



# 2570-2590 ARGYLE ROAD

**MISSISSAUGA, ON** 

PEDESTRIAN WIND STUDY RWDI # 2000888 July 22, 2020

#### SUBMITTED TO

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# **EXECUTIVE SUMMARY**

RWDI was retained to conduct a pedestrian wind assessment for the proposed 2570-2590 Argyle Road development in Mississauga, ON (Image 1). Based on our wind-tunnel testing for the proposed development under the Existing and Proposed configurations (Images 2A and 2B) and the local wind records (Image 3), the potential wind comfort conditions are predicted as shown on site plans in Figures 1A through 2B, while the associated wind speeds are listed in Table 1. These results can be summarized as follows:

- The wind safety criterion for pedestrians is met for all locations and configurations assessed.
- In the existing site, wind speeds are comfortable for standing and walking activities year-round, with one location with uncomfortable conditions in the courtyard between the existing buildings during the winter. These conditions are appropriate and are typical around mid-rise buildings in this area of Mississauga.
- When the proposed development is introduced, no uncomfortable wind conditions are expected, and the overall wind conditions at grade are similar to existing. Winds at all grade-level locations are expected to be suitable for their intended use year-round.
- Above grade, the wind conditions are predicted to be comfortable for sitting or standing in the summer for all terraces, which is appropriate for the intended pedestrian use. During the winter, above-grade outdoor amenity spaces are not likely to be used frequently, and higher wind speeds may be considered acceptable.



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# 1 INTRODUCTION

RWDI was retained to conduct a pedestrian wind assessment for the proposed 2570-2590 Argyle Road development in Mississauga, ON. This report presents the project objectives, background and approach, and discusses the results from RWDI's assessment.

## 1.1 **Project Description**

The project (site shown in Image 1) is located south of the intersection of Argyle Road and Dundas Street West, to the southwest of the existing 12-storey Building A and Building B Argyle Road developments. The proposed development, Building C, is 46 m tall, consisting of a 15-storey tower with a four-story podium with outdoor amenity access at the fifth level.

## 1.2 Objectives

The objective of the study was to assess the effect of the proposed development on local conditions in pedestrian areas on and around the study site and provide recommendations for minimizing adverse effects, if needed. This quantitative assessment was based on wind speed measurements on a scale model of the project and its surroundings in one of RWDI's boundary-layer wind tunnels. These measurements were combined with the local wind records and compared to appropriate criteria for gauging wind comfort and safety in pedestrian areas. The assessment focused on critical pedestrian areas, including building entrances, public sidewalks on and around the project site, and outdoor amenity spaces.

It is worth noting that 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.



Image 1: Aerial View of Existing 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 surround	dings (Image 2A), and
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B - Proposed: Proposed project with existing surroundings (Image 2B).

The wind tunnel model included all relevant surrounding buildings and topography within an approximate 360m radius of the study site. The wind and turbulence profiles in the atmospheric boundary layer beyond the modelled area were also simulated in RWDI's wind tunnel. The wind tunnel model was instrumented with 83 specially designed wind speed sensors (55 sensors at grade and 28 sensors on the building) to measure mean and gust speeds at a full-scale height of approximately 1.5 m above local grade in pedestrian areas throughout the study site. Wind speeds were measured for 36 directions in 10-degree increments. The measurements at each sensor location were recorded in the form of ratios of local mean and gust speeds to the mean wind speed at a reference height above the model. The placement of wind measurement locations was based on our experience and understanding of the pedestrian usage for this site and reviewed by Ranee Management.

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Image 2A: Wind Tunnel Study Model – Existing Configuration

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Image 2B: Wind Tunnel Study Model – Proposed Configuration

### 2.2 Meteorological Data

Wind statistics recorded at Toronto Pearson International Airport between 1988 and 2018, 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, west and northwest directions are predominant during both summer and winter. During the winter season, the prevailing winds from the east direction are also frequent, as indicated by the wind roses. The southeast winds are frequent in the summer, but typically of low wind speeds. Strong winds of a mean speed greater than 30 km/h measured at the airport (at an anemometer height of 10 m) occur for 4.6% and 11.2% 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.



Summer (May – October)





Image 3: Directional Distribution of Winds Approaching Toronto Pearson International Airport from 1988 to 2018



## 2.3 Mississauga Pedestrian Wind Criteria

The Mississauga pedestrian wind criteria, developed in June 2014, are specified in the Urban Design Terms of Reference, "Pedestrian Wind Comfort and Safety Studies". The following defines the criterion in detail.

