposed buildings are to be comfortable for their intended use. The table below describes the minimum criteria for specific locations. The criteria deal with comfort and safety of pedestrians:

Comfort: Commonly experienced wind speeds have been categorized into ranges based on the activity level of a person that the winds would be conducive to. Lower wind speeds are desirable for passive activities and active pedestrians would be tolerant of higher wind speeds.

Safety: It is important to assess wind conditions in the pedestrian realm from a safety perspective as strong wind gusts can deter safe pedestrian use of outdoor spaces. Wind speeds associated with wind gusts are infrequent but deserve special attention due to their potential impact on pedestrian safety.

Comfort Category	GEM Speed (km/h)	Minimum Occurrence (% of Time)	Description	Area of Application
Sitting	≤ 10	80	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	80	Gentle breezes suitable for passive pedestrian activities where a breeze may be tolerated	Main entrances, bus-stops, dog areas, and other outdoor areas where seated activities are not expected.
Walking	≤ 20	80	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	20	Strong winds, considered a nuisance for most activities.	Not acceptable in areas with pedestrian access

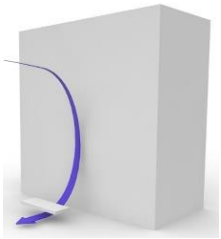
NOTES:
1) Gust Equivalent Mean (GEM) speed = maximum of either mean speed or gust speed/1.85. The gust speed can be measured directly from wind tunnel or estimated as mean speed + (3 x RMS speed).
2) Comfort calculations are to be based on wind events recorded between 6:00 and 23:00 daily.

Safety Criterion	Gust Speed (km/h)	Minimum Occurrence Annual	Description	Area of Application
Exceeded	> 90	0.1% (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:
3) Safety calculations are to be based on wind events recorded for 24 hours a day

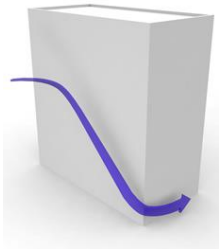
2.4 Generalized Wind Flows

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



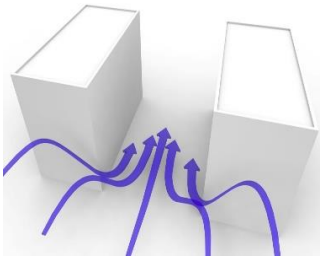
DOWNWASHING

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.



CHANNELLING EFFECT

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

Image 4: Generalized Wind Flows

3 RESULTS AND DISCUSSION

The predicted wind conditions are shown on a site plan in Figures 1A through 2B 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.

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 in both configurations assessed.

3.1 Existing Configuration

The existing site is undeveloped and surrounded by relatively dense vegetation. During the summer, wind speeds on the existing project site, with the trees removed, are comfortable for standing (Figure 1A). During the winter, when seasonally stronger winds occur, wind speeds are mostly comfortable for walking (Figure 2A).

3.2 Proposed Configuration

3.2.1 Grade Level (Locations 1 through 67)

Generally, 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 or sitting are preferred at main entrances where pedestrians are apt to linger.

The proposed project, is taller than surroundings and therefore, exposed to winds from all directions. The buildings will intercept and redirect the prevailing southwesterly winds, and cause downwashing flows at the western facade, corner acceleration flows at the western corners and channeling flows in the area between the project and neighbouring condo buildings to the south. Therefore, higher wind activity, relative to the existing conditions, is expected in these areas.

The proposed buildings would also reduce the wind speeds in the central area of the site by sheltering the area from southwest through northwest winds. Positively, the main entrance (near Location 1in Figures 1B and 2B) is situated at the sheltered side of the proposed building. Wind conditions comfortable for sitting or standing are expected near this area throughout the year that are suitable for the intended usage.

Wind conditions at other ground-level areas assessed, including the central courtyard and internal walkways are expected to be comfortable for standing during the summer and for standing or walking during the winter. Higher wind speeds along the sidewalk of the Dorchester Road and Street "J" are expected to be mostly comfortable for walking during the summer and uncomfortable during the winter. To improve the wind conditions at these sidewalks during the winter strategic landscaping with coniferous or marcescent species are recommended to be placed locally near windy areas identified.

