PEDESTRIAN-LEVEL WIND REPORT

CPP PROJECT 16807
JUNE 28, 2022

1225 DUNDAS ST E
Mississauga, ON

PREPARED FOR:
Dundix Realty Holdings
c/o SmartCentres REIT
3200 Highway 7 Vaughan ON L4K 5Z5

Daniel Orellana
Development Manager
dorellana@smartcentres.com

PREPARED BY:
Kevin Bauman, P.Eng., Project Engineer
kbauman@cppwind.com
Albert Brooks, M.Sc., P.Eng., Senior Engineer
abrooks@cppwind.com
Jon Galsworthy, PhD, P.Eng., Managing Director
jgalsworthy@cppwind.com

Cermak Peterka Petersen Wind Engineering Consultants
2655 N Sheridan Way
Mississauga, ON L5K 2N6
Tel: +1-289-272-7140
www.cppwind.com

EXECUTIVE SUMMARY

A wind tunnel study of the proposed 1225 Dundas St E development to be located in Mississauga, ON was conducted to assess pedestrian wind comfort and safety. The proposed development includes two 12 storey mixed used towers, back-to-back townhomes, and 1-below grade parking structure.

This study was conducted to investigate the pedestrian wind environment around the development in accordance with the City of Mississauga "Urban Design Terms of Reference", in support of the ZBL / OPA and SPA submission requirements. Wind tunnel measured velocities were combined with local wind climate data to obtain the full-scale wind speeds and exceedance frequencies at the project site.

The results of the study can be summarized as follows:

- All measurement locations are predicted to meet the wind safety criteria in the existing configuration and with the addition of the proposed development.
- In the existing configuration, wind conditions at the measurement locations around the site are generally expected to be comfortable for sitting and standing with some increased wind activity, rated as walking, occurring to the northeast and southeast of the site during the summer.
- With the addition of the 1225 Dundas St E development, wind conditions are expected to remain similar to the existing site. Increased wind activity is expected within the project site and along Arena Rd and Dundas St E. The predicted wind conditions are considered appropriate for the intended use of these areas during the summer.
- The highest wind speeds are expected to occur in the central grade level breezeway where winds are expected to accelerate and channel, resulting in wind speeds rated uncomfortable. These winds are expected to be able to be addressed through landscaping and other wind control measures.
- As seasonally stronger winds are more prevalent during the winter, the predicted wind comfort conditions in the vicinity of the project site for both the existing and project site are expected to be lessened comparatively to the summer wind conditions.
- For the existing configuration, wind conditions around the site are generally expected to be comfortable for walking with uncomfortable wind conditions anticipated on the northeast side of the site.
- For the project configuration, the addition of the 1225 Dundas St E development is expected to increase wind activity around the site with the wind conditions at several additional measurement locations anticipated to be rated as uncomfortable. Most uncomfortable wind conditions are anticipated to occur at the building corners as a result of winds intercepting the massing, descending to grade and accelerating at the downwind corners. These winds are expected to be able to be addressed during future submissions through the inclusion of landscaping and other wind control strategies.
- While uncomfortable wind conditions are not uncommon for the Mississauga area during the winter, and currently present in the existing scenario, it is expected that as the design of the development progresses, wind control features (i.e. canopies, landscaping, etc.) will be refined.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

Pedestrian wind studies are conducted to predict, assess and where necessary mitigate adverse wind conditions that a building or development may have on pedestrian level wind conditions. This assessment of the acceptability of the wind environment around developments can inform designers about the suitability of outdoor areas for their intended uses. Where necessary, design modifications can be made, or intervention measures added to mitigate areas with the potential for excessive wind speeds.

The proposed 1225 Dundas St E development to be constructed in Mississauga, ON, is located on the northwest side of Dundas St E on the block between Queen Frederica Dr (Northeast) and Arena Rd (Southwest) (see Image 1 for reference). The development plans to demolish the existing low rise building and replace with the proposed development that includes two 12 storey mixed used towers, back-to-back townhomes, and 1-below grade parking structure.

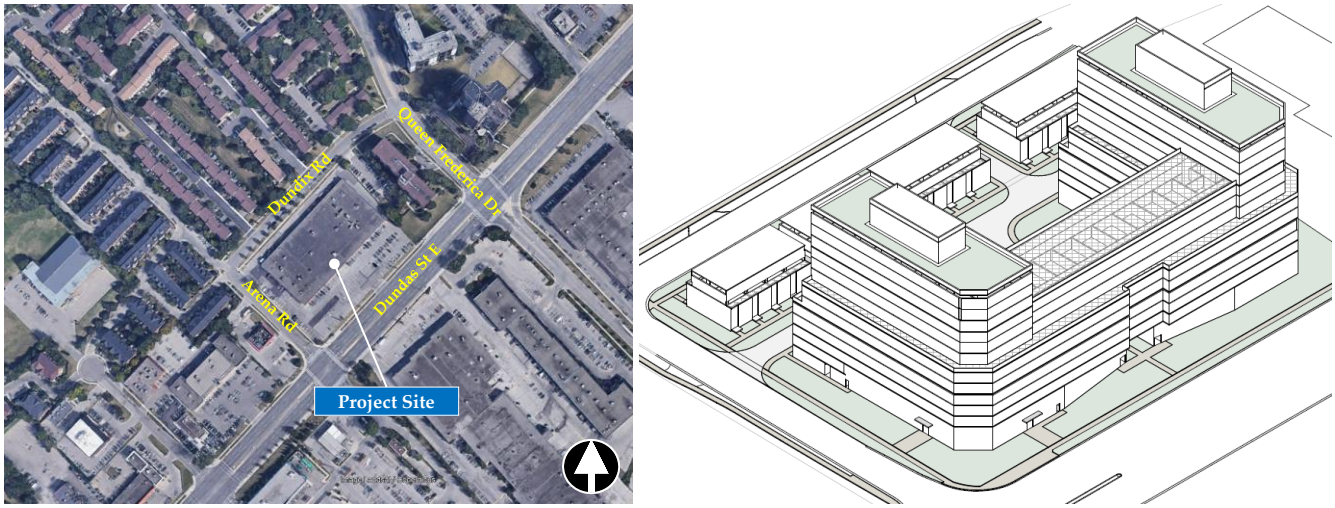


Image 1: Aerial View of Project Site (Google Earth™) (Left) and Conceptual Rendering of 1225 Dundas St E Development (Draft Concept Plan June 16, 2022) (Right)

This report includes a summary of the wind tunnel test procedures, test results, a discussion of the test results and recommendations to improve wind conditions in areas where any adverse wind conditions may be identified.

This study was conducted in accordance with the City of Mississauga "Urban Design Terms of Reference", in support of the ZBL / OPA and SPA submission requirements.

All data collection was performed in accordance with the National Building Code (NBC) of Canada (2015), American Society of Civil Engineers (ASCE) Standard 49-12 on Wind Tunnel Testing of Buildings and Other Structures (2021).

2. METHODOLOGY

2.1 WIND TUNNEL MODEL

The anticipated wind conditions around the proposed 1225 Dundas St E development were quantitatively evaluated through wind tunnel testing of a 1:300 scale model of the development and surrounding area. This scale allowed for an adequate portion of surrounding developments and terrain to be included within an approximately 500 m radius of the site and all the relevant building details to be modeled accurately. The boundary-layer wind conditions beyond the modelled area were also appropriately simulated in CPP's wind tunnel.

MEASUREMENT POINTS

Wind speed (mean and turbulence) and directional measurements were made using Calibratable Pedestrian-level Pressure (CPP) probes at 69 locations at grade level around the project site. The placement of measurement points was focused towards areas of frequent pedestrian usage (ie. near entrances, sidewalks, crosswalks, parks, plazas, outdoor dining areas etc.) as well as areas known to have unique wind flow conditions or are more susceptible to accelerated wind flows (ie. building corners, setback /recessed areas, between adjacent structures etc.). Measurements were made at the model-scale equivalent of 1.5 m above the surface for 36 wind directions in 10° increments for each of the CPP probe locations.

TEST CONFIGURATIONS

As a pedestrians' perception of wind can often be subjective and vary depending on regional difference in wind climate and thermal conditions, a comparison of wind speeds for the existing site versus the site with the addition of the proposed development is often the most objective way in assessing the local pedestrian wind conditions.

A summary and description of the configurations tested to evaluate the impact of the development on the pedestrian wind conditions in the vicinity of the site is provided in the table below. Photographs of the test model within the wind tunnel are also provided for each of the test configurations in Images 2A and 2B.

Configurations		Description
A	Existing	Site and surroundings as they currently exist and any/all developments within the test radius currently under construction.
B	Project	The existing configuration with the addition of the proposed 1225 Dundas St E development.

