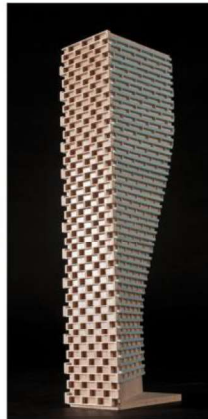


**PEDESTRIAN LEVEL
WIND STUDY**

2155 Leanne Boulevard
Mississauga, Ontario

Report: 26-025-PLW



April 6, 2026

PREPARED FOR
1000293648 Ontario Inc.
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Etobicoke, ON M8Z 2X3

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EXECUTIVE SUMMARY

This report describes a pedestrian level wind (PLW) study undertaken to satisfy Official Plan Amendment and Zoning By-Law Amendment application submission requirements for the proposed residential development located at 2155 Leanne Boulevard in Mississauga, Ontario. Our mandate within this study is to investigate pedestrian wind conditions within and surrounding the subject site, and to identify areas where wind conditions may interfere with certain pedestrian activities so that mitigation measures may be considered, where required.

The PLW study involves simulation of wind speeds for sixteen (16) wind directions in a three-dimensional (3D) computer model using the computational fluid dynamics (CFD) technique, combined with meteorological data integration, to assess pedestrian wind comfort and safety within and surrounding the subject site according to City of Mississauga wind comfort and safety criteria.

A complete summary of the predicted wind conditions is provided in Section 5 and illustrated in Figures 3A-4B, and is summarized as follows:

- 1) All grade-level areas within and surrounding the subject site are predicted to experience conditions that are considered acceptable for the intended pedestrian uses throughout the year. Specifically, conditions over surrounding sidewalks, transit stops, neighbouring existing drive aisles, and surface parking lots, the proposed drive aisles, surface parking, park, and walkways, and in the vicinity of building access points, are considered acceptable.
- 2) The foregoing statements and conclusions apply to common weather systems, during which no dangerous wind conditions, as defined in Section 4.4, are expected over the subject site. During extreme weather events, (for example, thunderstorms, tornadoes, and downbursts), pedestrian safety is the main concern. However, these events are generally short-lived and infrequent and there is often sufficient warning for pedestrians to take appropriate covers.



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1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by 1000293648 Ontario Inc. to undertake a pedestrian level wind (PLW) study to satisfy Official Plan Amendment and Zoning By-Law Amendment application submission requirements for the proposed residential development located at 2155 Leanne Boulevard in Mississauga, Ontario. Our mandate within the current study is to investigate pedestrian wind conditions within and surrounding the subject site and to identify areas where wind conditions may interfere with certain activities so that mitigation measures may be considered, where required.

Our work is based on industry standard computer simulations using the CFD technique and data analysis procedures, City of Mississauga wind comfort and safety criteria, architectural drawings provided by Dunpar Homes in March 2026, surrounding street layouts and existing and approved future building massing information obtained from the City of Mississauga, recent satellite imagery, and experience with numerous similar developments.

2. TERMS OF REFERENCE

The subject site is located at 2155 Leanne Boulevard in Mississauga, situated approximately 50 metres (m) to the south-southeast of the intersection of Leanne Boulevard and Erin Mills Parkway, on a irregularly shaped parcel of land bordered by Leanne Boulevard to the west, an existing gas station to the north, Erin Mills Parkway to the northeast, and a mid-rise long-term care residence building to the south.

The proposed development comprises a nominally rectangular 8-storey residential building and nine townhouse blocks. The midrise is located to the east of the subject site while the nine blocks of 4-storey townhouses are planned to the west of the proposed development: Blocks A and B to the southwest, Blocks C and E to the west, Blocks D, F, H, and I central to the subject site, and Block G to the north of the subject site. A park is proposed at the northwest corner. Drive aisles extend from Leanne Boulevard and Erin Mills Parkway, providing vehicular access to the surface parking within the subject site and the parking ramp and loading space to the north of the midrise.



Above underground parking, the ground floor of the proposed development includes a lobby to the north, livework units to the east, and residential units to the west. Levels 2-8 are reserved for residential occupancy. Setbacks from all elevations are located at Level 7.

