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October 1, 2024

590 Argus LP
c/o Clarence Zichen Qian
Distrikt
90 Wingold Avenue, Unit 1
Toronto, Ontario M6B 1P5
czqian@distrikt.com

Re: Pedestrian Wind Study Results for Oakville TOC
590 Argus Road
RWDI Reference No. 2302744

Dear Clarence,

We have prepared this letter to comment on potential changes to wind conditions that may result from recent design updates to the proposed development at 590 Argus Road in Oakville, Ontario. These comments are based on the wind tunnel assessment conducted earlier by RWDI (*Report – Pedestrian Wind Study – 590 Argus Road, Oakville, Ontario – RWDI #2302744 – November 28th, 2023, by Kamran Shirzadeh, Timothy Wiechers, Hanqing Wu, and Scott Bell*).

Summary of The Latest Report

The existing site is exposed to winds from all directions, and wind speeds can be locally uncomfortable during the winter. With the proposed buildings in place, wind speeds were expected to be appropriate for pedestrian use at most locations during the summer. However, during the winter, uncomfortable conditions were predicted at multiple locations around the site. Wind speeds near most main entrances were measured to be suitable throughout the year, except near one entrances to the Tower C during the winter. Wind conditions at the courtyards and daycare playground were measured to be appropriate during the summer considering the added benefit of landscaping and privacy screens. Wind speeds on the podium rooftop were mostly predicted to be too high for passive use. Wind gusts were predicted to exceed wind safety criterion at multiple locations at grade and podium rooftop. Conceptual wind control strategies applicable to each area of interest were discussed in the body of the report. Further wind tunnel testing was recommended to evaluate the performance of the wind mitigation elements.

Updated Tower Designs

Based on updated drawings received on September 13th, 2024, the overall massing of the proposed buildings is similar to the designs used for the November 2023 wind study. The drawings used for the wind study are shown in Images 1a, 2a and 3a, and the site plan, elevation and arial views of the updated design are shown in Images 1b, 2b and 3b. We have identified slight changes to the tower heights as the result of changes to the number of levels and ceiling heights of the towers listed in the table below:

Tower	Original Design *(2023-09-26)*	Updated Design *(2024-09-13)*
A	45 storeys / ***159 meters	47 storeys / ***169 meters
B	50 storeys / ***174 meters	50 storeys / ***178 meters
C	57 storeys / ***195 meters	55 storeys / ***194 meters
*Approximate height including the penthouse		

From a wind impact perspective, these height changes are not expected to significantly alter the wind conditions predicted in the aforementioned wind study. The layout of the main entrance at grade is generally comparable to the original design, and wind conditions are expected to remain suitable. The podium rooftop is expected to continue being windier than desired.

Some positive changes in the design to note are (Images 1b and 3b):

- podium and tower setbacks at the northeast corner of the project site,
- chamfering the northeast corner of the Tower C that is exposed to the prevailing easterly winds, and
- more podium space on the north side of the project.

These changes are expected to improve the wind conditions along the north side of the project site. However, the local wind control strategies that was mentioned in the latest report are still applicable to the updated design.

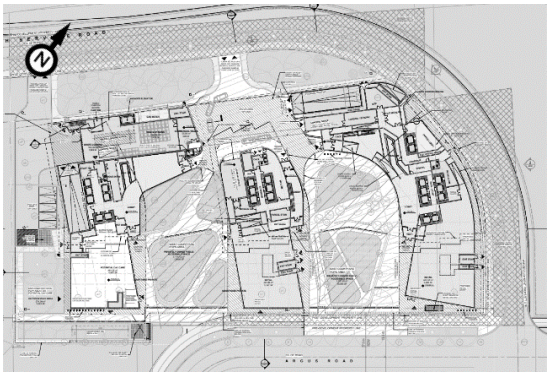

Image 1a: Original Ground Floor Plan, Courtesy of Distrikt

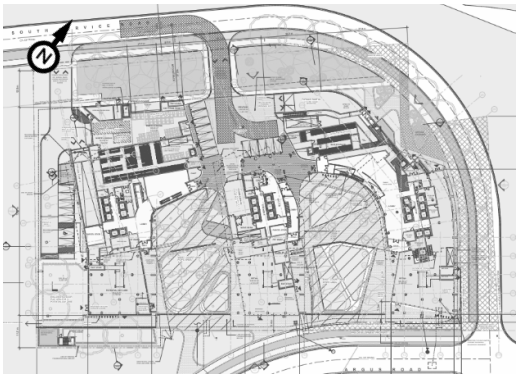

Image 1b: Updated Ground Floor Plan, Courtesy of Distrikt

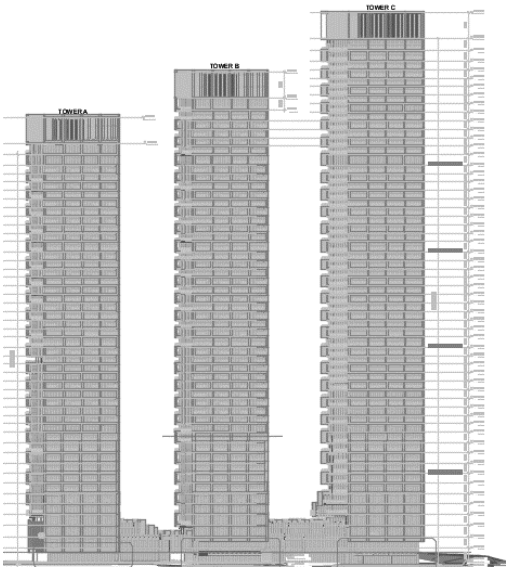

Image 2a: Original South Elevation View, Courtesy of Distrikt

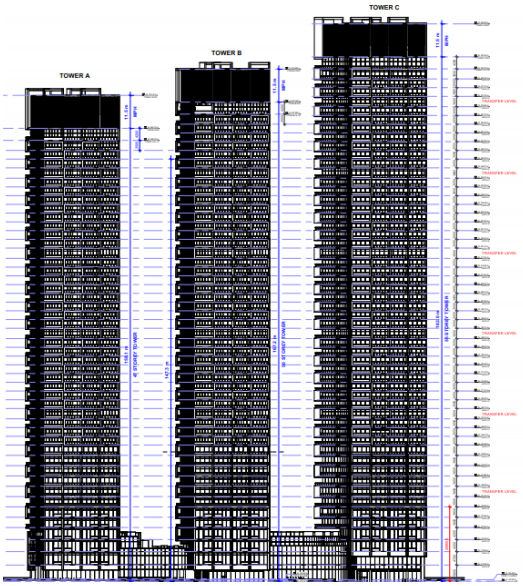

Image 2b: Updated South Elevation View, Courtesy of Distrikt

Image 3a: Original Northeast View of the Project, Courtesy of Distrikt

Image 3b: Updated Northeast View of the Project, Courtesy of Distrikt

Concluding Remarks

The aforementioned updates to the project drawings are not expected to significantly alter wind conditions on and around the proposed development site; however, we are expected to see reduction in wind speeds to the north of the project site at grade compared to the November 2023 wind study.

It is our understanding that additional wind-tunnel tests will be conducted at later design stages to quantify the wind conditions and to refine wind control strategies. In the interest of time, we trust this memo satisfies the current requirements for the city submission. Should you have any questions or require additional information, please do not hesitate to contact us.

Yours truly,

RWDI

Scott Bell, GSC
Project Manager

Kamran Shirzadeh, M.E.Sc.,
Technical Coordinator

Statement of Limitations

This letter was prepared by Rowan Williams Davies & Irwin Inc. ("RWDI") for 590 Argus LP ("Client"). The findings and conclusions presented in this letter have been prepared for the Client and are specific to the project described herein ("Project"). The conclusions and recommendations contained in this letter are based on the information available to RWDI when this letter was prepared. Because the contents of this letter may not reflect the final design of the Project or subsequent changes made after the date of this letter, RWDI recommends that it be retained by Client during the final stages of the project to verify that the results and recommendations provided in the previous report and this letter have been correctly interpreted in the final design of the Project.

The conclusions and recommendations contained in the previous report and this letter have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the report/letter 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 letter carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.