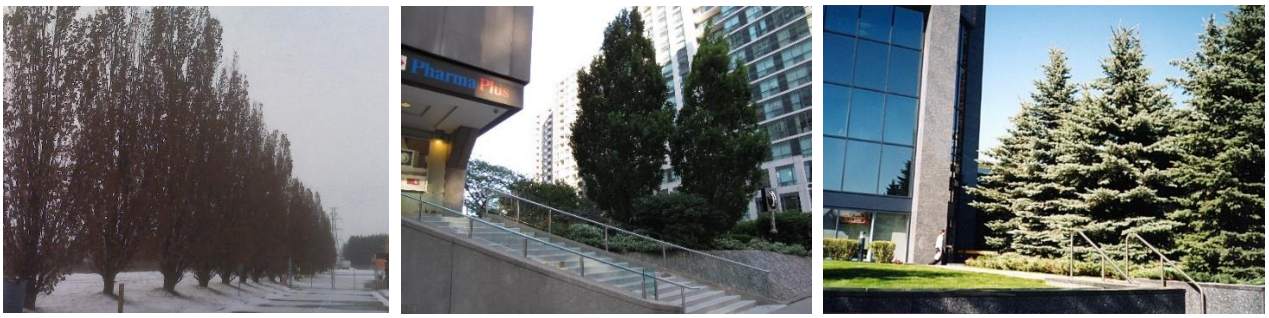


Image 4: Wind Control Measures for Sidewalks

3.2.2 Above-Grade Terraces (Locations 68 through 73)

It is generally desirable for wind conditions on terraces intended for passive activities to be comfortable for sitting more than 80% of the time in the summer. During the winter, these areas would not be used frequently, and increased wind activity would be considered appropriate.

The south terrace would be relatively exposed to the prevailing winds in the area and wind conditions comfortable for standing or walking are expected during the summer. The east terrace would be sheltered by the main body of the proposed building and wind conditions comfortable for sitting or standing are expected during the summer. During winter wind speeds are expected to be higher and conditions would be comfortable for standing or walking. These wind speeds are higher than desired for prolonged passive activities. Improved wind conditions are achievable through the use of tall screens (at most 30% permeable) and/or dense landscaping around designated seating areas to create localized protected zones. Some examples are shown in the Image 5.

Image 5: Wind Control Measures for Above-Grade Terraces

3.3 Updated Site Plan

After carrying out the wind tunnel tests, RWDI has received updated site plan of the proposed development on August 24, 2023. In the updated plan the surrounding buildings including the retails and retirement home has undergone slight changes. These design changes are not expected to affect the wind conditions around the study building and the results presented in this report remain applicable.

4 STATEMENT OF LIMITATIONS

4.1 Limitations

This report was prepared by Rowan Williams Davies & Irwin, Inc. ("RWDI") for GR (CAN) Investment Co. Ltd. ("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.

4.2 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 Z SQUARE GROUP and GR-GP and used to construct the scale model of the proposed Riverfront Community Phase II **("Project Data**")

File Name	File Type	Date Received (dd/mm/yyyy)
A01 - Commercial 20230816	PDF	24/08/2023
22266-COMMERCIAL-SITE PLAN	PDF	29/06/2023
Hotel_danze - 3D View	DWG	15/06/2023