Comfort Category	GEM Speed (km/h)	Description	
Sitting	<u>&lt;</u> 10	Calm or light breezes desired for outdoor restaurants and seating areas where one can read a paper without having it blown away	
Standing	<u>&lt;</u> 15	Gentle breezes suitable for main building entrances and bus stops	
Walking	<u>&lt;</u> 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 most activities, and wind mitigation is typically recommended	

#### Notes:

(1) GEM speed = max (mean speed, gust speed/1.85);

(2) GEM speeds listed above are based on a seasonal exceedance of 20% of the time between 6:00 and 23:00.

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.



# **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. These conditions and the associated wind speeds are also represented in Table 1, located in the "Tables" section of this report. The following is a detailed discussion of the suitability of the predicted wind conditions for the anticipated pedestrian use of each area of interest.

Wind conditions that meet the safety criterion are predicted at all locations for all configurations assessed.

## 3.1 Grade Level (Locations 1 through 55)

Wind conditions comfortable for walking are appropriate for sidewalks and walkways as pedestrians will be active and less likely to remain in one area for prolonged periods of time. Lower wind speeds conducive to standing are preferred at main entrances where pedestrians are apt to linger.

#### 3.1.1 Existing Configuration

In the existing site, the wind speeds are mostly comfortable for standing during the summer (Figure 1A). During the winter, the stronger wind speeds that are characteristic of the winter climate in Mississauga bring about wind conditions that are mostly comfortable for standing and walking, which is appropriate, with an isolated location between existing Buildings A and B that is uncomfortable during the winter (Location 29, Figure 2A).

#### 3.1.2 Proposed Configuration

When the proposed Building C is introduced to the site, wind speeds generally remain similar to the existing site, and wind conditions are anticipated to be appropriate for the intended use at all locations; the proposed development is expected to eliminate the uncomfortable condition (Location 29, Figure 2B). Wind speeds are typically expected to be comfortable for standing in the summer, with some areas comfortable for walking (Figure 1B), and generally comfortable for walking in the winter (Figure 2B). The proposed building is predicted to shelter the site from prevailing southwesterly through northwesterly winds, creating calmer conditions compared to existing at many locations to the northeast around the existing Buildings A and B (Figures 1B and 2B).

The main entrance of the proposed Building C is situated near Location 1 (Figures 1B and 2B). Wind conditions at the entrance are anticipated to be comfortable for standing, year-round, which is appropriate.

## 3.2 Above-Grade Levels (Locations 56 through 83)

It is generally desirable for wind conditions on terraces intended for passive activities to be comfortable for sitting or standing more than 80% of the time in the summer. As shown in Figure 1B, the wind conditions at all terrace locations are anticipated to be suitable for the intended use during the summer. During the winter, while the wind speeds in most areas are expected to remain calm, with the more exposed areas of Levels 14 and 16 suitable for walking (Figure 2B). In the winter months, the outdoor amenity spaces may not be used frequently, and increased wind activity would be considered appropriate.



# 4 APPLICABILITY OF RESULTS

The wind conditions presented in this report pertain to the model of the 2570-2590 Argyle Road constructed using the drawings and information listed below. Should there be any design changes that deviate from this list of drawings, the predicted wind conditions may change. Therefore, if changes in the design are made, it is recommended that RWDI be contacted and requested to review their potential effects on wind conditions.

File Name	File Type	Date Received (dd/mm/yyyy)
120325_Argyle-NewBuilding_2020_06-08	RVT	09/06/2020
120325_Argyle_Coordination 2020-06-03	PDF	09/06/2020
120325_Argyle-Sheet - A-301 - BUILDING SECTIONS	DWG	09/06/2020
120325_Argyle-Sheet - A-302 - BUILDING SECTIONS	DWG	09/06/2020