REPORT

590 ARGUS ROAD

OAKVILLE, ONTARIO

PEDESTRIAN WIND STUDY
RWDI # 2302744
November 28, 2023

SUBMITTED TO

590 Argus LP

CC TO

Clarence Zichen Qian
czqian@distrikt.com
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90 Wingold Avenue, Unit 1
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SUBMITTED BY

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EXECUTIVE SUMMARY

RWDI was retained to conduct a pedestrian wind assessment for the proposed 590 Argus Road that includes Buildings A, B and C in Oakville, Ontario. (Image 1). 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 (Image 2). The results were analysed using the regional wind climate records (Image 3) 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 criteria description is appended to this report to assist with interpretation of the results. The predicted wind conditions are presented in Figures 1A through 3B, and Table 1, and are summarized as follows:

- The existing site is exposed to winds from all directions and wind speeds can be locally uncomfortable during the winter.
- The proposed buildings are substantially taller than their surroundings and, therefore, will redirect wind to the ground level. However, the proposed stepped podium and orientation of the towers will help moderate wind impacts to some extent.
- Wind conditions near all main entrances are expected to be suitable throughout the year.
- Wind speeds at the courtyards and the daycare playground may considered suitable for passive use during the summer (with added protection provided by the deciduous trees, which was not included in the testing), but they are expected to be too windy during the winter.
- Wind conditions at nearby walkway are expected to be suitable for intended use during the summer, except at one location at the southwest corner of Building A. Uncomfortable wind conditions are predicted at multiple locations around the site during the winter.
- Wind conditions under the building overhangs and trellises at Level 4 amenity areas are expected to be generally suitable during the summer. Wind speeds on Level 3 amenity area are expected to be higher than desired for passive use or even uncomfortable at some localized areas near Buildings A and C.
- The wind safety criterion is expected to be exceeded near exposed corners of the project at grade. Wind gusts also may exceed the safety threshold at Level 3 near the buildings' bases as well as at Level 4 near Building A.
- Several wind mitigation elements have been incorporated into the building design, informed by the CFD studies conducted earlier by RWDI. The design team continues to actively collaborate with RWDI to pursue a more wind-responsive design. The effectiveness of these design refinements will be evaluated through additional wind tunnel testing at a later stage.

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1 INTRODUCTION

RWDI was retained to conduct a pedestrian wind assessment for the proposed 590 Argus Road project in Oakville, ON. This report presents the project objectives, approach, 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 project site is located on Argus Road which is situated south of Queen Elizabeth Way and west of Trafalgar Road (Image 1). The site is approximately 2 km north from the shore of Lake Ontario and is surrounded by low-rise suburban neighbourhoods in all directions. The proposed development will consist of Buildings A, B and C that are 45, 50 and 57 storeys tall (or approximately 143, 162 and 183 m), respectively. The towers are connected with a low podium that includes stepped massing with accessible podium rooftops and retail spaces at grade.

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. In addition to sidewalks and properties near the project site, the assessment focused on other critical pedestrian areas, including main entrances to the buildings, two courtyards, an outdoor playground for daycare, and podium rooftops on Levels 3 and 4.

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 1:400 scale model of the project site and surroundings was constructed for the wind tunnel tests of the following configurations:

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

B - Proposed: Proposed project with existing surroundings and proposed coniferous landscaping (Image 2B).

The wind tunnel model included all relevant surrounding buildings and topography within an approximate 480 m radius around the study site. The wind and turbulence profiles in the atmospheric boundary layer beyond the modelled area were also simulated in RWDI's wind tunnel. The wind tunnel model was instrumented with 132 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.

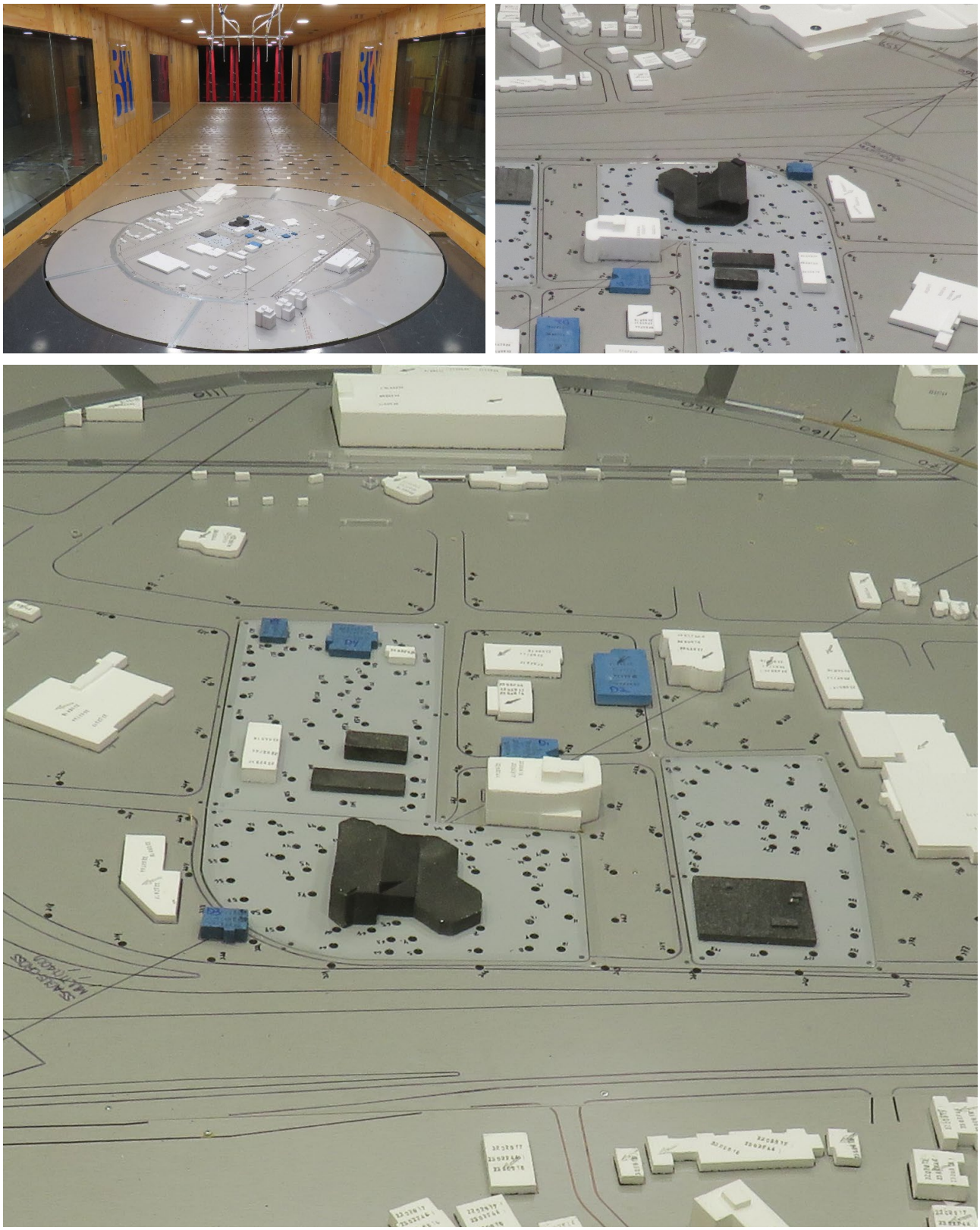
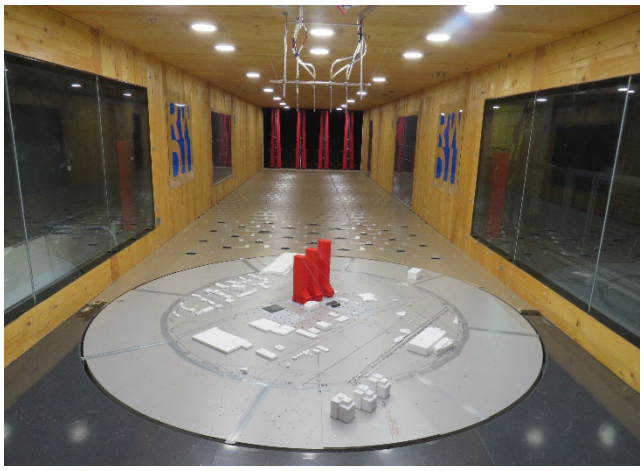
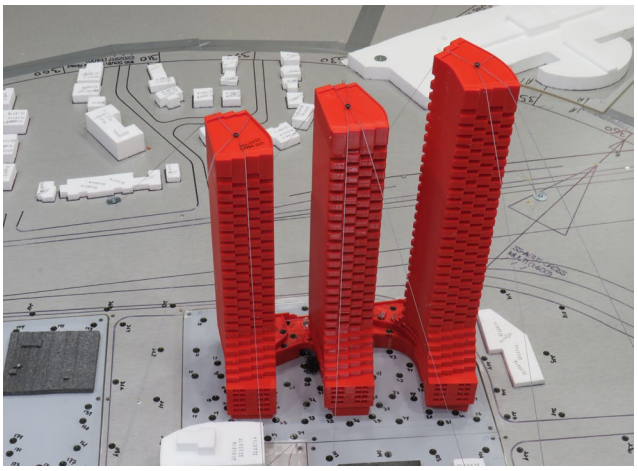