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

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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.
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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	13	Standing	16	Walking	56	Pass
	Proposed	9	Sitting	12	Standing	45	Pass
2	Existing	14	Standing	17	Walking	57	Pass
	Proposed	10	Sitting	12	Standing	46	Pass
3	Existing	14	Standing	17	Walking	57	Pass
	Proposed	6	Sitting	7	Sitting	31	Pass
4	Existing	14	Standing	17	Walking	57	Pass
	Proposed	11	Standing	13	Standing	49	Pass
5	Existing	14	Standing	17	Walking	59	Pass
	Proposed	8	Sitting	11	Standing	41	Pass
6	Existing	14	Standing	17	Walking	57	Pass
	Proposed	12	Standing	14	Standing	58	Pass
7	Existing	14	Standing	17	Walking	58	Pass
	Proposed	15	Standing	17	Walking	67	Pass
8	Existing	14	Standing	18	Walking	60	Pass
	Proposed	14	Standing	16	Walking	63	Pass
9	Existing	15	Standing	18	Walking	60	Pass
	Proposed	14	Standing	16	Walking	62	Pass
10	Existing	14	Standing	18	Walking	58	Pass
	Proposed	11	Standing	13	Standing	52	Pass
11	Existing	14	Standing	17	Walking	55	Pass
	Proposed	8	Sitting	10	Sitting	39	Pass
12	Existing	13	Standing	16	Walking	54	Pass
	Proposed	10	Sitting	12	Standing	54	Pass
13	Existing	14	Standing	18	Walking	57	Pass
	Proposed	12	Standing	14	Standing	53	Pass
14	Existing	14	Standing	17	Walking	58	Pass
	Proposed	13	Standing	15	Standing	63	Pass
15	Existing	14	Standing	18	Walking	58	Pass
	Proposed	13	Standing	16	Walking	63	Pass
16	Existing	13	Standing	16	Walking	54	Pass
	Proposed	12	Standing	16	Walking	65	Pass
17	Existing	13	Standing	16	Walking	54	Pass
	Proposed	8	Sitting	10	Sitting	40	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	14	Standing	16	Walking	55	Pass
	Proposed	6	Sitting	8	Sitting	28	Pass
19	Existing	13	Standing	16	Walking	53	Pass
	Proposed	9	Sitting	11	Standing	42	Pass
20	Existing	13	Standing	16	Walking	53	Pass
	Proposed	9	Sitting	12	Standing	42	Pass
21	Existing	13	Standing	17	Walking	54	Pass
	Proposed	10	Sitting	12	Standing	48	Pass
22	Existing	13	Standing	15	Standing	51	Pass
	Proposed	15	Standing	19	Walking	71	Pass
23	Existing	14	Standing	17	Walking	55	Pass
	Proposed	14	Standing	19	Walking	75	Pass
24	Existing	13	Standing	16	Walking	53	Pass
	Proposed	16	Walking	22	Uncomfortable	80	Pass
25	Existing	12	Standing	15	Standing	52	Pass
	Proposed	15	Standing	21	Uncomfortable	83	Pass
26	Existing	12	Standing	15	Standing	51	Pass
	Proposed	15	Standing	19	Walking	75	Pass
27	Existing	12	Standing	15	Standing	53	Pass
	Proposed	16	Walking	21	Uncomfortable	77	Pass
28	Existing	13	Standing	16	Walking	54	Pass
	Proposed	11	Standing	14	Standing	57	Pass
29	Existing	12	Standing	15	Standing	50	Pass
	Proposed	16	Walking	20	Walking	72	Pass
30	Existing	13	Standing	15	Standing	53	Pass
	Proposed	12	Standing	14	Standing	58	Pass
31	Existing	13	Standing	15	Standing	52	Pass
	Proposed	18	Walking	22	Uncomfortable	80	Pass
32	Existing	13	Standing	15	Standing	53	Pass
	Proposed	21	Uncomfortable	24	Uncomfortable	90	Pass
33	Existing	12	Standing	15	Standing	52	Pass
	Proposed	19	Walking	24	Uncomfortable	87	Pass
34	Existing	13	Standing	15	Standing	53	Pass
	Proposed	12	Standing	14	Standing	51	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	15	Standing	53	Pass
	Proposed	15	Standing	19	Walking	67	Pass
36	Existing	13	Standing	16	Walking	55	Pass
	Proposed	19	Walking	24	Uncomfortable	85	Pass
37	Existing	13	Standing	16	Walking	55	Pass
	Proposed	14	Standing	18	Walking	65	Pass
38	Existing	13	Standing	16	Walking	56	Pass
	Proposed	13	Standing	18	Walking	72	Pass
39	Existing	13	Standing	16	Walking	55	Pass
	Proposed	18	Walking	23	Uncomfortable	74	Pass
40	Existing	13	Standing	16	Walking	56	Pass
	Proposed	19	Walking	26	Uncomfortable	90	Pass
41	Existing	13	Standing	16	Walking	57	Pass
	Proposed	17	Walking	22	Uncomfortable	80	Pass
42	Existing	13	Standing	16	Walking	56	Pass
	Proposed	10	Sitting	14	Standing	55	Pass
43	Existing	14	Standing	17	Walking	59	Pass
	Proposed	14	Standing	18	Walking	74	Pass
44	Existing	14	Standing	17	Walking	59	Pass
	Proposed	13	Standing	16	Walking	67	Pass
45	Existing	14	Standing	17	Walking	59	Pass
	Proposed	15	Standing	18	Walking	73	Pass
46	Existing	14	Standing	17	Walking	58	Pass
	Proposed	15	Standing	17	Walking	72	Pass
47	Existing	14	Standing	18	Walking	60	Pass
	Proposed	9	Sitting	13	Standing	59	Pass
48	Existing	14	Standing	18	Walking	60	Pass
	Proposed	17	Walking	20	Walking	75	Pass
49	Existing	14	Standing	18	Walking	60	Pass
	Proposed	17	Walking	20	Walking	71	Pass
50	Existing	14	Standing	18	Walking	59	Pass
	Proposed	15	Standing	18	Walking	76	Pass
51	Existing	15	Standing	18	Walking	60	Pass
	Proposed	13	Standing	14	Standing	60	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	14	Standing	17	Walking	56	Pass
	Proposed	11	Standing	12	Standing	55	Pass
53	Existing	15	Standing	18	Walking	59	Pass
	Proposed	14	Standing	16	Walking	71	Pass
54	Existing	15	Standing	18	Walking	59	Pass
	Proposed	12	Standing	14	Standing	60	Pass
55	Existing	14	Standing	18	Walking	58	Pass
	Proposed	11	Standing	13	Standing	56	Pass
56	Existing	15	Standing	18	Walking	59	Pass
	Proposed	11	Standing	13	Standing	62	Pass
57	Existing	15	Standing	18	Walking	59	Pass
	Proposed	13	Standing	15	Standing	69	Pass
58	Existing	15	Standing	18	Walking	58	Pass
	Proposed	13	Standing	16	Walking	66	Pass
59	Existing	14	Standing	17	Walking	56	Pass
	Proposed	12	Standing	14	Standing	66	Pass
60	Existing	14	Standing	17	Walking	56	Pass
	Proposed	14	Standing	16	Walking	67	Pass
61	Existing	14	Standing	17	Walking	57	Pass
	Proposed	12	Standing	14	Standing	62	Pass
62	Existing	13	Standing	15	Standing	52	Pass
	Proposed	11	Standing	13	Standing	52	Pass
63	Existing	13	Standing	16	Walking	53	Pass
	Proposed	11	Standing	13	Standing	53	Pass
64	Existing	13	Standing	16	Walking	54	Pass
	Proposed	12	Standing	17	Walking	78	Pass
65	Existing	13	Standing	15	Standing	51	Pass
	Proposed	13	Standing	19	Walking	72	Pass
66	Existing	12	Standing	15	Standing	53	Pass
	Proposed	15	Standing	18	Walking	67	Pass
67	Existing	12	Standing	14	Standing	50	Pass
	Proposed	15	Standing	18	Walking	69	Pass
68	Existing	-	-	-	-	-	-
	Proposed	12	Standing	15	Standing	60	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