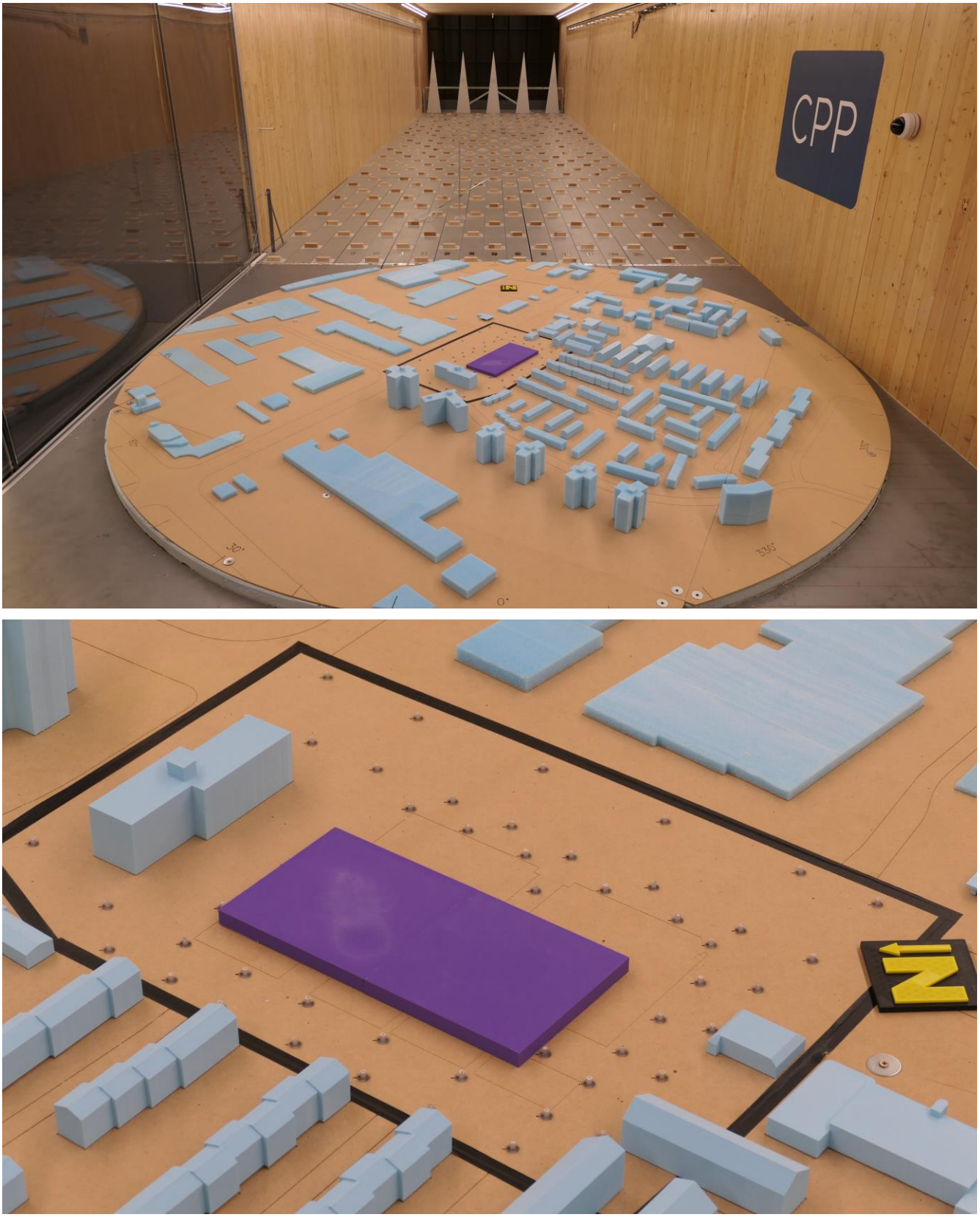


Image 2A: Photographs of Wind Tunnel Test Model – Existing Configuration

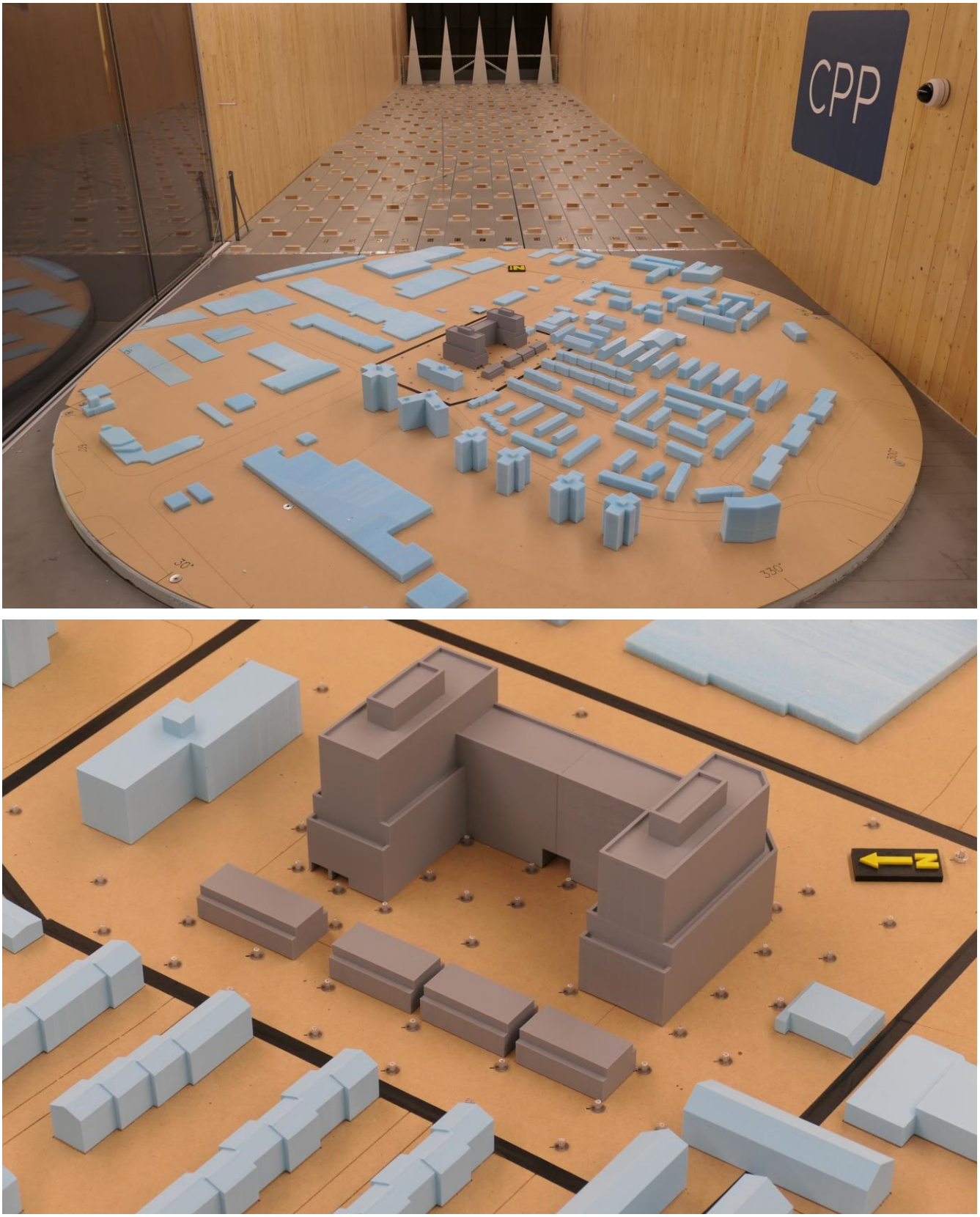


Image 2B: Photographs of Wind Tunnel Test Model – Project Configuration

2.2 WIND CLIMATE

The City of Mississauga "Urban Design Terms of Reference" provides guidance on the appropriate wind data to be leveraged depending on a Projects location within the Mississauga area:

"A minimum of 30 years of hourly wind data from Lester B. Pearson International Airport should be used for pedestrian wind comfort and safety studies in the City of Mississauga for developments north of the QEW. Data from Billy Bishop Toronto City Airport should be used for developments south of the QEW".

As the development is located north of the Queen Elizabeth Way (QEW) in Mississauga, wind climate data from Toronto Pearson International Airport was leveraged for CPP's evaluation of the pedestrian wind environment at the project site. Additionally, as the project site is in closer proximity to Toronto Pearson International Airport (8 km) versus the Billy Bishop Toronto City Airport (15.5km), it is CPP's opinion that the wind climate recorded at this airport is the most representative of the wind conditions that occur at the project site (see Image 3 for reference).

