REPORT

COLBORNE COURT APARTMENTS

NIAGARA FALLS, ONTARIO

PEDESTRIAN WIND STUDY
RWDI # 2306104
January 24, 2024

SUBMITTED TO

Regent North Properties Inc.
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EXECUTIVE SUMMARY

RWDI was retained to conduct a pedestrian wind assessment for the proposed Colborne Court Apartments in Niagara Falls, 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 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 2B, and Table 1, and are summarized as follows:

- Wind speeds at all areas assessed for both configurations are expected to meet the wind safety criterion.
- Wind speeds at and around the existing project site are moderate during the summer; during the winter wind speeds are slightly elevated due to the seasonal climate, but still appropriate for active pedestrian use.
- With the proposed development in place, higher wind speeds around the site are expected. However, wind conditions remain mostly appropriate for the intended use along the walkways and entrances of the buildings. During the winter, wind speeds near some of the entrances are predicted to be higher than desired. Uncomfortable wind speeds can occur on the driveway south of the 12-storey building in the winter, which is not a concern as frequent presence of pedestrian is not expected at this area.
- Wind-responsive design elements applicable to the entrances are discussed in the body of the report.

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1 INTRODUCTION

RWDI was retained to conduct a pedestrian wind assessment for the proposed Colborne Court Apartments in Niagara Falls, 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 west side of Portage Road between Saint John Street and Colborne Street (Image 1). The development will consist of adding 4 storeys to two existing buildings on the south and west of the site, along with a 12-storey apartment to the north of the site, accompanied by a low-rise parking structure on the northwest.

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 to minimize 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, walkways, and public sidewalks.

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

2 BACKGROUND AND APPROACH

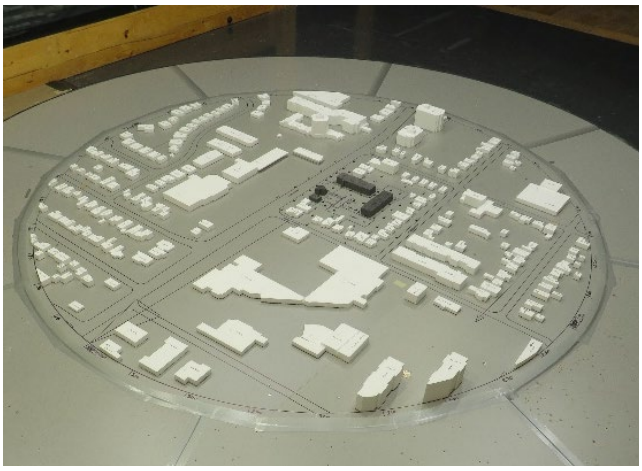
2.1 Wind Tunnel Study Model

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 (Image 2B).

The wind tunnel model included all relevant surrounding buildings and topography within an approximate 360 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 79 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. 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.