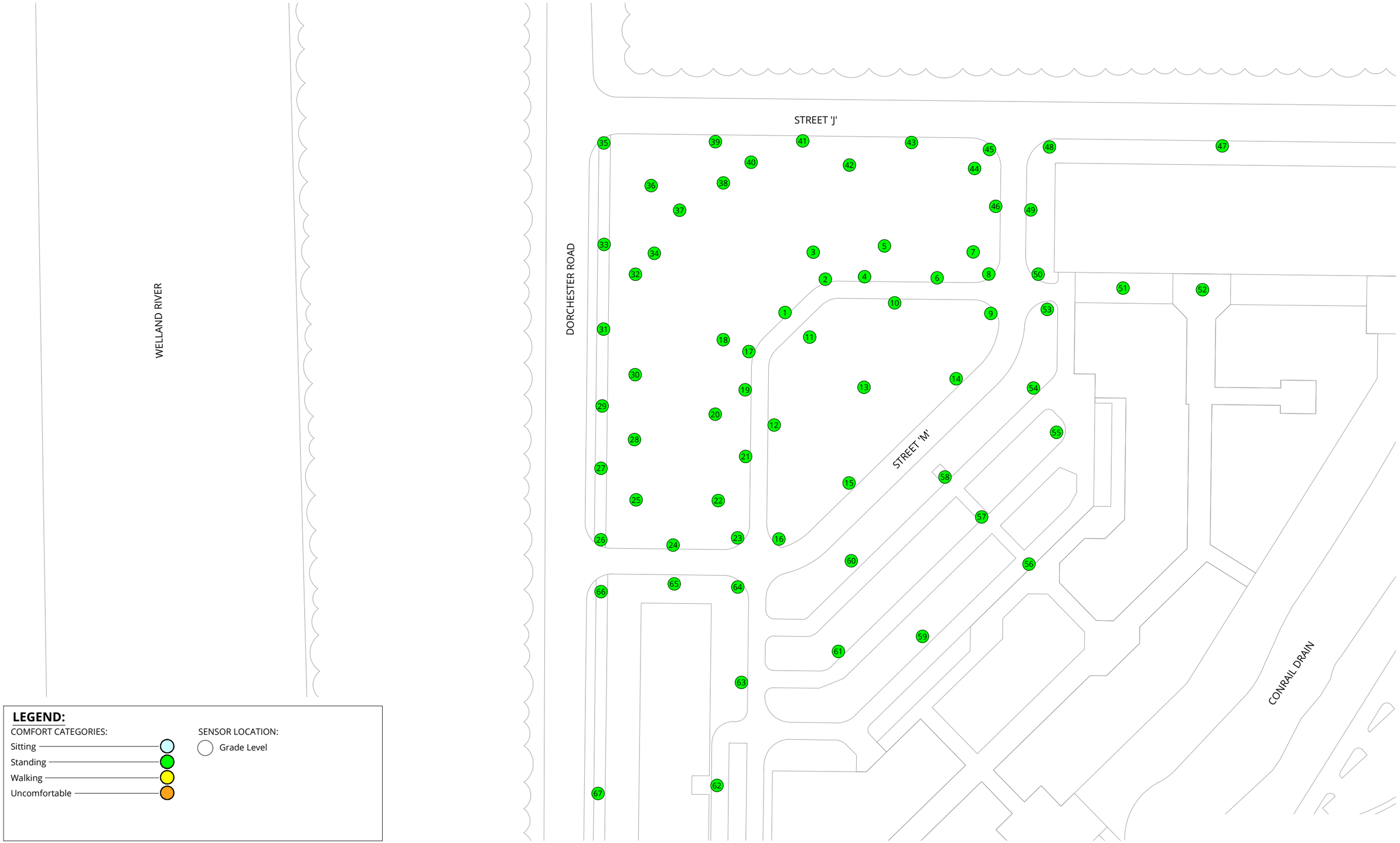
Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating
69	Existing	-	-	-	-	-	-
	Proposed	16	Walking	19	Walking	86	Pass
70	Existing	-	-	-	-	-	-
	Proposed	15	Standing	17	Walking	80	Pass
71	Existing	-	-	-	-	-	-
	Proposed	10	Sitting	12	Standing	49	Pass
72	Existing	-	-	-	-	-	-
	Proposed	13	Standing	15	Standing	58	Pass
73	Existing	-	-	-	-	-	-
	Proposed	12	Standing	14	Standing	53	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