Image 2A: Wind Tunnel Study Model – Existing Configuration





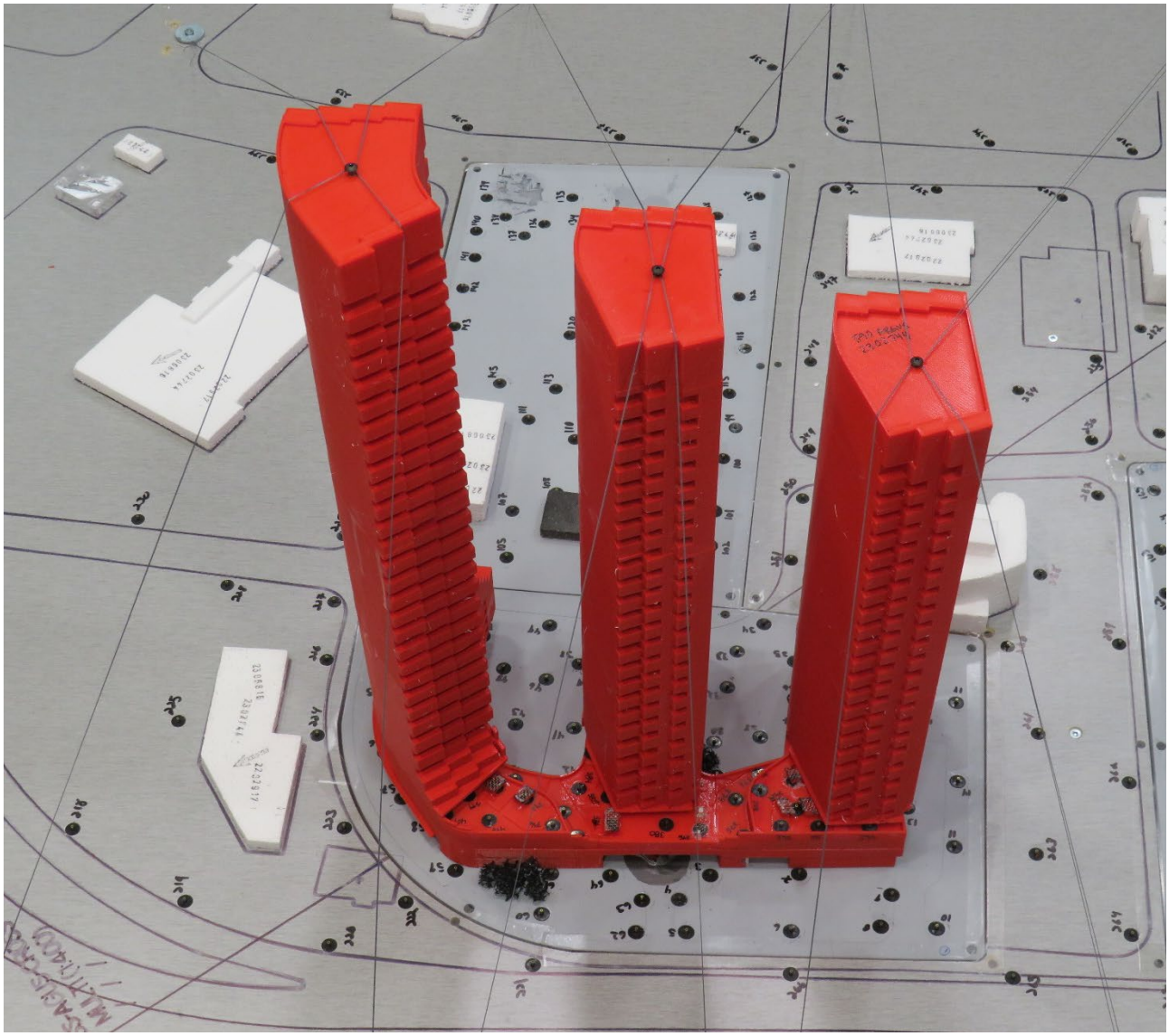
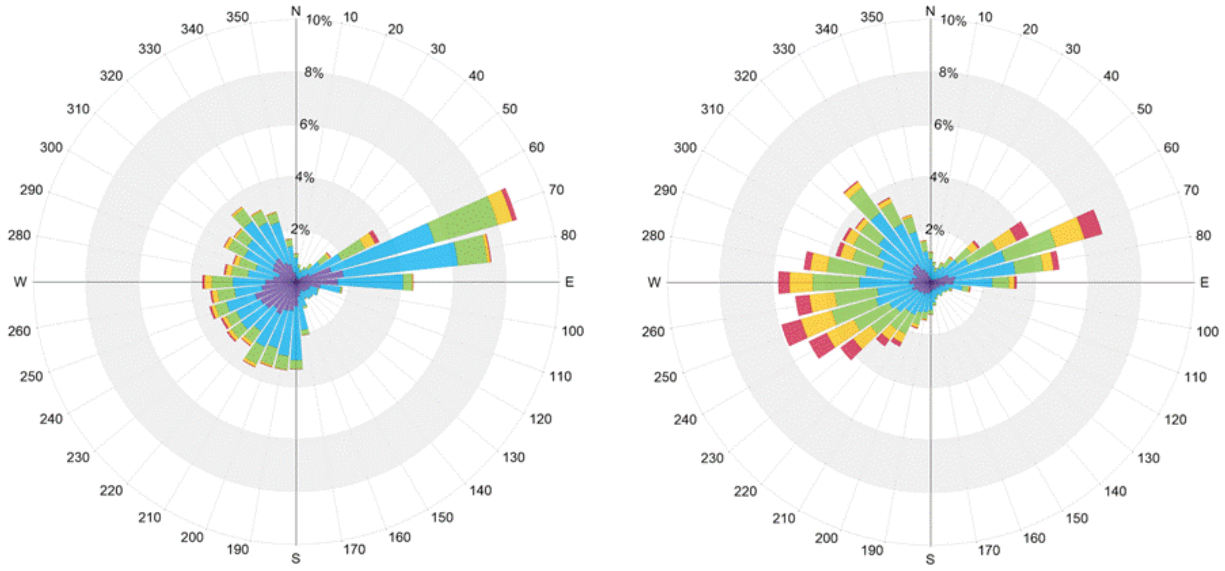


Image 2B: Wind Tunnel Study Model – Proposed Configuration

2.2 Wind Climate Data

Wind statistics recorded at Toronto Island 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 westerly quadrants are predominant throughout the year; in addition, strong east-northeast winds are frequent 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 4.3% and 17.2% 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.



Wind Speed (km/h)	Probability (%) Summer	Winter
Calm	5.6	2.6
1-10	30.4	17.1
11-20	43.3	37.8
21-30	16.3	25.3
31-40	3.4	11.4
>40	0.9	5.8

Image 3: Directional Distribution of Winds Approaching Toronto Island 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

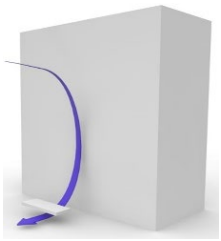
Notes:
(1) GEM Speed = max (Mean Speed, Gust Speed/1.85) and Gust Speed = Mean Speed + 3*RMS Speed;
(2) Wind conditions are considered to be comfortable if the predicted GEM speeds are within the respective thresholds for at least 80% of the time between 6:00 and 23:00. Nightly hours between 0:00 and 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 Oakville, 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.