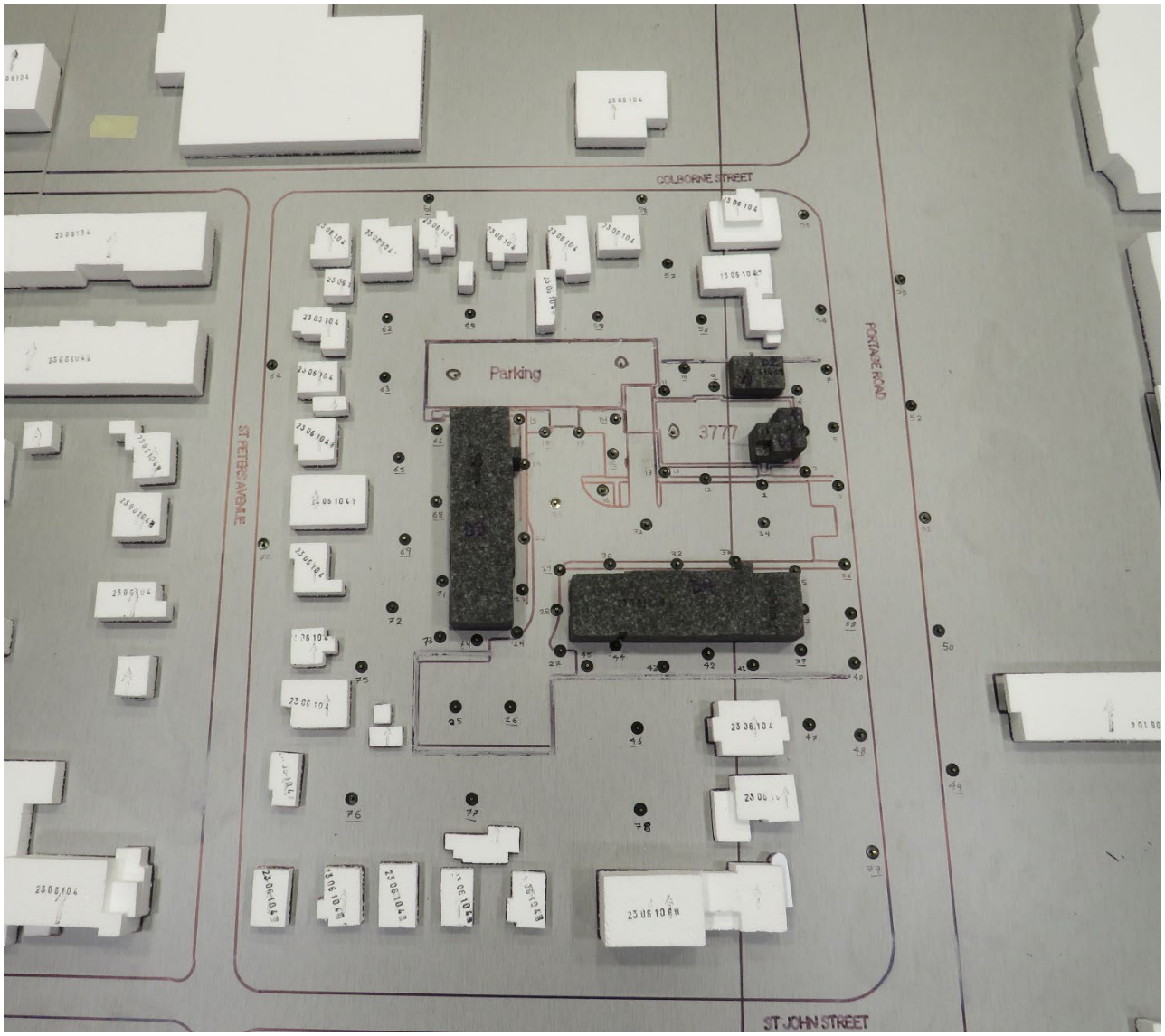


Image 2A: Wind Tunnel Study Model – Existing Configuration

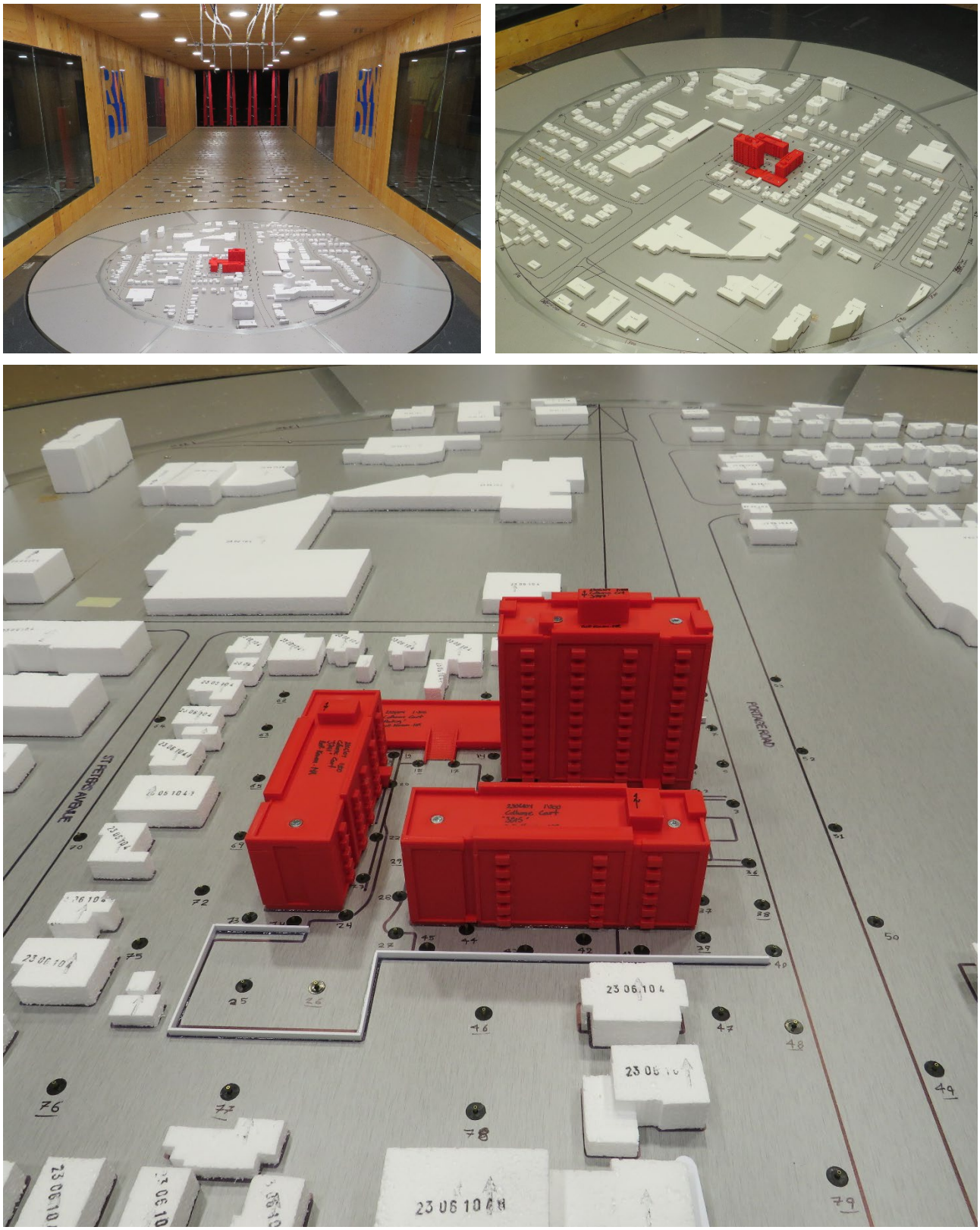
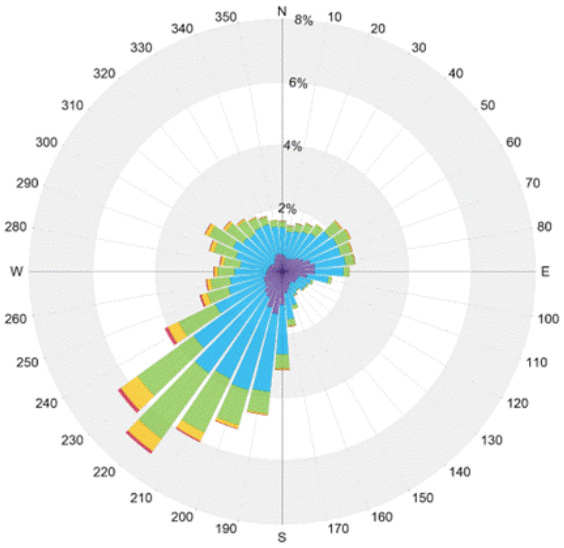


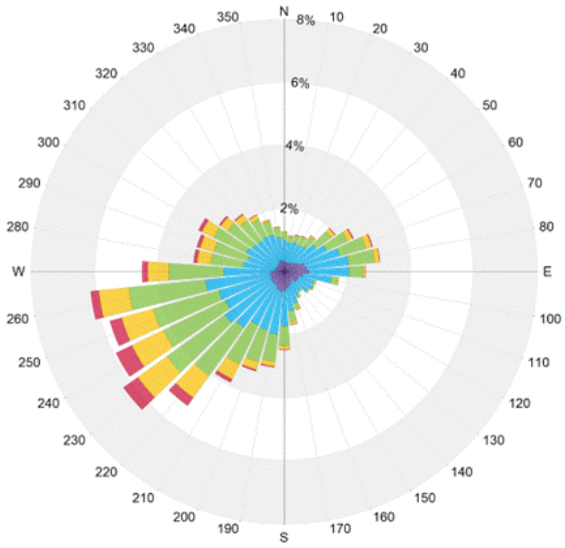
Image 2B: Wind Tunnel Study Model – Proposed Configuration

2.2 Wind Climate Data

Wind statistics recorded at Niagara 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.