FIGURES



LEGEND:

COMFORT CATEGORIES:
- Sitting
- Standing
- Walking
- Uncomfortable

SENSOR LOCATION:
- Grade Level

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

Riverfront Community Phase II - Niagara Falls, ON

True North

Project #2206772

Drawn by:	DUC	Figure:	1A
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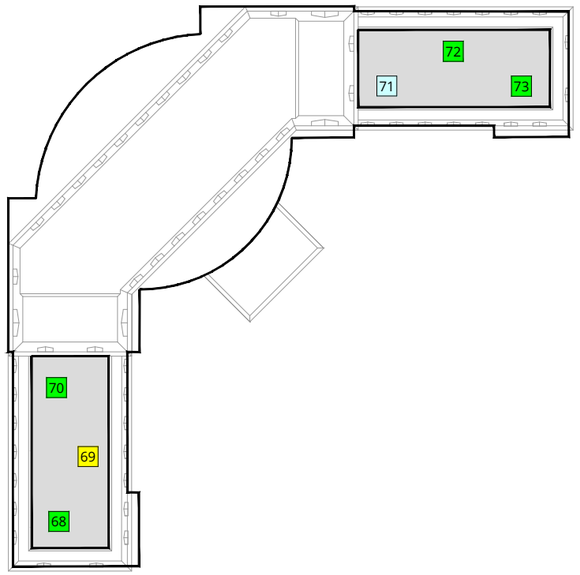
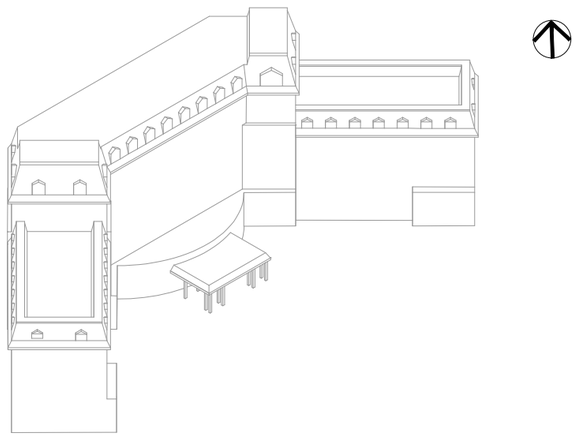
Date Revised:	Jul. 5, 2023		