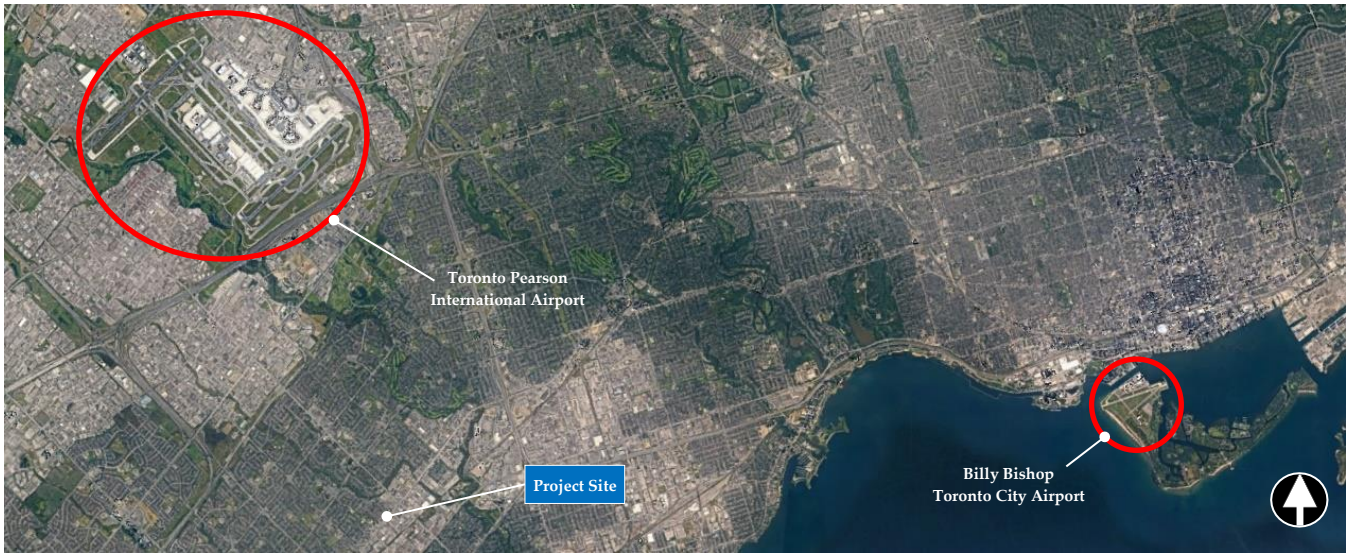


Image 3: Aerial View of Project Site Relative to Nearby Airports (Google Earth™)

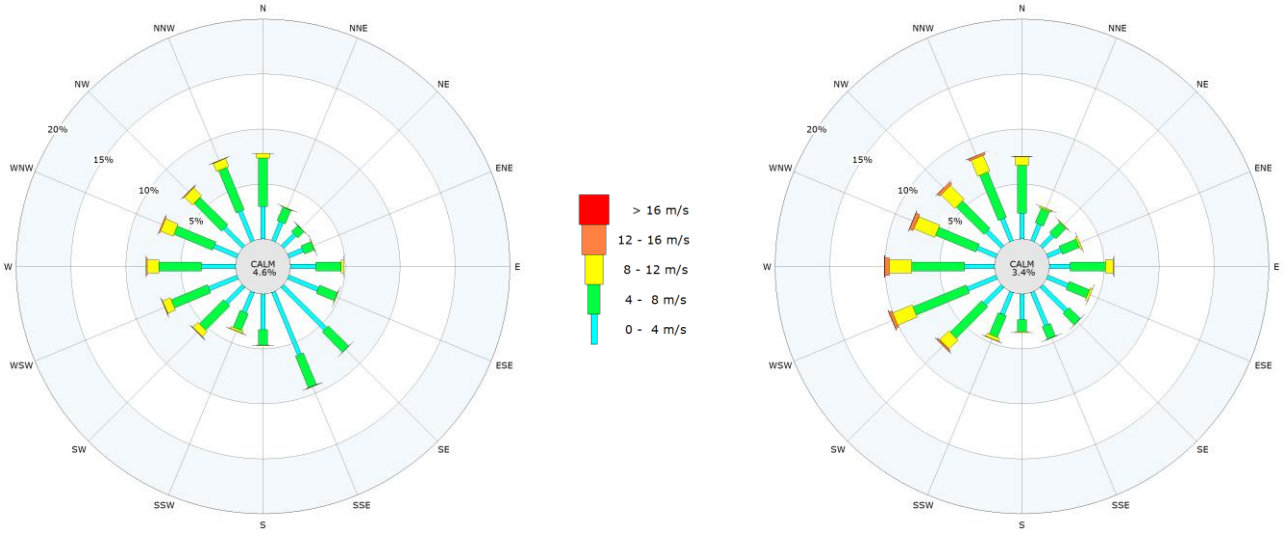
To enable a quantitative assessment of the wind environment, the measured velocity data from the wind tunnel data were normalized to an approach reference wind speed and then combined with wind frequency and direction information derived from data measured at the Toronto Pearson International Airport from 1982 - 2021 at a standard height of 10 m. This data is portrayed in the wind roses in Images 4 and 5. The arms of the wind roses point in the direction from where the wind is blowing from, the width and colour of the arm represent the wind speed, and the length of the arm indicates the percent of the time that the wind blows for that combination of speed and direction.

As approaching wind directions, frequencies and magnitudes can have distinct seasonal variations (especially in regions with colder climates like Mississauga) the assessment of pedestrian wind comfort for the project site was conducted for the summer (May through October) and winter (November through April) seasons. The wind roses in Image 4 depict the frequency and directions of winds for each of these respective seasons.

As can be seen, predominant winds from the southwest through northerly directions occur in both the summer and winter. During the summer, winds are also frequently from the south-southeast and southeast directions. In addition, seasonally stronger winds occur more often in the winter season, as indicated by the yellow and orange bands in the winter wind rose in Image 4. This seasonal variation in the wind climate has been addressed in the wind comfort results presented in this report.

Summer

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



Winter

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

Image 4: Probability of Wind Speed by Direction – Toronto Pearson International Airport (1982 – 2021)

In addition to a seasonal analysis of winds for the assessment of pedestrian wind comfort, the distribution and frequency of winds on an annual basis were also leveraged to assess the project with regards to wind safety.

Unlike the seasonal breakdown of winds shown in the summer and winter wind roses, which have been filtered between the hours of 6:00 to 23:00 (inclusive), the annual wind rose portrayed in Image 5 accounts for all hours (0:00 to 23:00 (inclusive)). Echoing the frequency and directionality of the winds during the summer and winter seasons, winds for the area are predominant from the southwest through northerly directions on an annual basis.

All climate data were adjusted to the site location using an analytical method to account for the exposure of the project site for each direction. The combination of the wind tunnel data and climatological data produces a cumulative probability distribution of wind speed for the site at each pedestrian measurement location which are then evaluated against the applicable pedestrian wind comfort and safety criterion for the region.

Annual

(January through December, 0:00 – 23:00)

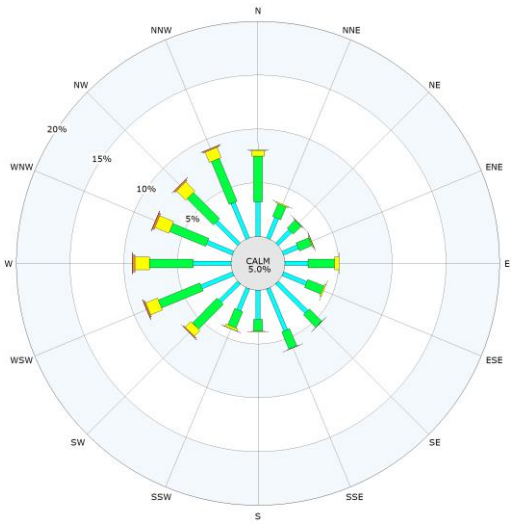


Image 5: Probability of Wind Speed by Direction - Toronto Pearson International Airport (1982 – 2021)

2.3 WIND ASSESSMENT CRITERIA

In 2014, the City of Mississauga, established terms of references focused towards the assessment of pedestrian winds resulting from the construction of new developments in the urban cityscape. These aforementioned terms of references are focused at encouraging positive building form for the purposes of providing a comfortable grade level wind environment for pedestrians conducive to passive activities (ie. dining, window shopping, etc.), while also considering adequate air circulation at-grade is maintained to clear street-level pollutants and improve air quality for pedestrians and cyclists.