Summer (May – October) **Winter (November – April)**

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 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

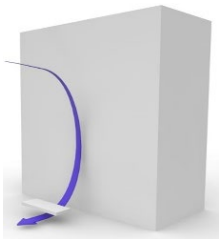
NOTES:
1) Gust Equivalent Mean (GEM) speed = maximum of either mean speed or gust speed/1.85. The gust speed can be measured directly from wind tunnel or estimated as mean speed + (3 x RMS speed).
2) Comfort calculations are to be based on wind events recorded between 6:00 and 23:00 daily.

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

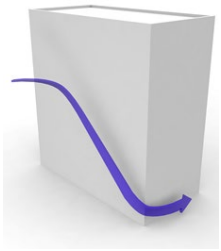
2.4 General Wind Flow Mechanisms

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



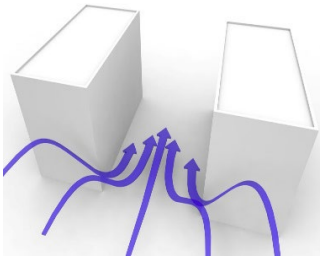
DOWNWASHING

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

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.

Generally, wind conditions that are 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. Wind conditions that are comfortable for sitting are desired for outdoor amenity/seating areas during the summer. 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 for both configurations assessed.

3.1 Existing Configuration

During the summer, wind speeds on the existing project site are mostly comfortable for sitting; slightly higher wind speeds near the existing building corners and the gap between them are expected that are comfortable for standing (Figure 1A). During the winter, when seasonally stronger winds occur, wind speeds are mostly comfortable for standing throughout the site; locally higher wind conditions conductive to walking occur near the northwest corner of the south existing building on-site (Figure 2A). For all building entrances, wind conditions are comfortable for sitting or standing for both seasons (Locations 20, 33, 44 and 71 in Figures 1A and 2A). These wind conditions are suitable for the intended use.

3.2 Proposed Configuration

The proposed project includes buildings that are taller than the surrounding structures and, as a result, are exposed to winds from all directions. These buildings will intercept and redirect the prevailing southwesterly and northeasterly winds, creating channelling flows between the project buildings. Consequently, higher wind activity, relative to the existing conditions, is expected.

Wind conditions that are mostly comfortable for standing during the summer and standing or walking during the winter are expected along the sidewalks and walkways around and on the project site (Figures 1B and 2B). In winter, locally uncomfortable wind conditions can occur between the south and north apartments (Locations 34 in Figure 2B). However, this may not be a concern as this area is part of the vehicular road and is not expected to be frequented by pedestrians.

Entrances of the proposed buildings are situated near Locations 1, 11, 13, 20, 33, 44, and 71 in Figures 1B and 2B. wind conditions mostly comfortable for sitting or standing are expected near all these entrance locations throughout the year. Higher wind speeds comfortable for walking are expected near entrances of north and south apartments (Locations 1 and 33 in Figure 2B). These conditions are higher that desired for intended use of main entrances. Improved wind conditions are achievable by recessing these entrances into the building facades to create pockets of low wind zones that protect the door hardware and patrons from redirected winds, similar to the doors at Locations 44 and 71. Alternatively, local wind screens or planters may be considered on both sides of the entrances for wind control. Some examples are illustrated in Image 5.

Based on the site plans, there are designated seating areas around the buildings near Locations 2 Through 10, 14 through 17, 35 through 45, and 66 through 73. Wind conditions comfortable for sitting or standing are expected at these areas during the summer (Figure 1B), which might be considered suitable, assuming the added benefit of landscaping that was not included in the wind-tunnel testing. Higher wind speeds that are comfortable for standing or walking during the winter are also appropriate as these areas would not be used frequently during the colder months of the year.