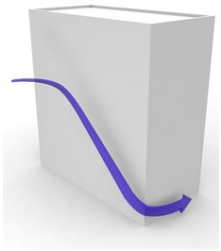
2.4 General Wind Flow Mechanisms

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



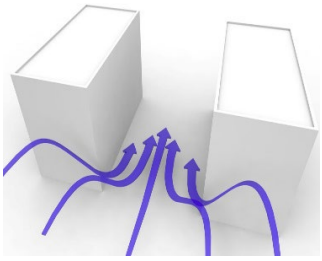
DOWNWASHING

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



CORNER ACCELERATION

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



CHANNELLING EFFECT

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

Image 4: General Wind Flow Mechanisms

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

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

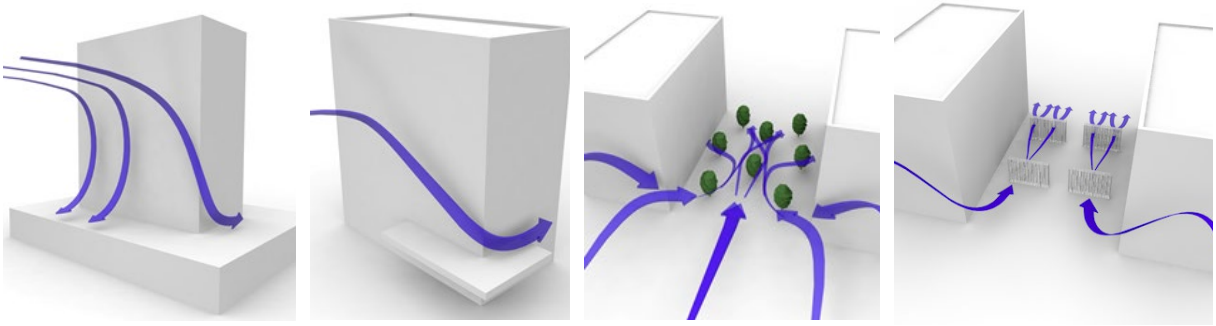


Image 5: Common Wind Control Measures

3 RESULTS AND DISCUSSION

The predicted wind conditions are shown on site plans in Figures 1A through 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. In general, wind speeds suitable for sitting or standing are considered desirable for building entrances where pedestrians are apt to linger. These low wind speeds are also preferred in areas such as courtyards and outdoor amenity spaces where passive patron activities are anticipated during the summer. For sidewalks and walkways, where pedestrians are active and less likely to remain in one place for prolonged periods of time, higher wind speeds comfortable for strolling or walking are appropriate. 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

Wind conditions on and around the existing site are mostly comfortable for standing during the summer and strolling during the winter due to seasonal variations in wind speeds (Figures 1A and 2A). Higher wind speeds are anticipated at the south of the site, near the west corner of Argus Road, due to winds channeling and accelerating between existing buildings. As a result, wind speeds comfortable for strolling or walking during the summer are expected, but uncomfortable conditions may occur during the winter (Locations 24 and 34 in Image 2A).

Wind speeds at all the assessed areas meet the pedestrian wind safety criterion (Figure 3A).

3.2 Proposed Configuration

The proposed project includes towers that are substantially taller than the surroundings in all directions. Thus, the tall massing will intercept the strong prevailing west and east-northeast winds at higher elevations and redirect them to the ground level, resulting in higher wind activity locally around the building (refer to Image 4).

3.2.1 Grade Level (Locations 1 through 103)

Wind speeds at grade level are anticipated to be mostly comfortable for standing and strolling during the summer, with lower speeds suitable for sitting in sheltered areas near the building perimeter (Figure 1B). These speeds are suitable for the intended use. However, locally higher wind speeds, categorized as uncomfortable, are expected near the southwest corner of Building A induced by redirected westerly winds. With higher seasonal wind speeds during the winter, uncomfortable wind conditions are predicted at various locations around the site (Figure 2B). The uncomfortable conditions towards the north of the site along the highway may not pose a concern, as this area is not expected to be frequented by pedestrians. Slightly calmer wind speeds are expected in more sheltered regions such as courtyards between the three buildings.

Entrances of the proposed project are situated near Locations 1, 16, 27, 40, 47, 58, 67, and 69 in Figures 1B, 2B and 3B. These entrances have been strategically positioned and are recessed. Favorable wind conditions suitable for sitting or standing are anticipated near most entrances throughout the year, which is considered appropriate for an entrance. However, slightly higher than desired wind speeds that are comfortable for strolling are anticipated at the entrance near Location 47 during the winter.

Wind conditions in two courtyards between the buildings are expected to be mostly comfortable for standing or strolling during the summer. Elevated wind speeds are expected at these areas during the winter that are predicted to be comfortable for walking or even uncomfortable. The courtyards are already designed with dense deciduous landscaping that are expected to improve the conditions to suitable levels for passive use during the summer, when these areas are expected to be used most frequently.

The daycare playground is situated near the southwest corner of the project. During the summer, wind conditions are anticipated to range from being comfortable for sitting to strolling (Locations 17, 19, and 20 in Inage 1B). However, in the winter, these conditions are expected to be windier, with conditions comfortable for strolling/walking or categorized as uncomfortable. RWDI understands that this area is planned to be equipped with tall privacy screens around the perimeter, therefore, these wind conditions might be deemed suitable for the intended use during the summer with the screens in place.

The wind safety criterion is expected to be met at most of the areas assessed around the site except near six locations (Locations 9, 22, 24, 56, 59, 73 in Figure 3B).

3.2.2 Levels 3 and 4 Amenity Areas (Locations 104 through 132)

The proposed amenity areas at Level 3 and 4 are exposed to stronger winds at higher elevations. In addition, these areas will also be subjected to building induced flows like downwashing and channelling. As part of the building design these areas are planned to include trellises that can locally protect patrons from vertical component of the redirected winds.

Wind speeds on Level 3 are expected to be primarily comfortable for strolling, with locally higher speeds near the bases of Buildings A and C that are potentially uncomfortable during the summer (Figure 1B). These wind speeds are higher than desired for passive use. During the winter, wind speeds on the Level 3 outdoor amenity are expected to be categorized as uncomfortable at most locations assessed (Figure 2B).

Wind speeds on Level 4 of Buildings A and C are expected to be generally comfortable for standing with the added benefit of overhead trellis features. Slightly higher wind speeds that are comfortable for strolling are expected near Building A. Considering the added benefit of planters and landscaping these conditions may be considered suitable for passive use during the summer. During the winter, wind speeds comfortable for strolling or walking are expected for the Building C amenity space, while wind speeds are mostly uncomfortable on the amenity space of Building A. Elevated wind speeds during the winter season may not be of concern due to reduced pedestrian usage during the cold months.

The wind safety criterion is expected to be exceeded at five locations on Level 3 and three locations on Level 4 of Building A (Locations 105, 107, 112, 113, 118, 122, 125, and 126 in Figure 3B).

3.3 Wind Control Strategies

RWDI has previously conducted wind comfort assessment using Computational Fluid Dynamics (CFD) in August 2023. Findings from that study were used to inform some wind control strategies that were implemented for the wind tunnel testing. These features include coniferous landscaping, addition of canopies at grade and above grade, changes to the office entrance layout, and addition of trellises on the Level 3 and 4 Amenity areas. The results from this wind tunnel test showed an overall improvement in wind conditions compared to the previous CFD study. However, there are still areas where unfavorable wind conditions may persist. RWDI acknowledges that the design team is actively collaborating with RWDI to create a more wind-responsive design. Further wind tunnel testing will be necessary at a later stage to quantify the effectiveness of the wind control measures as the design progresses.

The following provides some additional guidance for wind control strategies applicable to each area of interest. The photographs are for reference purposes only and the features may be designed to fit the design intent of the buildings accordingly.

3.3.1 Massing Changes

If feasible, introducing stepped massing at the east and west portions of the project can be considered to help breakup the downwashing and corner accelerating winds. Some examples are provided in Image 6.