As both mean and gust wind speeds can affect pedestrian comfort, their combined effect is used as the basis of the criteria and defined as a Gust Equivalent Mean (GEM) wind speed. CPP's evaluation of the wind conditions was conducted through detailed quantitative wind tunnel testing where wind speed ratios were acquired, combined with the local climate data to produce the predicted wind speeds. These results were then compared to the wind comfort and safety criteria applicable for the Mississauga area.

The comfort criteria allow planners to assess the usability, with respect to the wind environment, of different locations for various purposes, such as for long-duration activities (e.g., sitting at an outdoor café) or transiting a site on walkways. The safety criteria help to identify locations where wind speeds may be potentially hazardous to pedestrians.

Comfort ratings are based on an equivalent wind speed (U_{Equiv}) (the larger of the mean wind speed (U_{Mean}) or the gust-equivalent mean (GEM) wind speed (U_{GEM}) which is equal to the gust wind speed divided by 1.85) that is exceeded seasonally 20% of the time. The wind comfort categories and criteria are defined as follows:

Comfort Rating	U_{Equiv} (1,2)	Description
Sitting	≤ 10 km/h	Calm or light breezes desired for outdoor restaurants and seating areas where one can read a paper without having it blown away.
Standing	≤ 15 km/h	Gentle breezes suitable for main building entrances and bus stops where pedestrians may linger.
Walking	≤ 20 km/h	Relatively high speeds that can be tolerated if one's objective is to walk, run, or cycle without lingering.
Uncomfortable	> 20 km/h	Strong winds of this magnitude are considered a nuisance for most activities, and wind mitigation is typically recommended.

Notes:

(1) $U_{Equiv} = Max\ (U_{Mean}, U_{Gust} / 1.85)$

(2) *U_{Equiv} speeds are based on a seasonal exceedance of 20% between the hours of 6:00 to 23:00 (inclusive). Hours from 0:00 – 5:00 (inclusive) are excluded from the wind comfort analysis because nighttime usage of outdoor spaces is anticipated to be limited during these hours.*

The perception of wind speeds within these comfort categories can vary by individual, so opinions regarding the local wind environment should be taken into account when evaluating predicted wind comfort conditions.

Safety ratings are based on gust wind speeds (U_{Gust}) that are exceeded annually 0.1% of the time and can be summarized as follows:

Safety Rating	U_{Gust} (1)	Description
○ Pass	≤ 90 km/h	Meets wind safety performance standards.
● Exceeds	> 90 km/h	Excessive gust speeds that can adversely affect a pedestrian's balance and footing. Wind mitigation is typically required.

Notes:

(1) *U_{Gust} speeds are based on an annual exceedance of 0.1% between the hours of 0:00 to 23:00 (inclusive).*

Note that the ratings of 'Uncomfortable' and 'Safety' are the words of the published wind requirements and may not apply directly to any particular project. High wind areas are certainly not unacceptable all the time, just on windier days. The word uncomfortable, in our understanding, refers to acceptability of the site by pedestrians for typical pedestrian use; i.e., on the windiest days, pedestrians will not find the areas 'acceptable' regardless of the regular intended use, and will tend to avoid such areas if possible. An exceedance of the safety criterion, as we understand it, indicates some unspecified potential for causing injury to a less stable individual who might be blown over. The likelihood of such an event is not well described in literature and is likely to be strongly affected by individual differences, presence of water, blowing dust or particulates, and other variables in addition to the wind speed.

3. DISCUSSION OF RESULTS

The results of the study are graphically presented in Figures 1A through 3B in which measurement locations for each configuration and season are displayed on a site plan and color coded to denote the predicted wind comfort / wind safety rating. This same information is also numerically presented in Tables 1 and 2, where in addition to a rating being provided for each measurement location, the predicted wind speed and frequency of occurrence within each wind comfort and safety category are also presented.

In general, wind conditions comfortable for sitting and standing are considered appropriate for areas such as entrances or dining spaces where pedestrians will be apt to gather for longer durations, while wind conditions comfortable for walking are more appropriate for sidewalks where pedestrians are actively in transit. Locations rated as uncomfortable are generally less suitable for most pedestrian activities in most cityscapes and wind control solutions are often sought. Whether mitigation is needed at a location depends upon the intended pedestrian usage of the location.

The evaluation of the project was done without the inclusion of landscaping (i.e., planters, hedges, existing streetscape, proposed trees etc.) to provide a baseline estimation of wind speeds. It is CPP's opinion that these types of details would likely provide an overall improvement to the wind conditions presented.

3.1 WIND COMFORT

Summer

In the existing configuration, wind conditions at the measurement locations around the site are generally expected to be comfortable for sitting and standing with some increased wind activity, rated as walking, occurring to the northeast and southeast of the site along Queen Frederica Dr and Dundas St E (Figure 1A).

With the addition of the 1225 Dundas St E development, wind conditions are expected to remain similar to the existing site with wind comfort ratings at measurement points predicted to maintain a comfort rating of standing and walking. Increased wind activity is expected within the project site and along Arena Rd and Dundas St E with the addition of the development. These predicted wind conditions are still considered appropriate for the intended use of these areas during the summer (Figure 1B).

The highest wind speeds are expected to occur in the central grade level breezeway through the massing where winds from the prevailing northwesterly and southeasterly directions are expected to accelerate and channel through the opening resulting in wind speeds rated uncomfortable (Location 5 in Figure 1B). This is also expected to result in increased wind speeds in the vicinity of the main entrances by the drop-off area (Locations 2 and 3) and the entrances along the southeast façade (Locations 6 and 12).

Winter

As seasonally stronger winds are more prevalent during the winter, the predicted wind comfort conditions in the vicinity of the project site for both the existing and project site are expected to be lessened comparatively to the summer wind conditions.

For the existing configuration, most measurement locations around the site are generally expected to be comfortable for walking with uncomfortable wind conditions anticipated on the northeast side of the site.

For the project configuration, the addition of the 1225 Dundas St E development is expected to increase wind activity around the site with wind conditions at several measurement locations anticipated to be rated as uncomfortable (Locations 5, 8, 15, 16, 19, 22, 34, 36, 63 in Figure 2B).The majority of these predicted uncomfortable wind conditions are expected to occur at the building corners as a result of winds intercepting the massing, descending to grade and accelerating at the downwind corners. While uncomfortable wind conditions are not uncommon for the Mississauga area during the winter season and currently present in the Existing scenario, it is expected that as the design of the development progresses, wind control features (i.e. canopies, landscaping, etc.) will be refined.

3.2 WIND SAFETY

All measurement locations are predicted to meet the wind safety criteria in both the existing and project configurations (Figures 3A and 3B and Table 2).

4. APPLICABILITY OF RESULTS

The results presented within this report are based on the drawings and 3D model information received by CPP on 9 June 2022 for the proposed 1225 Dundas St E development. If changes to the design of the development have occurred beyond this date, it is recommended that CPP be contacted to evaluate the impact of any design changes relative to the wind conditions presented within this report.