Roof Level Terraces

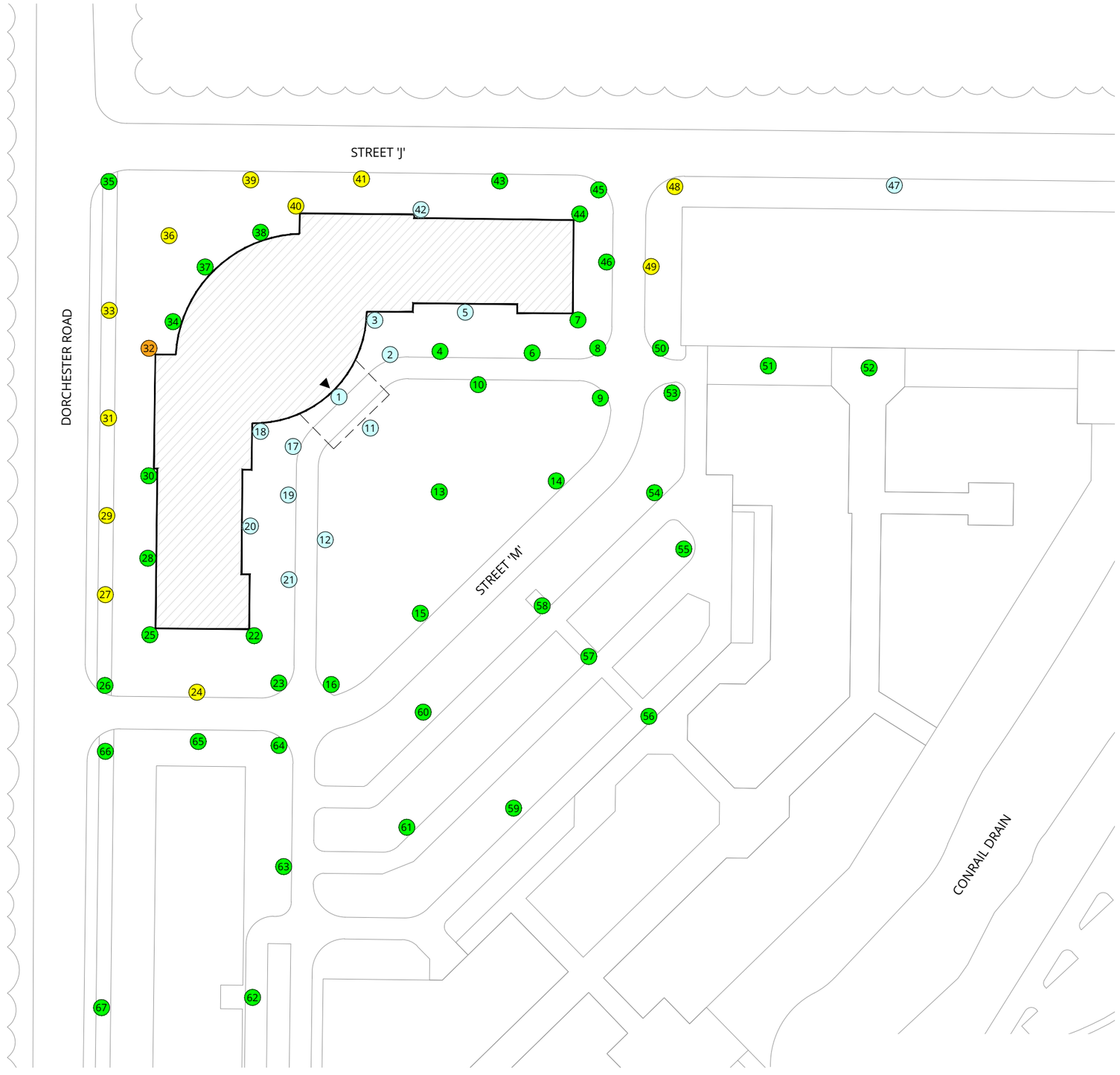


Isometric View of Building

LEGEND:

COMFORT CATEGORIES:
- Sitting
- Standing
- Walking
- Uncomfortable

SENSOR LOCATION:
- Grade Level
- Roof Level Terraces
- Building Above Removed for Clarity
- Main Entrance Location