Image 5: Examples of Wind Mitigation Strategies Near Entrances

4 STATEMENT OF LIMITATIONS

Limitations

This report was prepared by Rowan Williams Davies & Irwin, Inc. ("RWDI") for Regent North Properties 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 Peter J. Lesdow Architect and used to construct the scale model of the proposed Colborne Court Apartment **("Project Data**")

File Name	File Type	Date Received (dd/mm/yyyy)
Colborne Court - Site & Buildings	DWG	18/12/2023
Colborne Court model	DWG	13/06/2023

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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FIGURES

COLBORNE STREET

ST PETER AVENUE

PORTAGE ROAD

EXISTING 2.5 STOREY

EXISTING 2.5 STOREY

LEGEND:

COMFORT CATEGORIES:

- Sitting
- Standing
- Walking
- Uncomfortable

- Grade Level Sensor
- Building Above Removed for Clarity
- Main Entrance Location

0 10 30m

Pedestrian Wind Comfort Conditions

Existing Configuration

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

Colborne Court Apartments - Niagara Falls, ON

True North

Project #2306104

Drawn by:	DG	Figure:	1A
Approx. Scale:	1:800		
Date Revised:	Jan. 23, 2024		

Isometric View of Buildings

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

Colborne Court Apartments - Niagara Falls, ON

True North

Project #2306104

Drawn by:	DG	Figure:	1B
Approx. Scale:	1:800		
Date Revised:	Jan. 23, 2024		

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

Colborne Court Apartments - Niagara Falls, ON

True North

Project #2306104

Drawn by:	DG	Figure:	2A
Approx. Scale:	1:800		
Date Revised:	Jan. 23, 2024		

COLBORNE STREET

ST PETER AVENUE

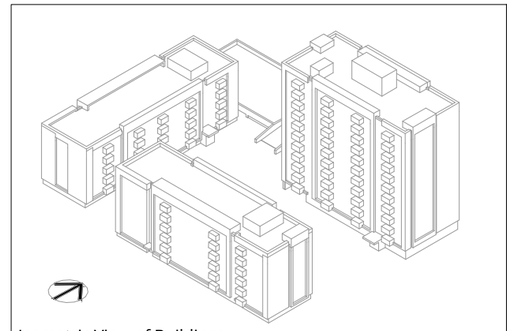
PORTAGE ROAD

PROPOSED PARKING

PROPOSED 12 STOREY APARTMENT

EXISTING 2.5 STOREY PROPOSED 3 STOREY ADDITION

EXISTING 2.5 STOREY PROPOSED 4 STOREY ADDITION



Isometric View of Buildings

LEGEND:

COMFORT CATEGORIES:

- Sitting
- Standing
- Walking
- Uncomfortable

- Grade Level Sensor
- Building Above Removed for Clarity
- Main Entrance Location