CERMAK PETERKA PETERSEN

PEDESTRIAN WIND COMFORT CONDITIONS

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

Existing Configuration

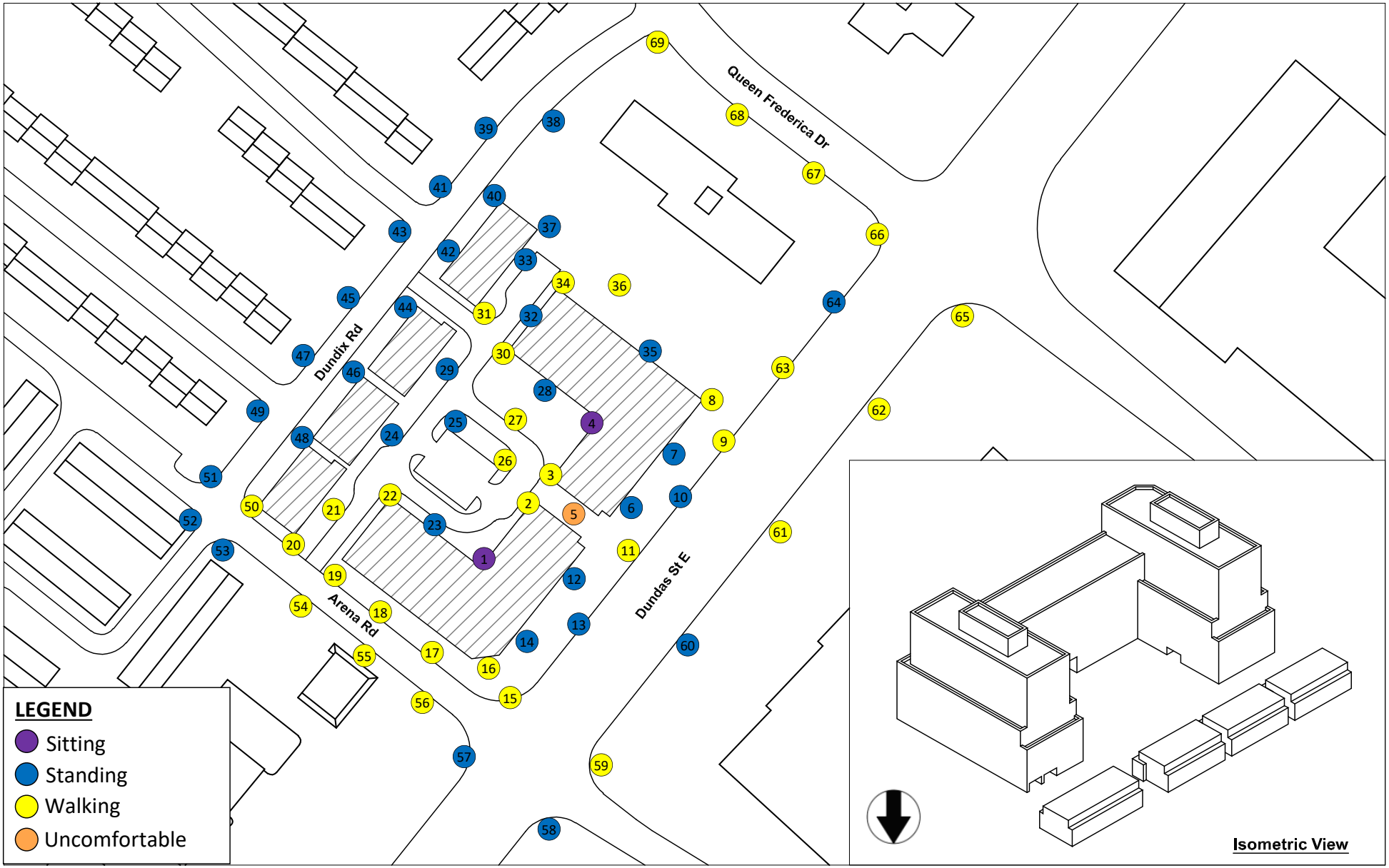
North

Figure: 1A

Project Name: 1225 Dundas St E

Ref#: CPP-16807

Date: 22 June 2022



CERMAK PETERKA PETERSEN

PEDESTRIAN WIND COMFORT CONDITIONS

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

Project Configuration

North

Figure: 1B

Project Name: 1225 Dundas St E

Ref#: CPP-16807

Date: 22 June 2022

CERMAK PETERKA PETERSEN

PEDESTRIAN WIND COMFORT CONDITIONS

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

Existing Configuration

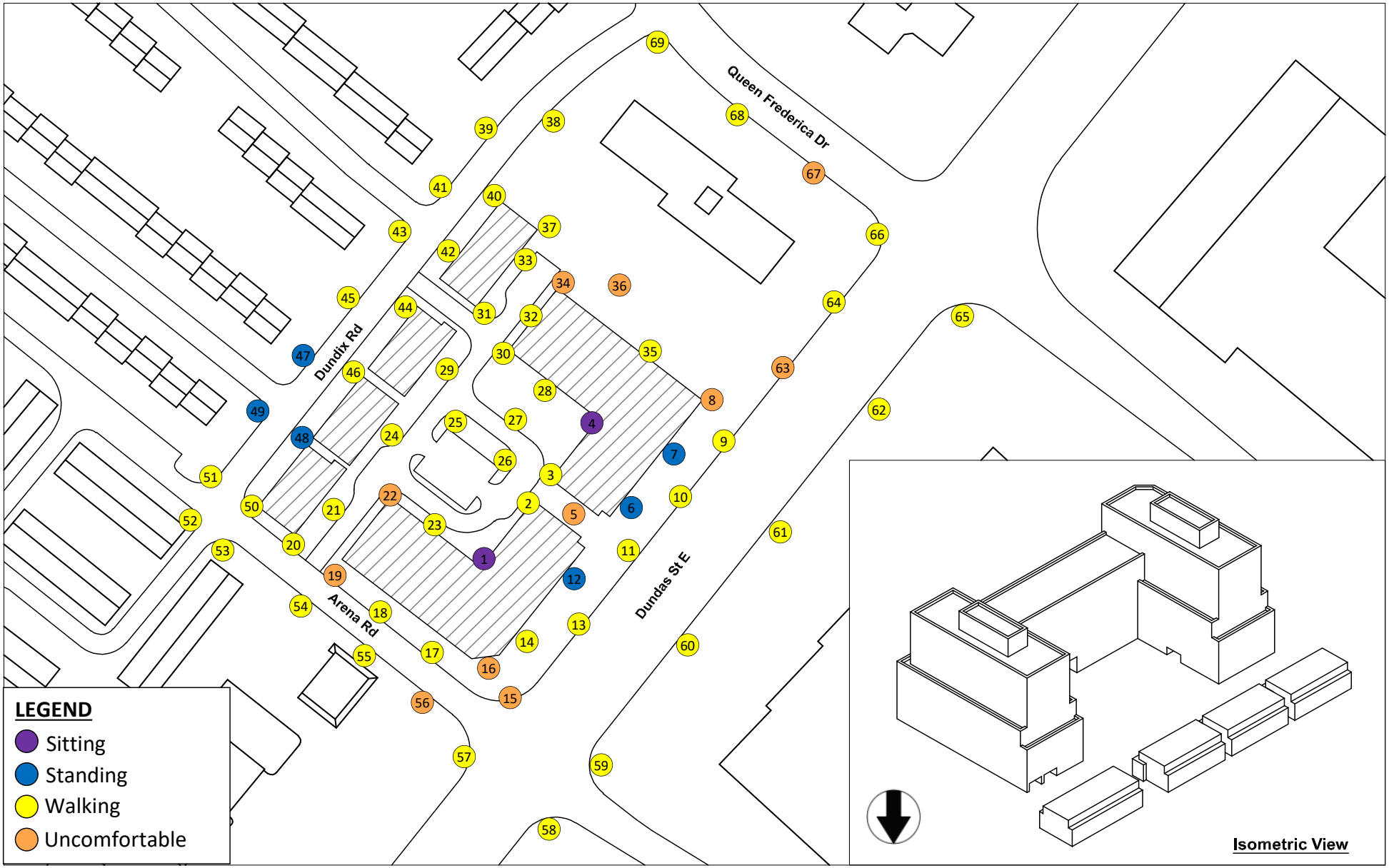
North

Figure: 2A

Project Name: 1225 Dundas St E

Ref#: CPP-16807

Date: 22 June 2022



CERMAK PETERKA PETERSEN

PEDESTRIAN WIND COMFORT CONDITIONS

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

Project Configuration

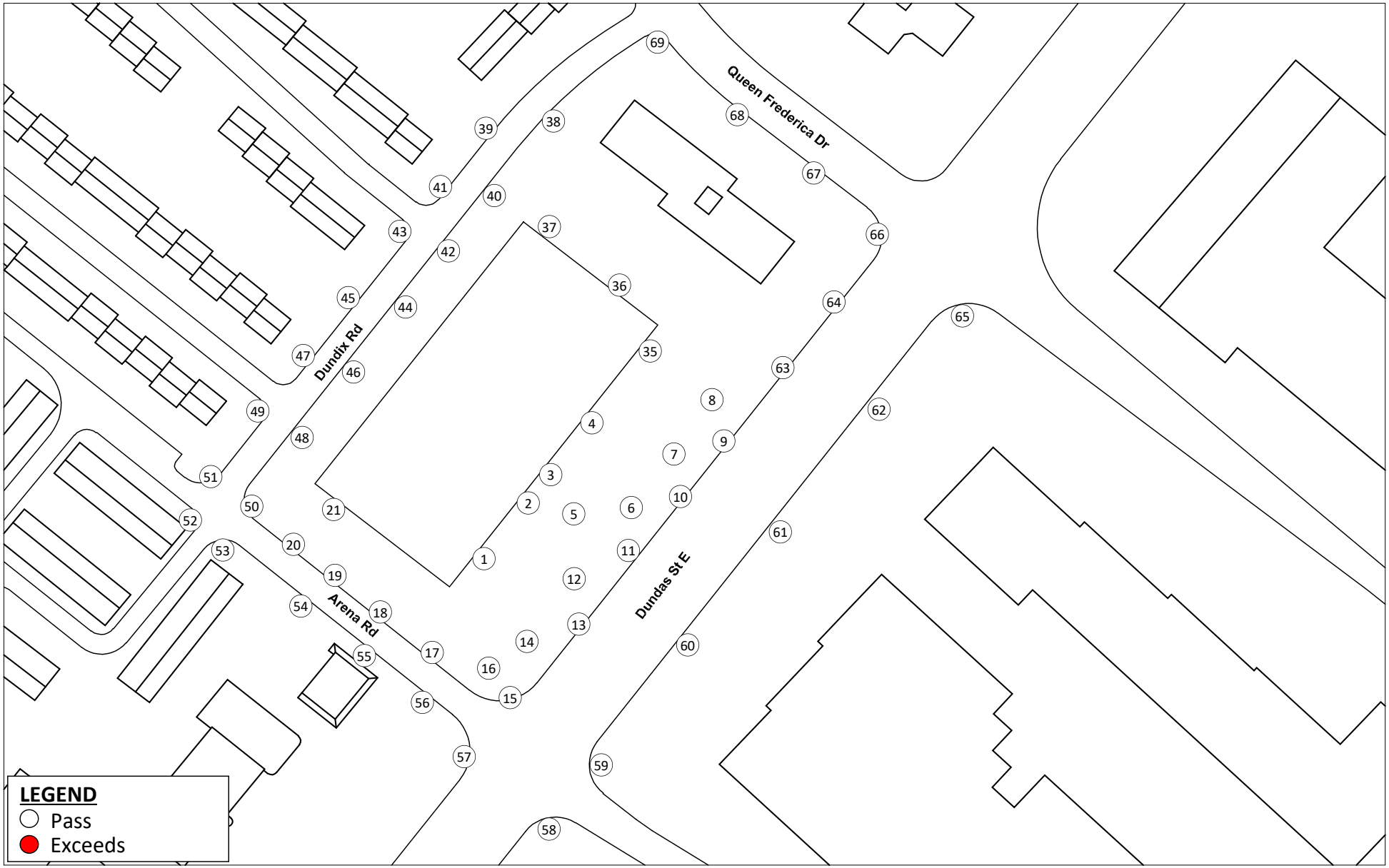
North

Figure: 2B

Project Name: 1225 Dundas St E

Ref#: CPP-16807

Date: 22 June 2022



CERMAK PETERKA PETERSEN

PEDESTRIAN WIND SAFETY CONDITIONS

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

Existing Configuration

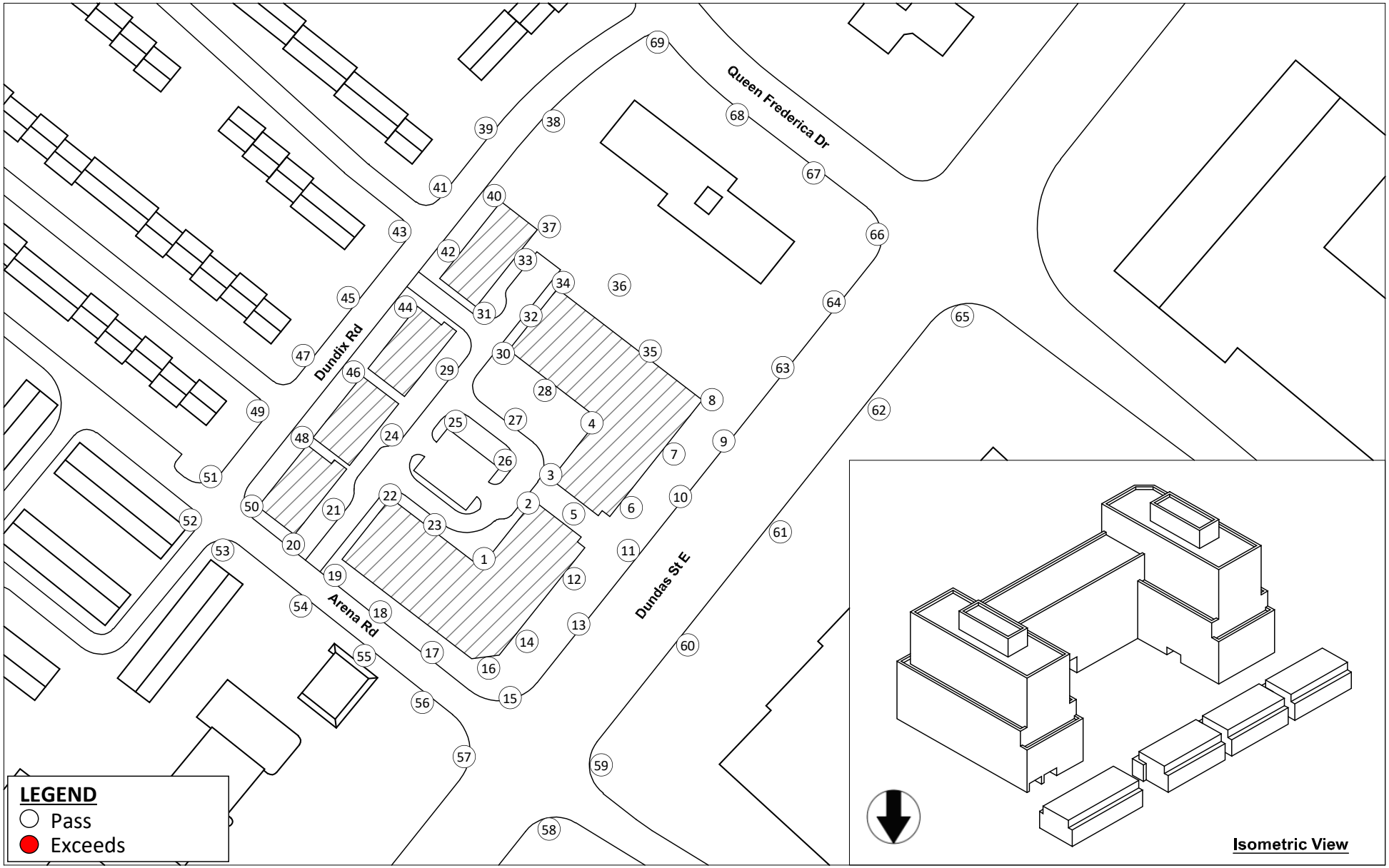
North

Figure: 3A

Project Name: 1225 Dundas St E

Ref#: CPP-16807

Date: 22 June 2022



CERMAK PETERKA PETERSEN

PEDESTRIAN WIND SAFETY CONDITIONS

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

Project Configuration

North

Figure: 3B

Project Name: 1225 Dundas St E

Ref#: CPP-16807

Date: 22 June 2022