Image 6: Stepped Massing Examples to Reduce Wind Impact at Grade

3.3.2 Entrances

The tower entrances are mostly well protected from prevailing winds, however, wind speeds slightly higher than desired may occur near one of the Building C entrances during the winter season. To reduce wind speeds and help protect the door hardware a tall wind screen or planter can be added to the west side of this entrance. Some examples are shown in the Image 7.

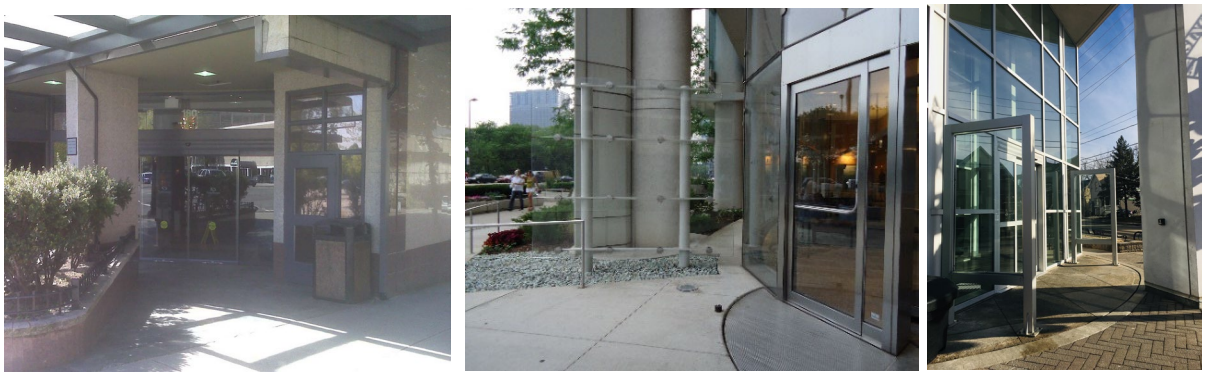


Image 7: Wind control Strategies Applicable to Entrances

3.3.3 Sidewalks and Walkways

To improve the wind conditions at identified windy areas along sidewalks and walkways, the addition of vertical wind screens can be considered to help reduce wind activity locally (examples are shown in Image 8). The current site plan includes some coniferous trees that offer wind control throughout the year. We encourage the design team to consider including more of these species in their landscaping plan along the project perimeter.

Image 8: Wind Screen Examples Along the Sidewalks

3.3.4 Level 3 and 4 Amenity Spaces

The design team has implemented taller parapets and trellises in specific areas of the podium rooftops to help mitigate wind exposure. If possible, increasing the height of the parapet along the southern edge of the Level 3 is also recommended. To further enhance these conditions, the design team might explore the addition of privacy screens and tall planters across the podium rooftop and around the key gathering areas to dissipate the energy of free-flowing winds. Some examples are shown in Image 9.

Image 9: Examples of Privacy Screens and Planters on Podium Rooftops

4 STATEMENT OF LIMITATIONS

Limitations

This report was prepared by Rowan Williams Davies & Irwin, Inc. ("RWDI") for 590 Argus LP ("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 Teeple Architects and used to construct the scale model of the proposed 590 Argus Road **("Project Data**")

File Name	File Type	Date Received (dd/mm/yyyy)
590 ARGUS - Amenity 3d Views	PDF	27/09/2023
590_Argus_Rd - Arch Drawings 2023-09-26	PDF	27/09/2023
590_Argus_Rd_R23_03	Revit	27/09/2023

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

QUEEN ELIZABETH WAY

ARGUS ROAD

LEGEND:

COMFORT CATEGORIES:

- Sitting
- Standing
- Strolling
- Walking
- Uncomfortable

Grade Level Sensor

0 25 50m

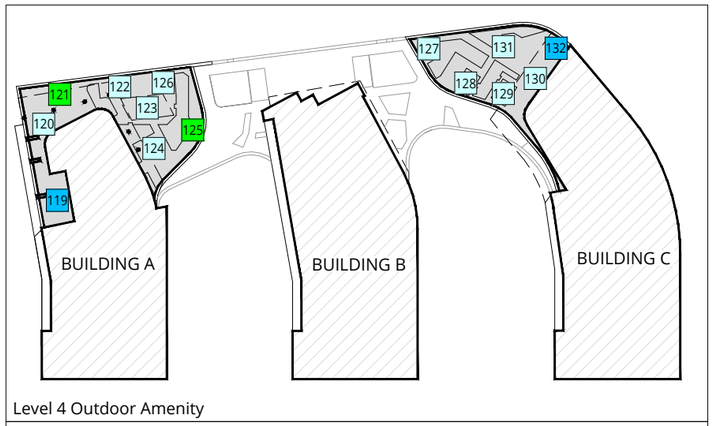
Pedestrian Wind Comfort Conditions
Existing Configuration
Summer (May to October, 6:00 to 23:00)

590 Argus Road - Oakville, ON

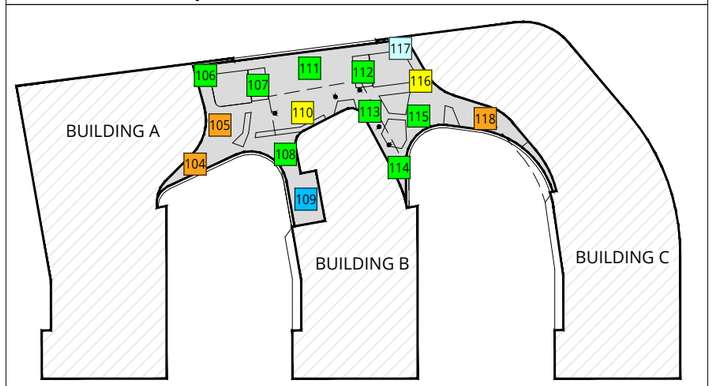
True North

Project #2302744

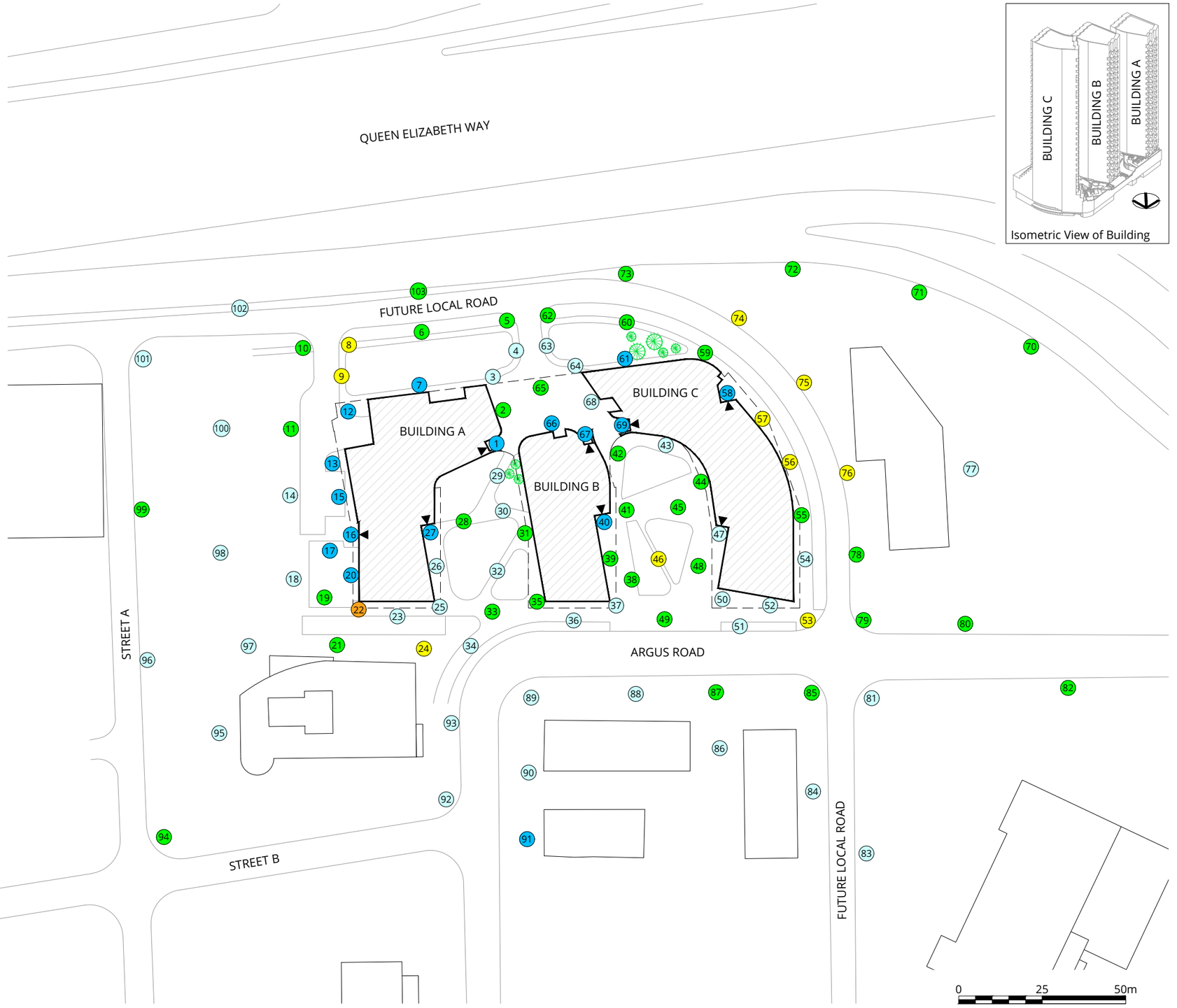
Drawn by:	GRE	Figure:	1A
Approx. Scale:	1:1250		
Date Revised:	Nov. 2, 2023		