Regarding wind exposures, the near-field surroundings (defined as an area falling within a 200-m-radius of the subject site) include a mid-rise hotel and a long-term care residence building to the southeast, low-rise residential buildings from the south clockwise to the north-northwest, a gas station to the north, and low-rise commercial buildings with surface parking lots from the north clockwise to the east-northeast. The far-field surroundings (defined as the area beyond the near field and within a 2-kilometre (km) radius) include a mix of mostly low-rise massing and green spaces in all compass directions with isolated high-rise buildings to the west, northeast, and south-southeast.

A site plan for the proposed and existing massing scenarios is illustrated in Figures 1A and 1B, while Figures 2A-2H illustrate the computational models used to conduct the study. The existing massing scenario includes the existing massing and any developments that have been approved by the City of Mississauga.

3. OBJECTIVES

The principal objectives of this study are to (i) determine pedestrian level wind conditions at key areas within and surrounding the subject site; (ii) identify areas where wind conditions may interfere with the intended uses of outdoor spaces; and (iii) recommend suitable mitigation measures, where required.

4. METHODOLOGY

The approach followed to quantify wind conditions over the site is based on CFD simulations of wind speeds across the subject site within a virtual environment, meteorological analysis of the Mississauga area wind climate, and synthesis of computational data with City of Mississauga criteria¹. The following sections describe the analysis procedures, including a discussion of the noted pedestrian wind criteria.

4.1 Computer-Based Context Modelling

¹ Mississauga, Urban Design Terms of Reference, *Pedestrian Wind Comfort and Safety Studies*, July 2024
<https://www.mississauga.ca/wp-content/uploads/2024/07/10131058/Pedestrian-wind-comfort-and-safety-studies.pdf>



A computer-based PLW study was performed to determine the influence of the wind environment on pedestrian comfort over the subject site. Pedestrian comfort predictions, based on the mechanical effects of wind, were determined by combining measured wind speed data from CFD simulations with statistical weather data obtained from Lester. B. Pearson International Airport. The general concept and approach to CFD modelling is to represent building and topographic details in the immediate vicinity of the subject site on the surrounding model, and to create suitable atmospheric wind profiles at the model boundary. The wind profiles are designed to have similar mean and turbulent wind properties consistent with actual site exposures.

An industry standard practice is to omit trees, vegetation, and other existing and proposed landscape elements from the model due to the difficulty of providing accurate seasonal representation of vegetation. The omission of trees and other landscaping elements produces slightly stronger wind speeds.

4.2 Wind Speed Measurements

The PLW analysis was performed by simulating wind flows and gathering velocity data over a CFD model of the subject site for 16 wind directions. The CFD simulation model was centered on the proposed development, complete with surrounding massing within a radius of 480 m. The process was performed for two context massing scenarios, as noted in Section 2.