Table 1. Pedestrian Wind Comfort Results

#	Season	Configuration	Speed (km/h)	Rating	Frequency of Occurrence (%)			
					Sitting	Standing	Walking	Uncomfortable
1	Summer	Existing	9.0	Sitting	85%	98%	100%	0%
		Project	5.9	Sitting	95%	99%	100%	0%
	Winter	Existing	10.4	Standing	77%	95%	99%	1%
		Project	7.7	Sitting	89%	98%	100%	0%
2	Summer	Existing	8.7	Sitting	86%	98%	100%	0%
		Project	15.8	Walking	62%	78%	89%	11%
	Winter	Existing	10.0	Sitting	80%	95%	99%	1%
		Project	19.5	Walking	50%	67%	81%	19%
3	Summer	Existing	8.4	Sitting	88%	98%	100%	0%
		Project	15.6	Walking	62%	78%	90%	10%
	Winter	Existing	9.6	Sitting	82%	96%	99%	1%
		Project	19.4	Walking	50%	67%	81%	19%
4	Summer	Existing	8.3	Sitting	88%	98%	100%	0%
		Project	5.3	Sitting	98%	100%	100%	0%
	Winter	Existing	9.4	Sitting	83%	96%	99%	1%
		Project	6.3	Sitting	96%	100%	100%	0%
5	Summer	Existing	12.2	Standing	66%	90%	98%	2%
		Project	20.8	Uncomfortable	35%	58%	77%	23%
	Winter	Existing	14.4	Standing	55%	82%	94%	6%
		Project	24.0	Uncomfortable	30%	51%	69%	31%
6	Summer	Existing	13.9	Standing	57%	84%	96%	4%
		Project	11.6	Standing	71%	91%	98%	2%
	Winter	Existing	16.5	Walking	45%	74%	90%	10%
		Project	12.9	Standing	64%	87%	96%	4%
7	Summer	Existing	13.7	Standing	58%	85%	96%	4%
		Project	11.7	Standing	71%	92%	98%	2%
	Winter	Existing	16.3	Walking	46%	74%	91%	9%
		Project	12.8	Standing	64%	88%	97%	3%
8	Summer	Existing	13.8	Standing	58%	85%	96%	4%
		Project	19.0	Walking	38%	64%	83%	17%
	Winter	Existing	16.5	Walking	45%	74%	90%	10%
		Project	20.8	Uncomfortable	32%	57%	77%	23%