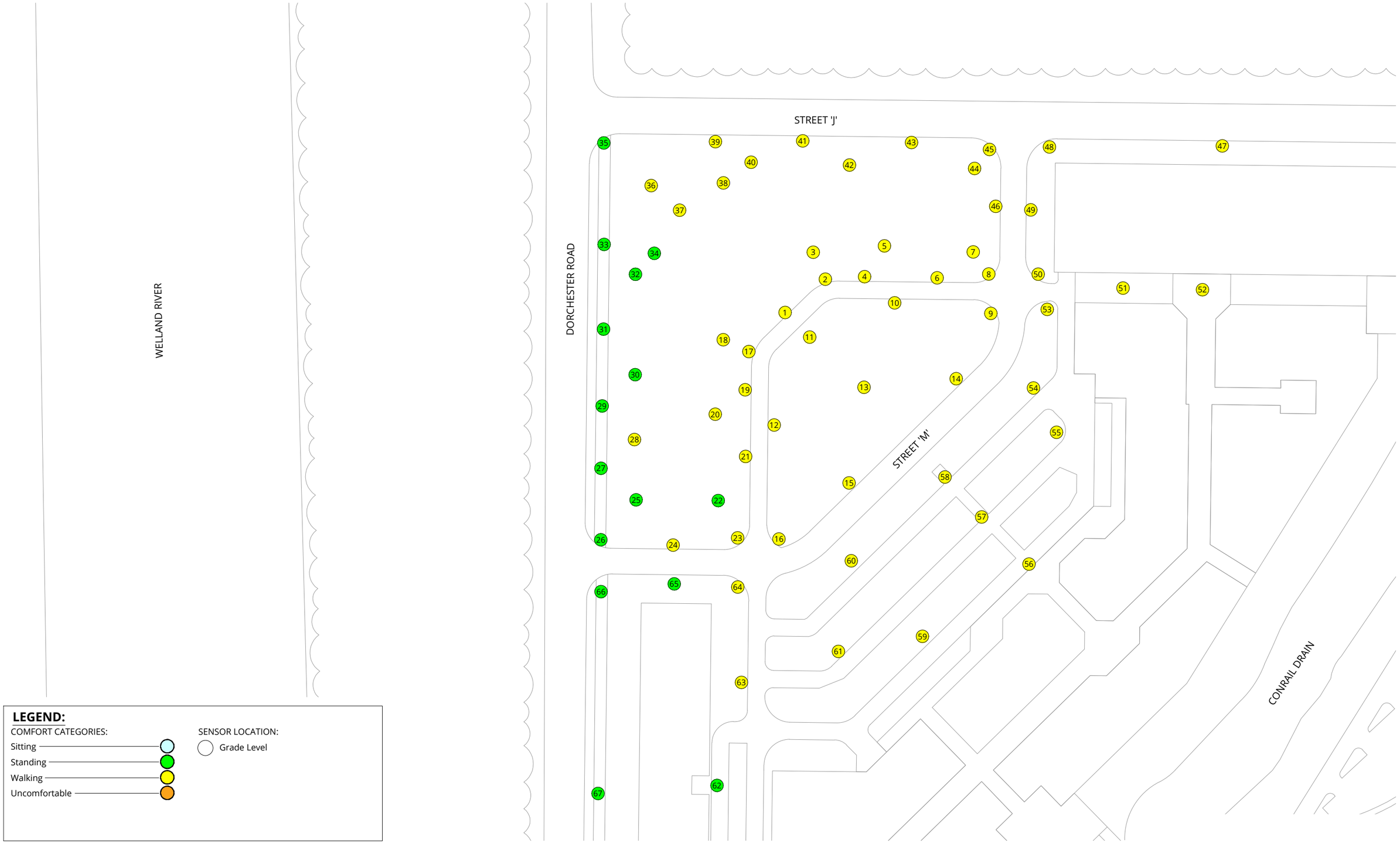
Pedestrian Wind Comfort Conditions
Proposed Configuration
Summer (May to October, 6:00 to 23:00)

Riverfront Community Phase II - Niagara Falls, ON

True North

Project #2206772

Drawn by:	DUC	Figure:	1B
Approx. Scale:		1:1250	
Date Revised:		Jul. 5, 2023	



LEGEND:

COMFORT CATEGORIES:
- Sitting
- Standing
- Walking
- Uncomfortable

SENSOR LOCATION:
- Grade Level

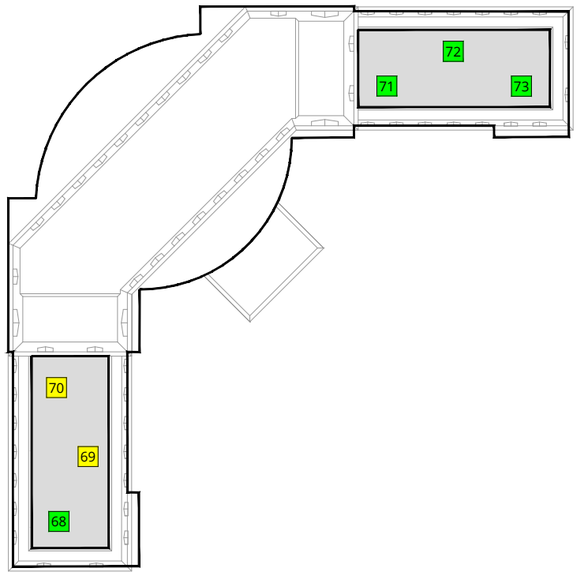
Pedestrian Wind Comfort Conditions
Existing Configuration
Winter (November to April, 6:00 to 23:00)