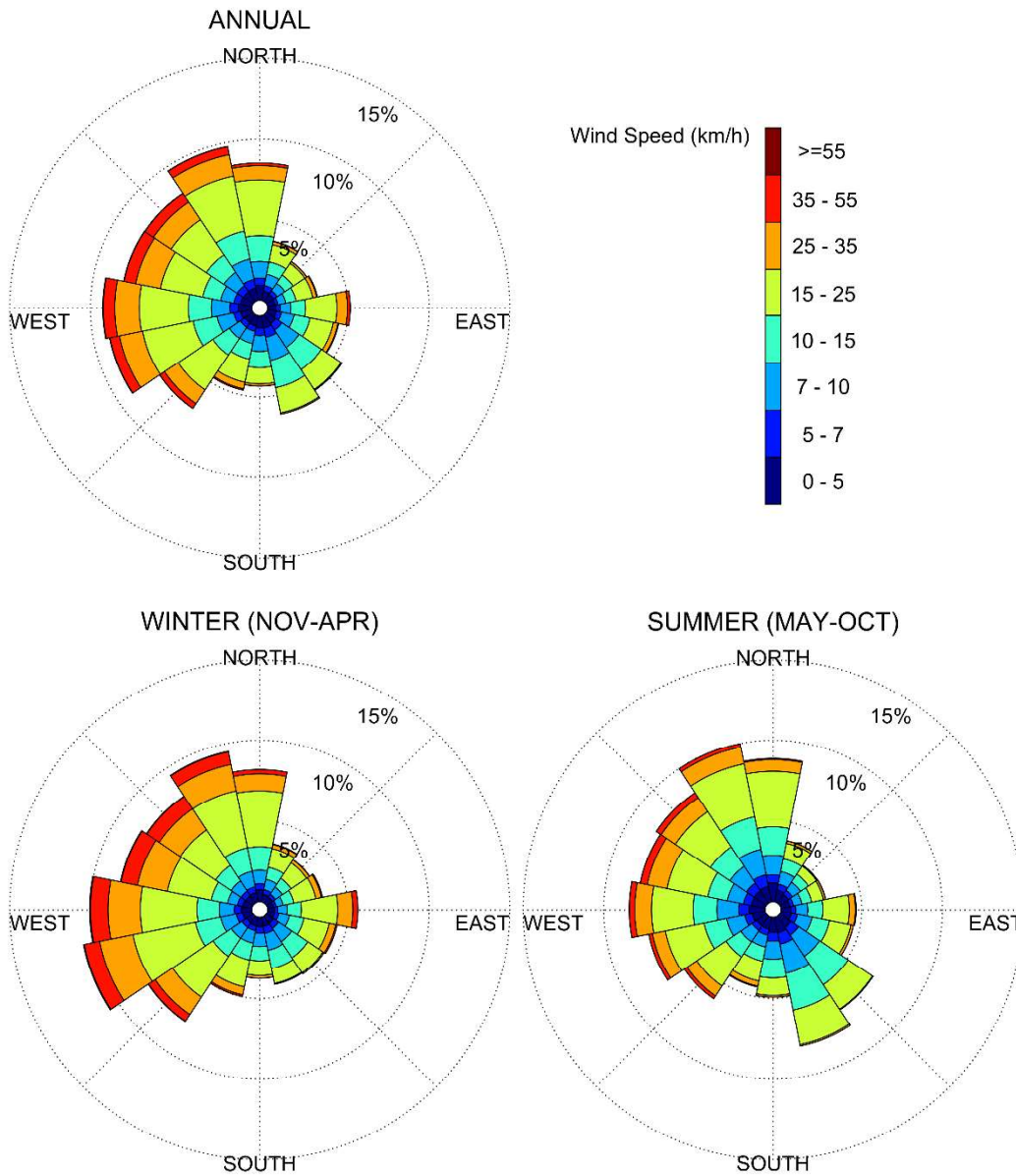
Mean and peak wind speed data obtained over the subject site for each wind direction were interpolated to 36 wind directions at 10° intervals, representing the full compass azimuth. Measured wind speeds approximately 1.5 m above local grade were referenced to the wind speed at gradient height to generate mean and peak velocity ratios, which were used to calculate full-scale values. Gradient height represents the theoretical depth of the boundary layer of the earth's atmosphere, above which the mean wind speed remains constant. Further details of the wind flow simulation technique are presented in Appendix A.

4.3 Historical Wind Speed and Direction Data

A statistical model for winds in Mississauga was developed from approximately 40 years of hourly meteorological wind data recorded at Lester. B. Pearson International Airport and obtained from Environment and Climate Change Canada. Wind speed and direction data were analyzed during the appropriate hours of pedestrian usage (that is, between 06:00 and 23:00) and divided into two distinct seasons, as stipulated in the wind criteria. Specifically, the summer season is defined as May through October, while the winter season is defined as November through April, inclusive.

The statistical model of the Mississauga area wind climate, which indicates the directional character of local winds on a seasonal basis, is illustrated on the following page. The plots illustrate seasonal distribution of measured wind speeds and directions in kilometers per hour (km/h). Probabilities of occurrence of different wind speeds are represented as stacked polar bars in sixteen azimuth divisions. The radial direction represents the percentage of time for various wind speed ranges per wind direction during the measurement period. The preferred wind speeds and directions can be identified by the longer length of the bars. For Mississauga (north of the Queen Elizabeth Way, or QEW), the most common winds occur for westerly wind directions, while the most common wind speeds are below 36 km/h. The directional preference and relative magnitude of wind speed changes somewhat from season to season.

SEASONAL DISTRIBUTION OF WIND LESTER B. PEARSON INTERNATIONAL AIRPORT, MISSISSAUGA, ONTARIO



Notes:

1. Radial distances indicate percentage of time of wind events.
2. Wind speeds are mean hourly in km/h, measured at 10 m above the ground.