Table 1. Pedestrian Wind Comfort Results

#	Season	Configuration	Speed (km/h)	Rating	Frequency of Occurrence (%)			
					Sitting	Standing	Walking	Uncomfortable
9	Summer	Existing	14.1	Standing	56%	83%	95%	5%
		Project	15.2	Walking	51%	79%	93%	7%
	Winter	Existing	16.9	Walking	44%	72%	89%	11%
		Project	16.8	Walking	43%	72%	89%	11%
10	Summer	Existing	14.1	Standing	55%	83%	95%	5%
		Project	13.7	Standing	59%	85%	96%	4%
	Winter	Existing	16.8	Walking	44%	72%	89%	11%
		Project	15.6	Walking	49%	77%	92%	8%
11	Summer	Existing	14.5	Standing	53%	82%	95%	5%
		Project	16.2	Walking	46%	75%	91%	9%
	Winter	Existing	17.2	Walking	42%	71%	88%	12%
		Project	19.2	Walking	36%	63%	82%	18%
12	Summer	Existing	14.4	Standing	54%	82%	95%	5%
		Project	11.8	Standing	70%	90%	97%	3%
	Winter	Existing	17.1	Walking	42%	71%	89%	11%
		Project	13.5	Standing	63%	85%	94%	6%
13	Summer	Existing	15.0	Standing	51%	80%	94%	6%
		Project	14.8	Standing	54%	81%	92%	8%
	Winter	Existing	17.8	Walking	40%	68%	87%	13%
		Project	18.0	Walking	43%	70%	85%	15%
14	Summer	Existing	14.5	Standing	53%	82%	95%	5%
		Project	12.5	Standing	67%	87%	95%	5%
	Winter	Existing	17.2	Walking	42%	71%	89%	11%
		Project	15.1	Walking	58%	80%	90%	10%
15	Summer	Existing	15.0	Standing	51%	80%	94%	6%
		Project	18.6	Walking	42%	67%	83%	17%
	Winter	Existing	17.7	Walking	40%	68%	87%	13%
		Project	23.2	Uncomfortable	31%	54%	72%	28%
16	Summer	Existing	14.4	Standing	54%	82%	95%	5%
		Project	17.7	Walking	48%	72%	85%	15%
	Winter	Existing	17.0	Walking	42%	71%	89%	11%
		Project	21.8	Uncomfortable	39%	61%	76%	24%

Table 1. Pedestrian Wind Comfort Results

#	Season	Configuration	Speed (km/h)	Rating	Frequency of Occurrence (%)			
					Sitting	Standing	Walking	Uncomfortable
17	Summer	Existing	14.1	Standing	55%	84%	96%	4%
		Project	16.3	Walking	51%	75%	90%	10%
	Winter	Existing	16.5	Walking	44%	73%	90%	10%
		Project	19.2	Walking	43%	66%	82%	18%
18	Summer	Existing	13.4	Standing	59%	86%	97%	3%
		Project	15.9	Walking	52%	77%	91%	9%
	Winter	Existing	15.8	Walking	49%	77%	92%	8%
		Project	18.1	Walking	44%	69%	85%	15%
19	Summer	Existing	13.6	Standing	59%	85%	96%	4%
		Project	19.5	Walking	38%	63%	81%	19%
	Winter	Existing	16.0	Walking	48%	76%	91%	9%
		Project	22.3	Uncomfortable	31%	55%	74%	26%
20	Summer	Existing	14.3	Standing	55%	83%	95%	5%
		Project	16.0	Walking	48%	76%	91%	9%
	Winter	Existing	16.7	Walking	45%	73%	89%	11%
		Project	18.1	Walking	39%	67%	86%	14%
21	Summer	Existing	12.9	Standing	65%	87%	96%	4%
		Project	17.2	Walking	44%	71%	88%	12%
	Winter	Existing	15.3	Walking	55%	79%	91%	9%
		Project	19.4	Walking	35%	62%	82%	18%
22	Summer	Existing	-	-	-	-	-	-
		Project	16.4	Walking	55%	75%	88%	12%
	Winter	Existing	-	-	-	-	-	-
		Project	20.2	Uncomfortable	41%	63%	79%	21%
23	Summer	Existing	-	-	-	-	-	-
		Project	14.5	Standing	64%	81%	91%	9%
	Winter	Existing	-	-	-	-	-	-
		Project	18.6	Walking	51%	70%	83%	17%
24	Summer	Existing	-	-	-	-	-	-
		Project	15.0	Standing	54%	80%	92%	8%
	Winter	Existing	-	-	-	-	-	-
		Project	17.4	Walking	44%	71%	87%	13%

Table 1. Pedestrian Wind Comfort Results

#	Season	Configuration	Speed (km/h)	Rating	Frequency of Occurrence (%)			
					Sitting	Standing	Walking	Uncomfortable
25	Summer	Existing	-	-	-	-	-	-
		Project	14.8	Standing	53%	81%	93%	7%
	Winter	Existing	-	-	-	-	-	-
		Project	17.7	Walking	41%	69%	86%	14%
26	Summer	Existing	-	-	-	-	-	-
		Project	17.2	Walking	42%	70%	89%	11%
	Winter	Existing	-	-	-	-	-	-
		Project	20.0	Walking	34%	60%	80%	20%
27	Summer	Existing	-	-	-	-	-	-
		Project	15.1	Walking	57%	79%	92%	8%
	Winter	Existing	-	-	-	-	-	-
		Project	18.4	Walking	44%	68%	84%	16%
28	Summer	Existing	-	-	-	-	-	-
		Project	14.6	Standing	62%	81%	92%	8%
	Winter	Existing	-	-	-	-	-	-
		Project	17.5	Walking	51%	72%	86%	14%
29	Summer	Existing	-	-	-	-	-	-
		Project	13.7	Standing	59%	85%	95%	5%
	Winter	Existing	-	-	-	-	-	-
		Project	16.5	Walking	47%	74%	90%	10%
30	Summer	Existing	-	-	-	-	-	-
		Project	16.0	Walking	53%	77%	90%	10%
	Winter	Existing	-	-	-	-	-	-
		Project	19.5	Walking	41%	65%	81%	19%
31	Summer	Existing	-	-	-	-	-	-
		Project	15.5	Walking	50%	78%	92%	8%
	Winter	Existing	-	-	-	-	-	-
		Project	18.7	Walking	39%	65%	84%	16%
32	Summer	Existing	-	-	-	-	-	-
		Project	12.7	Standing	68%	87%	96%	4%
	Winter	Existing	-	-	-	-	-	-
		Project	15.4	Walking	56%	78%	92%	8%

Table 1. Pedestrian Wind Comfort Results

#	Season	Configuration	Speed (km/h)	Rating	Frequency of Occurrence (%)			
					Sitting	Standing	Walking	Uncomfortable
33	Summer	Existing	-	-	-	-	-	-
		Project	14.5	Standing	56%	82%	93%	7%
	Winter	Existing	-	-	-	-	-	-
		Project	17.6	Walking	44%	70%	86%	14%
34	Summer	Existing	-	-	-	-	-	-
		Project	18.3	Walking	44%	69%	84%	16%
	Winter	Existing	-	-	-	-	-	-
		Project	22.8	Uncomfortable	32%	55%	72%	28%
35	Summer	Existing	8.7	Sitting	87%	98%	100%	0%
		Project	14.0	Standing	60%	83%	94%	6%
	Winter	Existing	9.8	Sitting	81%	96%	99%	1%
		Project	16.8	Walking	49%	73%	88%	12%
36	Summer	Existing	12.6	Standing	66%	88%	97%	3%
		Project	17.0	Walking	45%	72%	88%	12%
	Winter	Existing	15.0	Standing	54%	80%	93%	7%
		Project	20.5	Uncomfortable	36%	61%	79%	21%
37	Summer	Existing	12.7	Standing	64%	89%	97%	3%
		Project	15.0	Standing	51%	80%	94%	6%
	Winter	Existing	14.9	Standing	54%	80%	93%	7%
		Project	17.9	Walking	41%	68%	86%	14%
38	Summer	Existing	14.5	Standing	54%	82%	94%	6%
		Project	14.0	Standing	56%	84%	96%	4%
	Winter	Existing	17.1	Walking	43%	71%	88%	12%
		Project	16.3	Walking	45%	74%	91%	9%
39	Summer	Existing	13.7	Standing	58%	85%	96%	4%
		Project	14.1	Standing	55%	84%	96%	4%
	Winter	Existing	16.1	Walking	47%	75%	91%	9%
		Project	16.6	Walking	44%	73%	90%	10%
40	Summer	Existing	13.1	Standing	63%	87%	97%	3%
		Project	14.6	Standing	53%	81%	95%	5%
	Winter	Existing	15.9	Walking	49%	76%	91%	9%
		Project	17.3	Walking	42%	70%	88%	12%