Level 4 Outdoor Amenity



Level 3 Outdoor Amenity



Isometric View of Building

LEGEND:

COMFORT CATEGORIES:

- Sitting
- Standing
- Strolling
- Walking
- Uncomfortable

- Grade Level Sensor
- Outdoor Amenity Sensor
- Building Above Removed for Clarity
- Main Entrance Location
- Proposed Coniferous

Pedestrian Wind Comfort Conditions

Proposed Configuration

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

590 Argus Road - Oakville, ON

True North

Project #2302744

Drawn by:	GRE	Figure:	1B
Approx. Scale:	1:1250		
Date Revised:	Nov. 2, 2023		

QUEEN ELIZABETH WAY

ARGUS ROAD

LEGEND:

COMFORT CATEGORIES:

- Sitting
- Standing
- Strolling
- Walking
- Uncomfortable

Grade Level Sensor

0 25 50m

Pedestrian Wind Comfort Conditions

Existing Configuration

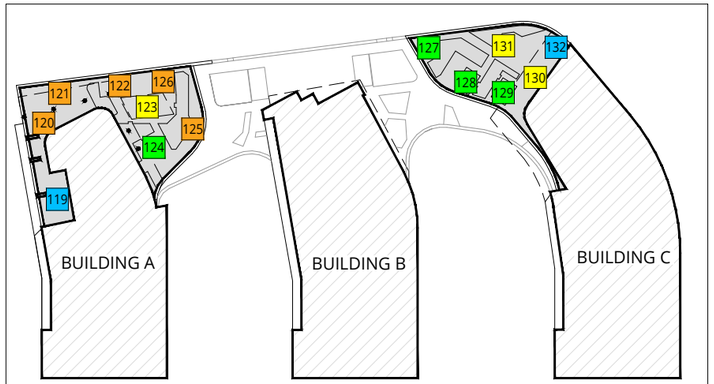
Winter (November to April, 6:00 to 23:00)

590 Argus Road - Oakville, ON

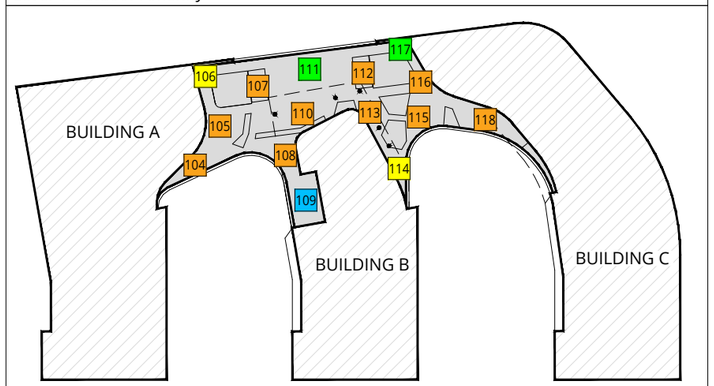
True North

Project #2302744

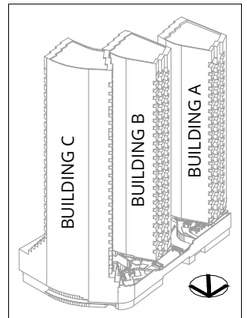
Drawn by:	GRE	Figure:	2A
Approx. Scale:	1:1250		
Date Revised:	Nov. 2, 2023		



Level 4 Outdoor Amenity



Level 3 Outdoor Amenity



Isometric View of Building

LEGEND:

COMFORT CATEGORIES:

- Sitting
- Standing
- Strolling
- Walking
- Uncomfortable

- Grade Level Sensor
- Outdoor Amenity Sensor
- Building Above Removed for Clarity
- Main Entrance Location
- Proposed Coniferous

Pedestrian Wind Comfort Conditions

Proposed Configuration

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

590 Argus Road - Oakville, ON

True North

Project #2302744

Drawn by:	GRE	Figure:	2B
Approx. Scale:	1:1250		
Date Revised:	Nov. 2, 2023		

QUEEN ELIZABETH WAY

ARGUS ROAD

LEGEND:

SAFETY CATEGORIES:

Pass

Exceeded

Grade Level Sensor

0 25 50m

Pedestrian Wind Safety Conditions

Existing Configuration

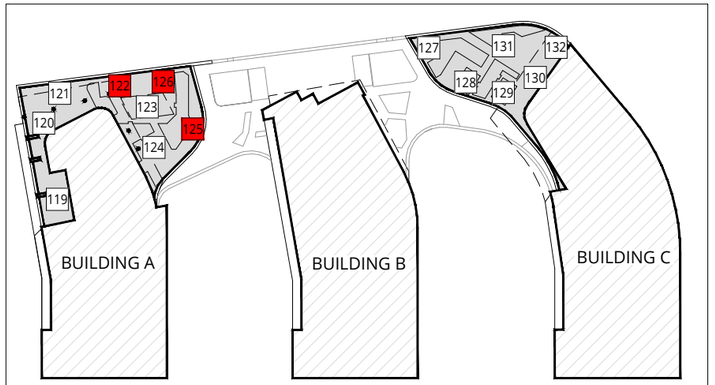
Annual (January to December, 0:00 to 23:00)

590 Argus Road - Oakville, ON

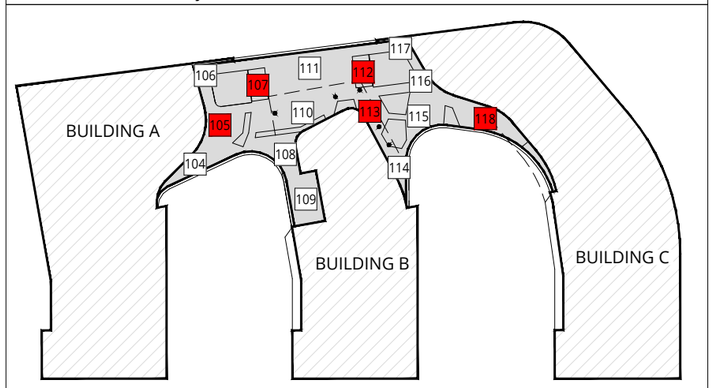
True North

Project #2302744

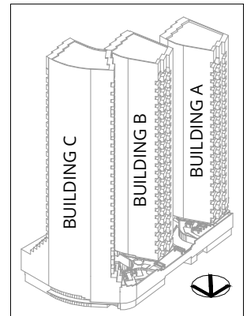
Drawn by:	GRE	Figure:	3A
Approx. Scale:	1:1250		
Date Revised:	Nov. 2, 2023		



Level 4 Outdoor Amenity



Level 3 Outdoor Amenity



Isometric View of Building

LEGEND:

SAFETY CATEGORIES:

Pass

Exceeded

Grade Level Sensor

Outdoor Amenity Sensor

Building Above Removed for Clarity

Main Entrance Location

Proposed Coniferous

Pedestrian Wind Safety Conditions

Proposed Configuration

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

590 Argus Road - Oakville, ON

True North

Project #2302744

Drawn by:	GRE	Figure:	3B
Approx. Scale:	1:1250		
Date Revised:	Nov. 2, 2023		

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	-	-	-	-	-	-
	Proposed	7	Sitting	10	Sitting	37	Pass
2	Existing	-	-	-	-	-	-
	Proposed	17	Strolling	20	Walking	77	Pass
3	Existing	-	-	-	-	-	-
	Proposed	13	Standing	21	Uncomfortable	80	Pass
4	Existing	9	Sitting	12	Standing	47	Pass
	Proposed	13	Standing	19	Walking	71	Pass
5	Existing	12	Standing	16	Strolling	62	Pass
	Proposed	16	Strolling	21	Uncomfortable	79	Pass
6	Existing	11	Standing	15	Strolling	52	Pass
	Proposed	16	Strolling	21	Uncomfortable	80	Pass
7	Existing	11	Standing	14	Standing	52	Pass
	Proposed	10	Sitting	15	Strolling	58	Pass
8	Existing	12	Standing	16	Strolling	55	Pass
	Proposed	18	Walking	23	Uncomfortable	81	Pass
9	Existing	12	Standing	16	Strolling	53	Pass
	Proposed	18	Walking	24	Uncomfortable	98	Exceeded
10	Existing	12	Standing	17	Strolling	57	Pass
	Proposed	17	Strolling	22	Uncomfortable	83	Pass
11	Existing	13	Standing	17	Strolling	58	Pass
	Proposed	16	Strolling	21	Uncomfortable	80	Pass
12	Existing	12	Standing	15	Strolling	52	Pass
	Proposed	7	Sitting	10	Sitting	56	Pass
13	Existing	12	Standing	16	Strolling	55	Pass
	Proposed	9	Sitting	12	Standing	62	Pass
14	Existing	12	Standing	16	Strolling	56	Pass
	Proposed	13	Standing	20	Walking	86	Pass
15	Existing	12	Standing	16	Strolling	53	Pass
	Proposed	8	Sitting	12	Standing	65	Pass
16	Existing	13	Standing	17	Strolling	60	Pass
	Proposed	8	Sitting	13	Standing	52	Pass
17	Existing	13	Standing	17	Strolling	60	Pass
	Proposed	10	Sitting	16	Strolling	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	Strolling	58	Pass
	Proposed	14	Standing	20	Walking	74	Pass
19	Existing	12	Standing	16	Strolling	60	Pass
	Proposed	15	Strolling	21	Uncomfortable	69	Pass
20	Existing	13	Standing	17	Strolling	68	Pass
	Proposed	10	Sitting	16	Strolling	64	Pass
21	Existing	10	Sitting	15	Strolling	61	Pass
	Proposed	15	Strolling	20	Walking	76	Pass
22	Existing	13	Standing	18	Walking	72	Pass
	Proposed	22	Uncomfortable	33	Uncomfortable	98	Exceeded
23	Existing	15	Strolling	20	Walking	75	Pass
	Proposed	14	Standing	16	Strolling	71	Pass
24	Existing	19	Walking	26	Uncomfortable	87	Pass
	Proposed	18	Walking	28	Uncomfortable	97	Exceeded
25	Existing	15	Strolling	20	Walking	66	Pass
	Proposed	11	Standing	15	Strolling	58	Pass
26	Existing	13	Standing	18	Walking	60	Pass
	Proposed	13	Standing	15	Strolling	62	Pass
27	Existing	10	Sitting	14	Standing	50	Pass
	Proposed	9	Sitting	11	Standing	45	Pass
28	Existing	-	-	-	-	-	-
	Proposed	15	Strolling	18	Walking	82	Pass
29	Existing	-	-	-	-	-	-
	Proposed	13	Standing	18	Walking	60	Pass
30	Existing	-	-	-	-	-	-
	Proposed	12	Standing	15	Strolling	72	Pass
31	Existing	-	-	-	-	-	-
	Proposed	16	Strolling	19	Walking	88	Pass
32	Existing	-	-	-	-	-	-
	Proposed	14	Standing	19	Walking	81	Pass
33	Existing	14	Standing	20	Walking	65	Pass
	Proposed	15	Strolling	21	Uncomfortable	78	Pass
34	Existing	13	Standing	21	Uncomfortable	72	Pass
	Proposed	13	Standing	20	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
35	Existing	13	Standing	18	Walking	66	Pass
	Proposed	16	Strolling	22	Uncomfortable	88	Pass
36	Existing	13	Standing	19	Walking	67	Pass
	Proposed	12	Standing	17	Strolling	62	Pass
37	Existing	13	Standing	18	Walking	68	Pass
	Proposed	12	Standing	16	Strolling	64	Pass
38	Existing	13	Standing	18	Walking	69	Pass
	Proposed	17	Strolling	19	Walking	75	Pass
39	Existing	-	-	-	-	-	-
	Proposed	15	Strolling	16	Strolling	73	Pass
40	Existing	-	-	-	-	-	-
	Proposed	9	Sitting	11	Standing	47	Pass
41	Existing	-	-	-	-	-	-
	Proposed	15	Strolling	18	Walking	85	Pass
42	Existing	-	-	-	-	-	-
	Proposed	16	Strolling	24	Uncomfortable	77	Pass
43	Existing	12	Standing	15	Strolling	61	Pass
	Proposed	11	Standing	15	Strolling	61	Pass
44	Existing	11	Standing	14	Standing	52	Pass
	Proposed	15	Strolling	18	Walking	76	Pass
45	Existing	11	Standing	14	Standing	49	Pass
	Proposed	16	Strolling	20	Walking	79	Pass
46	Existing	13	Standing	17	Strolling	68	Pass
	Proposed	20	Walking	24	Uncomfortable	86	Pass
47	Existing	11	Standing	15	Strolling	54	Pass
	Proposed	11	Standing	15	Strolling	62	Pass
48	Existing	12	Standing	16	Strolling	57	Pass
	Proposed	17	Strolling	23	Uncomfortable	87	Pass
49	Existing	13	Standing	18	Walking	60	Pass
	Proposed	16	Strolling	22	Uncomfortable	76	Pass
50	Existing	12	Standing	16	Strolling	58	Pass
	Proposed	13	Standing	16	Strolling	68	Pass
51	Existing	12	Standing	16	Strolling	59	Pass
	Proposed	14	Standing	19	Walking	81	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	12	Standing	17	Strolling	59	Pass
	Proposed	11	Standing	14	Standing	54	Pass
53	Existing	13	Standing	17	Strolling	59	Pass
	Proposed	19	Walking	24	Uncomfortable	85	Pass
54	Existing	12	Standing	16	Strolling	59	Pass
	Proposed	12	Standing	18	Walking	73	Pass
55	Existing	12	Standing	15	Strolling	55	Pass
	Proposed	17	Strolling	23	Uncomfortable	90	Pass
56	Existing	11	Standing	14	Standing	51	Pass
	Proposed	20	Walking	26	Uncomfortable	91	Exceeded
57	Existing	11	Standing	15	Strolling	56	Pass
	Proposed	20	Walking	26	Uncomfortable	88	Pass
58	Existing	12	Standing	17	Strolling	61	Pass
	Proposed	6	Sitting	8	Sitting	42	Pass
59	Existing	13	Standing	19	Walking	63	Pass
	Proposed	16	Strolling	19	Walking	91	Exceeded
60	Existing	13	Standing	18	Walking	68	Pass
	Proposed	15	Strolling	21	Uncomfortable	78	Pass
61	Existing	13	Standing	18	Walking	69	Pass
	Proposed	7	Sitting	12	Standing	54	Pass
62	Existing	12	Standing	17	Strolling	76	Pass
	Proposed	16	Strolling	21	Uncomfortable	83	Pass
63	Existing	9	Sitting	13	Standing	62	Pass
	Proposed	13	Standing	18	Walking	70	Pass