4.4 Pedestrian Wind Comfort and Safety Criteria – City of Mississauga

Pedestrian wind comfort and safety criteria are based on the mechanical effects of wind without consideration of other meteorological conditions (that is, temperature and relative humidity). The comfort criteria assume that pedestrians are appropriately dressed for a specified outdoor activity during any given season. Since both mean and gust wind speeds affect pedestrian comfort, their combined effect is defined in the City of Mississauga Urban Design Terms of Reference. Specifically, the criteria are defined as a Gust Equivalent Mean (GEM) wind speed, which is the greater of the mean wind speed or the gust wind speed divided by 1.85.

The wind speed ranges are based on the Beaufort scale, which describes the effects of forces produced by varying wind speed levels on objects. Four pedestrian comfort classes and corresponding gust wind speed ranges are used to assess pedestrian comfort: (1) Sitting; (2) Standing, (3) Walking; and (4) Uncomfortable. Wind conditions suitable for sitting are represented by the colour blue, standing by green, and walking by yellow; uncomfortable conditions are represented by the colour orange, consistent with the City of Mississauga Urban Design Terms of Reference. Specifically, the comfort classes, associated wind speed ranges, and limiting criteria are summarized as follows:

PEDESTRIAN WIND COMFORT CLASS DEFINITIONS

Wind Comfort Class	GEM Speed (km/h)	Description
SITTING	≤ 10	GEM wind speeds no greater than 10 km/h occurring at least 80% of the time are considered acceptable for sedentary activities, including sitting.
STANDING	≤ 15	GEM wind speeds no greater than 15 km/h occurring at least 80% of the time are considered acceptable for activities such as standing, strolling, or more vigorous activities.
WALKING	≤ 20	GEM wind speeds no greater than 20 km/h occurring at least 80% of the time are considered acceptable for walking or more vigorous activities.
UNCOMFORTABLE	> 20	Uncomfortable conditions are characterized by predicted values that fall below the 80% target for walking. Brisk walking and exercise, such as jogging, are considered acceptable for moderate excesses of this criterion.

Regarding wind safety, gust wind speeds greater than 90 km/h, occurring more than 0.1% of the time on an annual basis (based on wind events recorded for 24 hours a day), are classified as dangerous. From calculations of stability, it can be shown that gust wind speeds of 90 km/h would be the approximate threshold wind speed that would cause an average elderly person in good health to fall.

Experience and research on people’s perception of mechanical wind effects has shown that if the wind speed levels are exceeded for more than 20% of the time, the activity level would be judged to be uncomfortable by most people. For instance, if GEM wind speeds of 10 km/h were exceeded for more than 20% of the time most pedestrians would judge that location to be too windy for sitting. Similarly, if GEM wind speeds of 20 km/h at a location were exceeded for more than 20% of the time, walking or less vigorous activities would be considered uncomfortable. As these criteria are based on subjective reactions of a population to wind forces, their application is partly based on experience and judgment.

Once the pedestrian wind speed predictions have been established throughout the site, the assessment of pedestrian comfort involves determining the suitability of the predicted wind conditions for discrete regions within and surrounding the site. This step involves comparing the predicted comfort classes to the target comfort classes, which are dictated by the location type for each region (that is, a sidewalk, building entrance, amenity space, or other). An overview of common pedestrian location types and their typical windiest target comfort classes are summarized below. Depending on the programming of a space, the desired comfort class may differ from this table.

TARGET PEDESTRIAN WIND COMFORT CLASSES FOR VARIOUS LOCATION TYPES

Location Types	Target Comfort Classes
Primary Building Entrance	Standing
Secondary Building Access Point	Walking
Public Sidewalk / Bicycle Path	Walking
Outdoor Amenity Space / Public Park / Plaza	Sitting / Standing
Café / Patio / Bench / Garden	Sitting / Standing
Transit Stop (Without Shelter)	Standing
Transit Stop (With Shelter)	Walking
Garage / Service Entrance / Parking Lot	Walking

5. RESULTS AND DISCUSSION

The following discussion of the predicted pedestrian wind conditions for the subject site is accompanied by Figures 3A-4B, which illustrate conditions at grade level for the proposed and existing massing scenarios. Conditions are presented as continuous contours of wind comfort within and surrounding the subject site and correspond to the various comfort classes noted in Section 4.4.