Table 1. Pedestrian Wind Comfort Results

#	Season	Configuration	Speed (km/h)	Rating	Frequency of Occurrence (%)			
					Sitting	Standing	Walking	Uncomfortable
41	Summer	Existing	12.2	Standing	67%	89%	97%	3%
		Project	13.1	Standing	61%	87%	97%	3%
	Winter	Existing	15.0	Standing	54%	80%	93%	7%
		Project	15.7	Walking	48%	77%	92%	8%
42	Summer	Existing	12.5	Standing	67%	89%	97%	3%
		Project	13.4	Standing	61%	86%	96%	4%
	Winter	Existing	15.3	Walking	52%	79%	93%	7%
		Project	16.3	Walking	48%	75%	90%	10%
43	Summer	Existing	13.0	Standing	62%	88%	97%	3%
		Project	12.9	Standing	62%	88%	97%	3%
	Winter	Existing	15.5	Walking	50%	78%	92%	8%
		Project	15.5	Walking	50%	78%	92%	8%
44	Summer	Existing	12.0	Standing	69%	90%	98%	2%
		Project	13.0	Standing	63%	87%	97%	3%
	Winter	Existing	14.7	Standing	55%	81%	94%	6%
		Project	15.9	Walking	49%	76%	92%	8%
45	Summer	Existing	13.6	Standing	59%	85%	96%	4%
		Project	13.5	Standing	60%	86%	96%	4%
	Winter	Existing	16.3	Walking	48%	75%	90%	10%
		Project	16.3	Walking	47%	75%	90%	10%
46	Summer	Existing	12.7	Standing	65%	88%	97%	3%
		Project	12.8	Standing	65%	88%	97%	3%
	Winter	Existing	15.3	Walking	52%	78%	93%	7%
		Project	15.6	Walking	51%	77%	92%	8%
47	Summer	Existing	10.5	Standing	77%	95%	99%	1%
		Project	12.6	Standing	64%	89%	97%	3%
	Winter	Existing	12.4	Standing	66%	89%	97%	3%
		Project	14.7	Standing	53%	81%	94%	6%
48	Summer	Existing	12.7	Standing	64%	88%	97%	3%
		Project	12.5	Standing	66%	89%	97%	3%
	Winter	Existing	15.3	Walking	52%	79%	92%	8%
		Project	14.8	Standing	53%	81%	94%	6%

Table 1. Pedestrian Wind Comfort Results

#	Season	Configuration	Speed (km/h)	Rating	Frequency of Occurrence (%)			
					Sitting	Standing	Walking	Uncomfortable
49	Summer	Existing	12.9	Standing	62%	88%	97%	3%
		Project	13.0	Standing	61%	88%	98%	2%
	Winter	Existing	15.3	Walking	50%	79%	93%	7%
		Project	14.9	Standing	51%	80%	95%	5%
50	Summer	Existing	14.1	Standing	56%	83%	95%	5%
		Project	15.5	Walking	50%	78%	92%	8%
	Winter	Existing	16.9	Walking	45%	73%	89%	11%
		Project	17.2	Walking	42%	70%	88%	12%
51	Summer	Existing	14.4	Standing	56%	82%	94%	6%
		Project	13.2	Standing	60%	87%	97%	3%
	Winter	Existing	17.5	Walking	44%	70%	87%	13%
		Project	15.4	Walking	50%	78%	93%	7%
52	Summer	Existing	12.7	Standing	65%	88%	96%	4%
		Project	13.3	Standing	61%	86%	96%	4%
	Winter	Existing	15.4	Walking	53%	78%	91%	9%
		Project	15.4	Walking	50%	78%	93%	7%
53	Summer	Existing	14.2	Standing	57%	83%	94%	6%
		Project	13.7	Standing	58%	85%	96%	4%
	Winter	Existing	17.0	Walking	46%	72%	88%	12%
		Project	15.9	Walking	48%	76%	91%	9%
54	Summer	Existing	13.0	Standing	62%	88%	97%	3%
		Project	16.4	Walking	46%	74%	90%	10%
	Winter	Existing	15.4	Walking	50%	78%	93%	7%
		Project	19.4	Walking	37%	63%	81%	19%
55	Summer	Existing	10.9	Standing	75%	93%	98%	2%
		Project	17.0	Walking	46%	72%	88%	12%
	Winter	Existing	12.7	Standing	67%	87%	96%	4%
		Project	19.9	Walking	38%	63%	80%	20%
56	Summer	Existing	14.2	Standing	54%	83%	95%	5%
		Project	16.8	Walking	49%	74%	88%	12%
	Winter	Existing	16.7	Walking	43%	72%	90%	10%
		Project	20.6	Uncomfortable	38%	61%	78%	22%

Table 1. Pedestrian Wind Comfort Results

#	Season	Configuration	Speed (km/h)	Rating	Frequency of Occurrence (%)			
					Sitting	Standing	Walking	Uncomfortable
57	Summer	Existing	14.7	Standing	52%	81%	94%	6%
		Project	14.7	Standing	54%	81%	94%	6%
	Winter	Existing	17.4	Walking	41%	70%	88%	12%
		Project	17.9	Walking	42%	68%	86%	14%
58	Summer	Existing	15.1	Walking	51%	79%	93%	7%
		Project	15.0	Standing	52%	80%	93%	7%
	Winter	Existing	18.1	Walking	39%	67%	86%	14%
		Project	18.3	Walking	40%	67%	85%	15%
59	Summer	Existing	15.1	Walking	51%	79%	93%	7%
		Project	15.8	Walking	52%	77%	90%	10%
	Winter	Existing	17.8	Walking	40%	68%	86%	14%
		Project	19.4	Walking	39%	64%	81%	19%
60	Summer	Existing	14.8	Standing	54%	81%	94%	6%
		Project	14.6	Standing	57%	81%	93%	7%
	Winter	Existing	17.8	Walking	41%	69%	86%	14%
		Project	18.1	Walking	43%	69%	85%	15%
61	Summer	Existing	15.1	Walking	53%	79%	93%	7%
		Project	16.2	Walking	51%	76%	89%	11%
	Winter	Existing	18.3	Walking	40%	67%	85%	15%
		Project	19.5	Walking	39%	64%	81%	19%
62	Summer	Existing	14.8	Standing	55%	80%	93%	7%
		Project	15.2	Walking	52%	79%	92%	8%
	Winter	Existing	18.2	Walking	41%	67%	85%	15%
		Project	18.2	Walking	40%	67%	85%	15%
63	Summer	Existing	15.0	Standing	53%	80%	93%	7%
		Project	17.6	Walking	42%	70%	87%	13%
	Winter	Existing	18.3	Walking	41%	67%	85%	15%
		Project	20.2	Uncomfortable	34%	60%	79%	21%
64	Summer	Existing	13.7	Standing	59%	84%	95%	5%
		Project	13.4	Standing	59%	87%	97%	3%
	Winter	Existing	16.8	Walking	46%	73%	89%	11%
		Project	15.4	Walking	48%	78%	93%	7%

Table 1. Pedestrian Wind Comfort Results

#	Season	Configuration	Speed (km/h)	Rating	Frequency of Occurrence (%)			
					Sitting	Standing	Walking	Uncomfortable
65	Summer	Existing	15.5	Walking	49%	78%	92%	8%
		Project	15.6	Walking	49%	77%	92%	8%
	Winter	Existing	18.7	Walking	38%	65%	84%	16%
		Project	18.6	Walking	38%	65%	84%	16%
66	Summer	Existing	16.0	Walking	48%	76%	91%	9%
		Project	16.3	Walking	47%	75%	90%	10%
	Winter	Existing	19.4	Walking	37%	63%	82%	18%
		Project	19.4	Walking	36%	63%	82%	18%
67	Summer	Existing	17.2	Walking	43%	71%	88%	12%
		Project	17.9	Walking	42%	68%	86%	14%
	Winter	Existing	20.4	Uncomfortable	34%	60%	79%	21%
		Project	20.6	Uncomfortable	34%	59%	78%	22%
68	Summer	Existing	16.8	Walking	44%	73%	89%	11%
		Project	16.5	Walking	46%	74%	89%	11%
	Winter	Existing	20.1	Uncomfortable	34%	60%	80%	20%
		Project	19.7	Walking	37%	62%	81%	19%
69	Summer	Existing	15.3	Walking	50%	78%	93%	7%
		Project	15.1	Walking	51%	79%	93%	7%
	Winter	Existing	18.0	Walking	39%	67%	86%	14%
		Project	17.9	Walking	41%	68%	86%	14%