64	Existing	9	Sitting	13	Standing	47	Pass
	Proposed	13	Standing	17	Strolling	63	Pass
65	Existing	9	Sitting	14	Standing	60	Pass
	Proposed	17	Strolling	23	Uncomfortable	75	Pass
66	Existing	-	-	-	-	-	-
	Proposed	7	Sitting	11	Standing	40	Pass
67	Existing	-	-	-	-	-	-
	Proposed	4	Sitting	6	Sitting	21	Pass
68	Existing	-	-	-	-	-	-
	Proposed	11	Standing	17	Strolling	57	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	7	Sitting	10	Sitting	37	Pass
70	Existing	14	Standing	20	Walking	65	Pass
	Proposed	16	Strolling	23	Uncomfortable	81	Pass
71	Existing	14	Standing	20	Walking	65	Pass
	Proposed	16	Strolling	24	Uncomfortable	76	Pass
72	Existing	14	Standing	19	Walking	64	Pass
	Proposed	16	Strolling	24	Uncomfortable	75	Pass
73	Existing	13	Standing	18	Walking	62	Pass
	Proposed	17	Strolling	23	Uncomfortable	94	Exceeded
74	Existing	11	Standing	15	Strolling	57	Pass
	Proposed	19	Walking	26	Uncomfortable	87	Pass
75	Existing	9	Sitting	12	Standing	44	Pass
	Proposed	19	Walking	28	Uncomfortable	89	Pass
76	Existing	10	Sitting	14	Standing	52	Pass
	Proposed	18	Walking	26	Uncomfortable	90	Pass
77	Existing	11	Standing	14	Standing	53	Pass
	Proposed	14	Standing	20	Walking	78	Pass
78	Existing	12	Standing	16	Strolling	57	Pass
	Proposed	16	Strolling	22	Uncomfortable	83	Pass
79	Existing	13	Standing	17	Strolling	61	Pass
	Proposed	16	Strolling	21	Uncomfortable	73	Pass
80	Existing	13	Standing	18	Walking	62	Pass
	Proposed	15	Strolling	20	Walking	73	Pass
81	Existing	12	Standing	17	Strolling	60	Pass
	Proposed	13	Standing	18	Walking	61	Pass
82	Existing	14	Standing	19	Walking	64	Pass
	Proposed	15	Strolling	21	Uncomfortable	77	Pass
83	Existing	12	Standing	15	Strolling	53	Pass
	Proposed	13	Standing	17	Strolling	69	Pass
84	Existing	10	Sitting	13	Standing	54	Pass
	Proposed	11	Standing	17	Strolling	66	Pass
85	Existing	12	Standing	16	Strolling	59	Pass
	Proposed	15	Strolling	20	Walking	70	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating
86	Existing	11	Standing	15	Strolling	56	Pass
	Proposed	11	Standing	16	Strolling	61	Pass
87	Existing	11	Standing	15	Strolling	57	Pass
	Proposed	15	Strolling	21	Uncomfortable	82	Pass
88	Existing	11	Standing	15	Strolling	59	Pass
	Proposed	13	Standing	18	Walking	73	Pass
89	Existing	11	Standing	15	Strolling	60	Pass
	Proposed	13	Standing	21	Uncomfortable	83	Pass
90	Existing	11	Standing	15	Strolling	60	Pass
	Proposed	11	Standing	17	Strolling	69	Pass
91	Existing	9	Sitting	13	Standing	50	Pass
	Proposed	9	Sitting	13	Standing	53	Pass
92	Existing	11	Standing	15	Strolling	53	Pass
	Proposed	13	Standing	18	Walking	75	Pass
93	Existing	11	Standing	14	Standing	57	Pass
	Proposed	11	Standing	16	Strolling	68	Pass
94	Existing	14	Standing	19	Walking	62	Pass
	Proposed	16	Strolling	23	Uncomfortable	70	Pass
95	Existing	13	Standing	19	Walking	71	Pass
	Proposed	13	Standing	22	Uncomfortable	84	Pass
96	Existing	13	Standing	16	Strolling	59	Pass
	Proposed	14	Standing	18	Walking	69	Pass
97	Existing	14	Standing	18	Walking	65	Pass
	Proposed	14	Standing	20	Walking	75	Pass
98	Existing	12	Standing	15	Strolling	55	Pass
	Proposed	14	Standing	19	Walking	72	Pass
99	Existing	10	Sitting	13	Standing	52	Pass
	Proposed	15	Strolling	17	Strolling	67	Pass
100	Existing	13	Standing	16	Strolling	59	Pass
	Proposed	14	Standing	19	Walking	68	Pass
101	Existing	13	Standing	18	Walking	62	Pass
	Proposed	13	Standing	16	Strolling	62	Pass
102	Existing	13	Standing	18	Walking	61	Pass
	Proposed	14	Standing	18	Walking	68	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
103	Existing	13	Standing	17	Strolling	60	Pass
	Proposed	16	Strolling	21	Uncomfortable	83	Pass
104	Existing	-	-	-	-	-	-
	Proposed	21	Uncomfortable	27	Uncomfortable	84	Pass
105	Existing	-	-	-	-	-	-
	Proposed	21	Uncomfortable	28	Uncomfortable	104	Exceeded
106	Existing	-	-	-	-	-	-
	Proposed	15	Strolling	19	Walking	70	Pass
107	Existing	-	-	-	-	-	-
	Proposed	17	Strolling	21	Uncomfortable	94	Exceeded
108	Existing	-	-	-	-	-	-
	Proposed	17	Strolling	25	Uncomfortable	78	Pass
109	Existing	-	-	-	-	-	-
	Proposed	6	Sitting	7	Sitting	29	Pass
110	Existing	-	-	-	-	-	-
	Proposed	20	Walking	24	Uncomfortable	85	Pass
111	Existing	-	-	-	-	-	-
	Proposed	15	Strolling	16	Strolling	60	Pass
112	Existing	-	-	-	-	-	-
	Proposed	15	Strolling	23	Uncomfortable	93	Exceeded
113	Existing	-	-	-	-	-	-
	Proposed	16	Strolling	28	Uncomfortable	112	Exceeded
114	Existing	-	-	-	-	-	-
	Proposed	15	Strolling	20	Walking	74	Pass
115	Existing	-	-	-	-	-	-
	Proposed	16	Strolling	22	Uncomfortable	81	Pass
116	Existing	-	-	-	-	-	-
	Proposed	18	Walking	24	Uncomfortable	85	Pass
117	Existing	-	-	-	-	-	-
	Proposed	13	Standing	16	Strolling	59	Pass
118	Existing	-	-	-	-	-	-
	Proposed	27	Uncomfortable	35	Uncomfortable	120	Exceeded
119	Existing	-	-	-	-	-	-
	Proposed	6	Sitting	8	Sitting	27	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
120	Existing	-	-	-	-	-	-
	Proposed	14	Standing	21	Uncomfortable	87	Pass
121	Existing	-	-	-	-	-	-
	Proposed	17	Strolling	25	Uncomfortable	81	Pass
122	Existing	-	-	-	-	-	-
	Proposed	14	Standing	26	Uncomfortable	107	Exceeded
123	Existing	-	-	-	-	-	-
	Proposed	12	Standing	19	Walking	82	Pass
124	Existing	-	-	-	-	-	-
	Proposed	14	Standing	17	Strolling	80	Pass
125	Existing	-	-	-	-	-	-
	Proposed	16	Strolling	22	Uncomfortable	92	Exceeded
126	Existing	-	-	-	-	-	-
	Proposed	14	Standing	22	Uncomfortable	95	Exceeded
127	Existing	-	-	-	-	-	-
	Proposed	12	Standing	15	Strolling	59	Pass
128	Existing	-	-	-	-	-	-
	Proposed	12	Standing	17	Strolling	57	Pass
129	Existing	-	-	-	-	-	-
	Proposed	14	Standing	17	Strolling	61	Pass
130	Existing	-	-	-	-	-	-
	Proposed	14	Standing	18	Walking	85	Pass
131	Existing	-	-	-	-	-	-
	Proposed	13	Standing	18	Walking	70	Pass
132	Existing	-	-	-	-	-	-
	Proposed	8	Sitting	10	Sitting	40	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 - 14	Standing
15 - 17	Strolling
18 - 20	Walking
> 20	Uncomfortable

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