Riverfront Community Phase II - Niagara Falls, ON

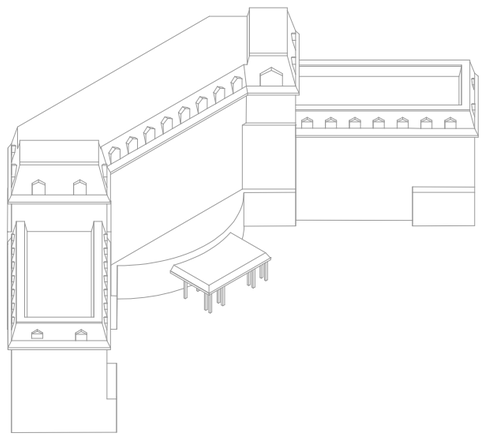
True North

Project #2206772

Drawn by:	DUC	Figure:	2A
Approx. Scale:	1:1250		
Date Revised:	Jul. 5, 2023		



Roof Level Terraces

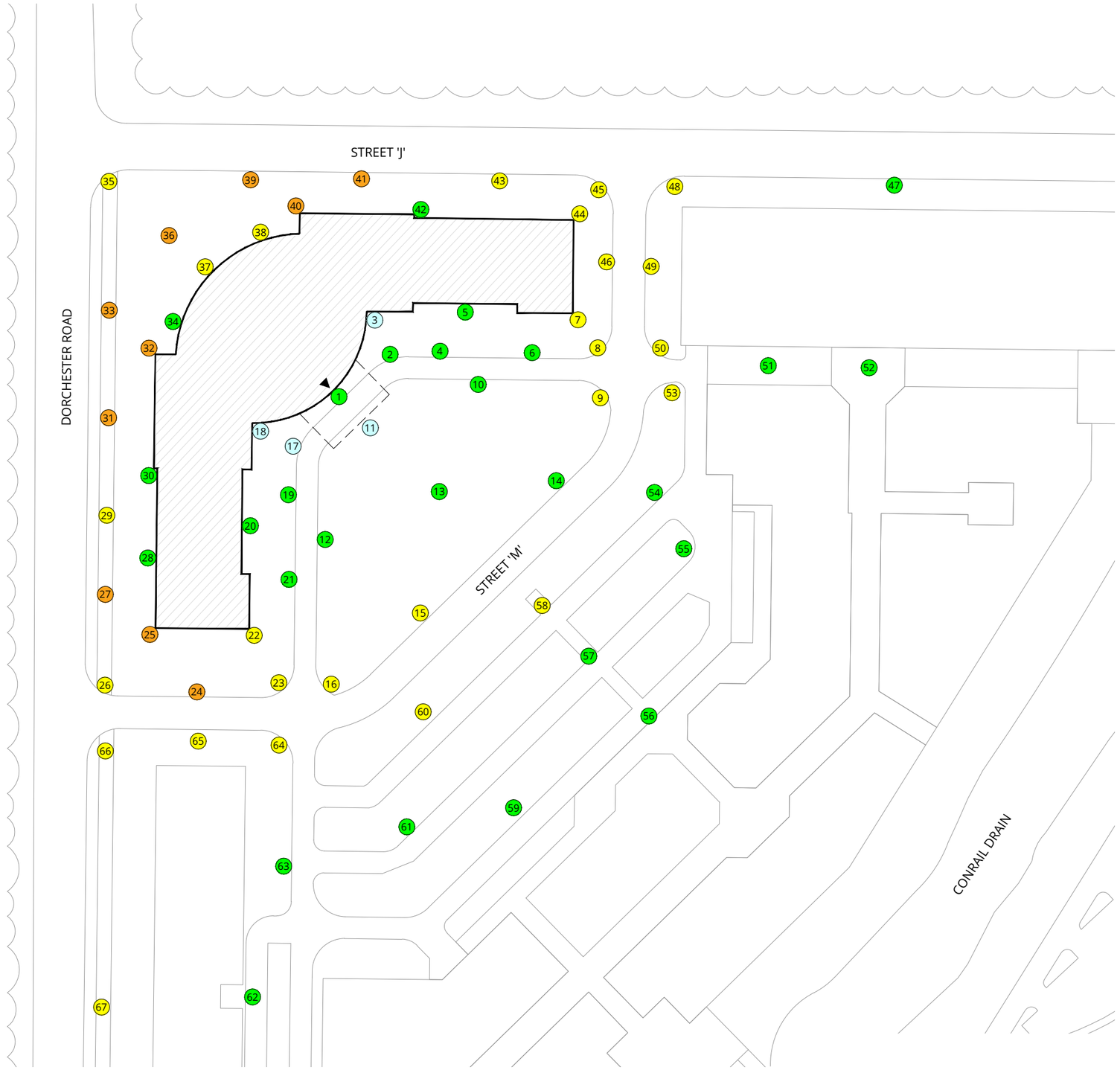


Isometric View of Building

LEGEND:

COMFORT CATEGORIES:
- Sitting
- Standing
- Walking
- Uncomfortable

SENSOR LOCATION:
- Grade Level
- Roof Level Terraces
- Building Above Removed for Clarity
- Main Entrance Location



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

Riverfront Community Phase II - Niagara Falls, ON

True North

Project #2206772

Drawn by:	DUC	Figure:	2B
Approx. Scale:	1:1250		
Date Revised:	Jul. 5, 2023		