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#### Wind Comfort Wind Safety Winter Annual Summer Configuration Location Speed Speed Speed Rating Rating Rating (km/h) (km/h) (km/h) 1 Existing 15 Standing 17 Walking 70 Pass Proposed 13 Standing 15 Standing 62 Pass 2 Existing 14 Standing 16 Walking 66 Pass Proposed Standing 13 Standing 15 59 Pass Existing 3 14 Standing 16 Walking 65 Pass Proposed Walking Walking 17 20 77 Pass 4 Existing 15 Standing 18 Walking 74 Pass Proposed 16 Walking 20 Walking 79 Pass 5 Existing 14 Standing 17 Walking 66 Pass Proposed 11 Standing 14 Standing 65 Pass Standing Walking 6 Existing 14 16 64 Pass Proposed 9 Sitting 10 Sitting 47 Pass 7 Existing Standing Walking 14 16 62 Pass Proposed Walking 20 Walking 16 85 Pass 8 Existing Standing Walking 14 16 64 Pass Proposed 16 Walking 19 Walking 88 Pass 9 Existing 13 Standing 16 Walking 61 Pass Proposed 15 Standing 18 Walking 84 Pass 10 Existing 14 Standing Walking Pass 16 64 Proposed 12 Standing Standing 14 65 Pass 11 Standing Standing Existing 13 15 66 Pass Proposed 13 Standing 14 Standing 62 Pass 12 Existing 13 Standing 15 Standing 63 Pass Proposed 11 Standing 13 Standing 53 Pass 13 Existing 13 Standing 15 Standing 64 Pass Proposed 14 Standing 16 Walking 66 Pass 14 Existing 12 Standing 15 Standing 62 Pass Proposed 15 Standing 18 Walking 78 Pass 15 Existing Standing Standing 11 13 51 Pass Proposed 11 Standing 14 Standing 66 Pass 16 Existing 11 Standing 13 Standing 54 Pass Proposed 15 Standing 19 Walking 82 Pass 17 Existing 13 Standing 15 Standing 64 Pass Proposed 16 Walking 20 Walking 77 Pass



#### Wind Comfort Wind Safety Winter Annual Summer Configuration Location Speed Speed Speed Rating Rating Rating (km/h) (km/h) (km/h) 18 Existing 14 Standing 17 Walking 70 Pass Proposed 16 Walking 20 Walking 84 Pass 19 Existing 13 Standing 15 Standing 62 Pass Proposed Walking 14 Standing 17 69 Pass Existing 20 14 Standing 16 Walking 69 Pass Proposed Standing Standing 12 14 61 Pass 21 Existing 13 Standing 16 Walking 64 Pass Proposed 15 Standing 18 Walking 73 Pass 22 Existing 11 Standing 13 Standing 59 Pass Proposed 15 Standing 18 Walking 79 Pass 23 Standing Walking Pass Existing 15 18 78 Proposed Walking 20 Walking 89 Pass 16 24 Existing Standing Standing 12 14 58 Pass Proposed 12 Standing Standing 15 66 Pass 25 Standing Walking Existing 14 16 69 Pass Proposed 14 Standing 17 Walking 71 Pass 26 Existing 14 Standing 16 Walking 68 Pass Proposed 14 Standing 16 Walking 70 Pass 27 Existing 16 Walking Walking 72 Pass 19 Proposed Standing Walking 75 15 18 Pass 28 Walking Walking 77 Pass Existing 16 20 Proposed 14 Standing 17 Walking 74 Pass 29 Existing 18 Walking 22 Uncomfortable 79 Pass Proposed 15 Standing 18 Walking 75 Pass 30 Existing 14 Standing 16 Walking 66 Pass Proposed 13 Standing 15 Standing 67 Pass 31 Existing Walking 20 Walking Pass 16 77 Proposed 15 Standing 18 Walking Pass 76 32 Existing Walking Walking 17 20 74 Pass Proposed 15 Standing 17 Walking 71 Pass 33 Existing 15 Standing 18 Walking 70 Pass Proposed 15 Standing 18 Walking 71 Pass Walking 71 34 Existing 15 Standing 17 Pass Proposed 16 Walking 18 Walking 68 Pass



#### Wind Comfort Wind Safety Winter Annual Summer Configuration Location Speed Speed Speed Rating Rating Rating (km/h) (km/h)(km/h) 35 Existing 11 Standing 13 Standing 59 Pass Proposed 12 Standing 15 Standing 60 Pass 36 Existing 15 Standing 18 Walking 71 Pass Proposed Walking 15 Standing 18 74 Pass 37 Existing 12 Standing 15 Standing 70 Pass Proposed Standing Standing 13 15 66 Pass 38 Existing 13 Standing 16 Walking 68 Pass Proposed 13 Standing 16 Walking 70 Pass 39 Existing 13 Standing 15 Standing 58 Pass Proposed 14 Standing 16 Walking 63 Pass 40 Standing Walking Pass Existing 15 17 74 Proposed Standing Walking Pass 14 17 81 41 Standing Walking Existing 14 18 79 Pass Proposed Standing 19 Walking 15 87 Pass 42 Standing Walking Existing 14 17 75 Pass Proposed 14 Standing 18 Walking 81 Pass 43 Existing 14 Standing 17 Walking 75 Pass Proposed 14 Standing 18 Walking 78 Pass 44 Existing 11 Standing Standing 58 Pass 13 Proposed Standing Standing 12 14 65 Pass 45 Standing Walking 73 Existing 13 17 Pass Proposed 13 Standing 17 Walking 75 Pass 46 Existing 12 Standing 14 Standing 57 Pass Proposed 12 Standing 14 Standing 57 Pass 47 Existing 11 Standing 13 Standing 54 Pass Proposed 13 Standing 15 Standing 57 Pass 48 Existing Standing 13 Standing 50 Pass 11 Proposed Standing 15 Standing Pass 13 59 49 Existing Standing Standing 11 13 51 Pass Proposed 12 Standing 15 Standing 57 Pass 50 Existing 13 Standing 15 Standing 57 Pass Proposed 14 Standing 17 Walking 69 Pass 51 Existing 15 Standing 17 Walking 73 Pass Proposed 14 Standing 17 Walking 72 Pass