0 10 30m

Pedestrian Wind Comfort Conditions

Proposed Configuration

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

Colborne Court Apartments - Niagara Falls, ON

True North

Project #2306104

Drawn by:	DG	Figure:	2B
Approx. Scale:	1:800		
Date Revised:	Jan. 23, 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	11	Standing	15	Standing	56	Pass
	Proposed	14	Standing	17	Walking	75	Pass
2	Existing	12	Standing	15	Standing	62	Pass
	Proposed	15	Standing	18	Walking	71	Pass
3	Existing	11	Standing	14	Standing	61	Pass
	Proposed	15	Standing	18	Walking	75	Pass
4	Existing	8	Sitting	9	Sitting	40	Pass
	Proposed	8	Sitting	9	Sitting	37	Pass
5	Existing	9	Sitting	11	Standing	41	Pass
	Proposed	12	Standing	13	Standing	55	Pass
6	Existing	9	Sitting	11	Standing	40	Pass
	Proposed	12	Standing	15	Standing	62	Pass
7	Existing	9	Sitting	11	Standing	39	Pass
	Proposed	13	Standing	15	Standing	58	Pass
8	Existing	-	-	-	-	-	-
	Proposed	11	Standing	14	Standing	52	Pass
9	Existing	10	Sitting	12	Standing	58	Pass
	Proposed	9	Sitting	11	Standing	43	Pass
10	Existing	10	Sitting	12	Standing	48	Pass
	Proposed	9	Sitting	11	Standing	42	Pass
11	Existing	10	Sitting	12	Standing	50	Pass
	Proposed	10	Sitting	12	Standing	48	Pass
12	Existing	10	Sitting	13	Standing	52	Pass
	Proposed	11	Standing	13	Standing	56	Pass
13	Existing	10	Sitting	12	Standing	53	Pass
	Proposed	10	Sitting	12	Standing	49	Pass
14	Existing	10	Sitting	12	Standing	47	Pass
	Proposed	8	Sitting	11	Standing	44	Pass
15	Existing	10	Sitting	12	Standing	50	Pass
	Proposed	11	Standing	14	Standing	53	Pass
16	Existing	10	Sitting	12	Standing	54	Pass
	Proposed	14	Standing	18	Walking	62	Pass
17	Existing	10	Sitting	12	Standing	48	Pass
	Proposed	14	Standing	17	Walking	77	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	10	Sitting	11	Standing	46	Pass
	Proposed	13	Standing	15	Standing	59	Pass
19	Existing	9	Sitting	10	Sitting	46	Pass
	Proposed	11	Standing	13	Standing	52	Pass
20	Existing	9	Sitting	10	Sitting	39	Pass
	Proposed	10	Sitting	12	Standing	46	Pass
21	Existing	11	Standing	13	Standing	59	Pass
	Proposed	14	Standing	17	Walking	69	Pass
22	Existing	10	Sitting	13	Standing	55	Pass
	Proposed	10	Sitting	12	Standing	49	Pass
23	Existing	10	Sitting	12	Standing	45	Pass
	Proposed	11	Standing	13	Standing	48	Pass
24	Existing	13	Standing	15	Standing	57	Pass
	Proposed	13	Standing	16	Walking	59	Pass
25	Existing	10	Sitting	12	Standing	44	Pass
	Proposed	9	Sitting	11	Standing	46	Pass
26	Existing	10	Sitting	13	Standing	47	Pass
	Proposed	9	Sitting	12	Standing	47	Pass
27	Existing	10	Sitting	12	Standing	47	Pass
	Proposed	11	Standing	12	Standing	48	Pass
28	Existing	12	Standing	14	Standing	52	Pass
	Proposed	13	Standing	16	Walking	59	Pass
29	Existing	13	Standing	16	Walking	59	Pass
	Proposed	15	Standing	18	Walking	68	Pass
30	Existing	8	Sitting	10	Sitting	42	Pass
	Proposed	12	Standing	14	Standing	49	Pass
31	Existing	9	Sitting	12	Standing	54	Pass
	Proposed	15	Standing	19	Walking	64	Pass
32	Existing	10	Sitting	13	Standing	58	Pass
	Proposed	12	Standing	14	Standing	51	Pass
33	Existing	10	Sitting	14	Standing	58	Pass
	Proposed	14	Standing	17	Walking	64	Pass
34	Existing	11	Standing	15	Standing	59	Pass
	Proposed	17	Walking	21	Uncomfortable	73	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	10	Sitting	13	Standing	48	Pass
	Proposed	13	Standing	16	Walking	63	Pass
36	Existing	11	Standing	14	Standing	55	Pass
	Proposed	15	Standing	18	Walking	76	Pass
37	Existing	7	Sitting	8	Sitting	35	Pass
	Proposed	9	Sitting	10	Sitting	43	Pass
38	Existing	11	Standing	12	Standing	46	Pass
	Proposed	10	Sitting	11	Standing	48	Pass
39	Existing	11	Standing	14	Standing	51	Pass
	Proposed	13	Standing	16	Walking	62	Pass
40	Existing	11	Standing	13	Standing	47	Pass
	Proposed	12	Standing	14	Standing	57	Pass
41	Existing	11	Standing	14	Standing	51	Pass
	Proposed	13	Standing	16	Walking	61	Pass
42	Existing	11	Standing	13	Standing	53	Pass
	Proposed	10	Sitting	13	Standing	56	Pass
43	Existing	11	Standing	13	Standing	49	Pass
	Proposed	10	Sitting	12	Standing	51	Pass
44	Existing	9	Sitting	11	Standing	47	Pass
	Proposed	7	Sitting	9	Sitting	37	Pass
45	Existing	9	Sitting	12	Standing	47	Pass
	Proposed	11	Standing	13	Standing	49	Pass
46	Existing	10	Sitting	13	Standing	47	Pass
	Proposed	9	Sitting	11	Standing	42	Pass
47	Existing	7	Sitting	9	Sitting	32	Pass
	Proposed	8	Sitting	9	Sitting	35	Pass
48	Existing	9	Sitting	10	Sitting	39	Pass
	Proposed	10	Sitting	11	Standing	41	Pass
49	Existing	10	Sitting	12	Standing	45	Pass
	Proposed	10	Sitting	12	Standing	44	Pass
50	Existing	11	Standing	13	Standing	46	Pass
	Proposed	12	Standing	13	Standing	53	Pass
51	Existing	12	Standing	15	Standing	58	Pass
	Proposed	16	Walking	19	Walking	82	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	11	Standing	13	Standing	48	Pass
	Proposed	15	Standing	17	Walking	69	Pass
53	Existing	11	Standing	14	Standing	50	Pass
	Proposed	11	Standing	12	Standing	45	Pass
54	Existing	10	Sitting	11	Standing	42	Pass
	Proposed	10	Sitting	11	Standing	45	Pass
55	Existing	11	Standing	12	Standing	45	Pass
	Proposed	9	Sitting	11	Standing	39	Pass
56	Existing	9	Sitting	11	Standing	44	Pass
	Proposed	12	Standing	14	Standing	64	Pass
57	Existing	10	Sitting	12	Standing	47	Pass
	Proposed	12	Standing	14	Standing	70	Pass
58	Existing	9	Sitting	11	Standing	42	Pass
	Proposed	9	Sitting	12	Standing	42	Pass
59	Existing	8	Sitting	10	Sitting	41	Pass
	Proposed	10	Sitting	12	Standing	48	Pass
60	Existing	9	Sitting	11	Standing	46	Pass
	Proposed	9	Sitting	11	Standing	43	Pass
61	Existing	10	Sitting	13	Standing	45	Pass
	Proposed	10	Sitting	13	Standing	45	Pass
62	Existing	7	Sitting	9	Sitting	32	Pass
	Proposed	9	Sitting	11	Standing	45	Pass
63	Existing	9	Sitting	11	Standing	44	Pass
	Proposed	11	Standing	14	Standing	57	Pass
64	Existing	9	Sitting	10	Sitting	43	Pass
	Proposed	10	Sitting	11	Standing	45	Pass
65	Existing	10	Sitting	12	Standing	46	Pass
	Proposed	13	Standing	17	Walking	69	Pass
66	Existing	12	Standing	15	Standing	59	Pass
	Proposed	9	Sitting	12	Standing	44	Pass
67	Existing	7	Sitting	8	Sitting	33	Pass
	Proposed	8	Sitting	12	Standing	48	Pass
68	Existing	11	Standing	14	Standing	54	Pass
	Proposed	10	Sitting	13	Standing	53	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	10	Sitting	12	Standing	43	Pass
	Proposed	12	Standing	16	Walking	64	Pass
70	Existing	9	Sitting	11	Standing	44	Pass
	Proposed	10	Sitting	11	Standing	43	Pass
71	Existing	10	Sitting	12	Standing	47	Pass
	Proposed	9	Sitting	11	Standing	45	Pass
72	Existing	10	Sitting	12	Standing	44	Pass
	Proposed	11	Standing	14	Standing	58	Pass
73	Existing	11	Standing	14	Standing	51	Pass
	Proposed	11	Standing	14	Standing	52	Pass
74	Existing	9	Sitting	11	Standing	46	Pass
	Proposed	10	Sitting	13	Standing	56	Pass
75	Existing	8	Sitting	10	Sitting	39	Pass
	Proposed	8	Sitting	10	Sitting	38	Pass
76	Existing	10	Sitting	11	Standing	45	Pass
	Proposed	9	Sitting	11	Standing	44	Pass
77	Existing	9	Sitting	12	Standing	45	Pass
	Proposed	8	Sitting	12	Standing	45	Pass
78	Existing	10	Sitting	13	Standing	56	Pass
	Proposed	11	Standing	14	Standing	54	Pass
79	Existing	9	Sitting	11	Standing	40	Pass
	Proposed	9	Sitting	11	Standing	39	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