#### Wind Comfort Wind Safety Winter Annual Summer Location Configuration Speed Speed Speed Rating Rating Rating (km/h) (km/h) (km/h) 52 Existing 12 Standing 14 Standing 63 Pass Proposed 11 Standing 13 Standing 62 Pass 53 Existing 13 Standing 15 Standing 67 Pass Proposed Standing 12 Standing 14 66 Pass Walking Walking 54 Existing 17 19 73 Pass Proposed 16 Walking 18 Walking 72 Pass 55 Existing 13 Standing 16 Walking 65 Pass Proposed 14 Standing 17 Walking 70 Pass 56 Existing -Proposed 5 Sitting 5 Sitting 24 Pass 57 Existing - -- -- -Proposed 9 Sitting 11 Standing 52 Pass 58 Existing - -- -- -Proposed 11 Standing 13 Standing 60 Pass 59 Existing - -- -- -Proposed 11 Standing 13 Standing 56 Pass 60 Existing - -- -- -Proposed 13 Standing 15 Standing 62 Pass Existing - -61 - -- -Proposed 10 Sitting 12 Standing 54 Pass - -- -- -62 Existing 12 Standing 14 Standing 62 Pass Proposed 63 Existing ----. . Proposed 10 Sitting 12 Standing 55 Pass 64 Existing - -- -- -Proposed 10 Sitting 9 Sitting 46 Pass 65 Existing - -- -- -Proposed 8 Sitting 9 Sitting 41 Pass 66 Existing - -- -- -Proposed 5 Sitting 6 Sitting 26 Pass 67 Existing - -- -- -12 Standing Proposed 10 Sitting 56 Pass 68 Existing - -- -- -Proposed 9 Sitting 12 Standing 67 Pass



	Configuration	Wind Comfort				Wind Safety	
Location		Summer		Winter		Annual	
		Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating
69	Existing	-	-	-	-	-	-
	Proposed	11	Standing	13	Standing	60	Pass
70	Existing	-	-	-	-	-	-
	Proposed	10	Sitting	12	Standing	54	Pass
71	Existing	-	-	-	-	-	-
	Proposed	10	Sitting	12	Standing	57	Pass
72	Existing	-	-	-	-	-	-
	Proposed	11	Standing	13	Standing	62	Pass
73	Existing	-	-	-	-	-	-
	Proposed	13	Standing	16	Walking	68	Pass
74	Existing	-	-	-	-	-	-
	Proposed	11	Standing	14	Standing	60	Pass
75	Existing	-	-	-	-	-	-
	Proposed	13	Standing	17	Walking	82	Pass
76	Existing	-	-	-	-	-	-
	Proposed	13	Standing	16	Walking	77	Pass
77	Existing	-	-	-	-	-	-
	Proposed	10	Sitting	11	Standing	50	Pass
78	Existing	-	-	-	-	-	-
	Proposed	10	Sitting	11	Standing	50	Pass
79	Existing	-	-	-	-	-	-
	Proposed	12	Standing	15	Standing	59	Pass
80	Existing	-	-	-	-	-	-
	Proposed	14	Standing	16	Walking	69	Pass
81	Existing	-	-	-	-	-	-
	Proposed	15	Standing	18	Walking	77	Pass
82	Existing	-	-	-	-	-	-
	Proposed	15	Standing	19	Walking	80	Pass
83	Existing	-	-	-	-	-	-
	Proposed	14	Standing	18	Walking	82	Pass

Seasons		Hours	Com	fort Speed (km/h)	Safety Speed (km/h)
Summer	May - October	6:00 - 23:00 for comfort	(20% Se	easonal Exceedance)	(> 0.1% Annual Exceedance)
Winter	November - April	0:00 - 23:00 for safety	≤ 10	Sitting	≤ 90 Pass
Configurat	tions		11 - 15	Standing	> 90 Exceeded
Existing	Existing site and sur	roundings	16 - 20	Walking	
Proposed	Proposed 2570-2590	Argyle Road tower with existing	> 20	Uncomfortable	
	surroundings				