The details of these conditions are summarized in the following pages for each area of interest.

5.1 Wind Comfort Conditions – Grade Level

Sidewalks and Transit Stops along Erin Mills Parkway: Prior to and following the introduction of the proposed development, wind conditions over the nearby public sidewalks along Erin Mills Parkway are predicted to be suitable for standing during the summer, becoming suitable for a mix of standing and walking during the winter. Conditions in the vicinity of the nearby transit stop to the northwest of the proposed development, which is served by a typical shelter, are predicted to be suitable for standing during the summer, becoming suitable for walking during the winter, while conditions in the vicinity of the nearby transit stop to the east of the proposed midrise are predicted to be suitable for standing throughout the year. The noted conditions are considered acceptable.

Sidewalks and Transit Stops along Leanne Boulevard: Prior to and following the introduction of the proposed development, wind conditions over the nearby public sidewalks along Leanne Boulevard are predicted to be suitable for standing, or better, during the summer, becoming suitable for walking, or better, during the winter. Conditions in the vicinity of the nearby transit stops along Leanne Boulevard are predicted to be suitable for standing throughout the year. The noted conditions are considered acceptable.

Neighbouring Existing Drive Aisles and Surface Parking Lots: Prior to and following the introduction of the proposed development, wind conditions over the nearby existing drive aisles and surface parking lots from the north clockwise to the east across Erin Mills Parkway are predicted to be suitable for standing, or better, throughout the year. The noted conditions are considered acceptable.

Proposed Park: Wind comfort conditions over the proposed park are predicted to be suitable for mostly sitting during the summer. The noted conditions are considered acceptable.



Proposed Drive Aisles, Surface Parking, and Walkways: Conditions over the drive aisles, surface parking, and walkways within the subject site are predicted to be suitable for a mix of sitting and standing during the summer, becoming suitable for standing, or better, during the winter. The noted conditions are considered acceptable.

Buildings Access Points: Owing to the protection of the building façades, conditions in the vicinity of the building access points serving the proposed development are predicted to be suitable for standing, or better, throughout the year, which is considered acceptable.

5.2 Wind Safety

Within the context of typical weather patterns, which exclude anomalous localized storm events such as tornadoes and downbursts, no pedestrian areas within or surrounding the subject site are expected to experience conditions that could be considered dangerous, as defined in Section 4.4.

5.3 Applicability of Results

Pedestrian wind comfort and safety have been quantified for the specific configuration of existing and foreseeable construction around the subject site. Future changes (that is, construction or demolition) of these surroundings may cause changes to the wind effects in two ways, namely: (i) changes beyond the immediate vicinity of the subject site would alter the wind profile approaching the subject site; and (ii) development in proximity to the subject site would cause changes to local flow patterns.

6. CONCLUSIONS AND RECOMMENDATIONS

A complete summary of the predicted wind conditions is provided in Section 5 of this report and illustrated in Figures 3A-4B. Based on computer simulations using the CFD technique, meteorological data analysis of the Mississauga wind climate and wind comfort and safety criteria, and experience with numerous similar developments, the study concludes the following:

- 1) All grade-level areas within and surrounding the subject site are predicted to experience conditions that are considered acceptable for the intended pedestrian uses throughout the year. Specifically, conditions over surrounding sidewalks, transit stops, neighbouring existing drive aisles, and surface parking lots, the proposed drive aisles, surface parking, park, and walkways, and in the vicinity of building access points, are considered acceptable.
- 2) The foregoing statements and conclusions apply to common weather systems, during which no dangerous wind conditions, as defined in Section 4.4, are expected over the subject site. During extreme weather events, (for example, thunderstorms, tornadoes, and downbursts), pedestrian safety is the main concern. However, these events are generally short-lived and infrequent and there is often sufficient warning for pedestrians to take appropriate covers.

Sincerely,

Gradient Wind Engineering Inc.



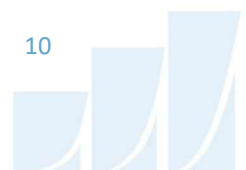
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Junior Wind Scientist

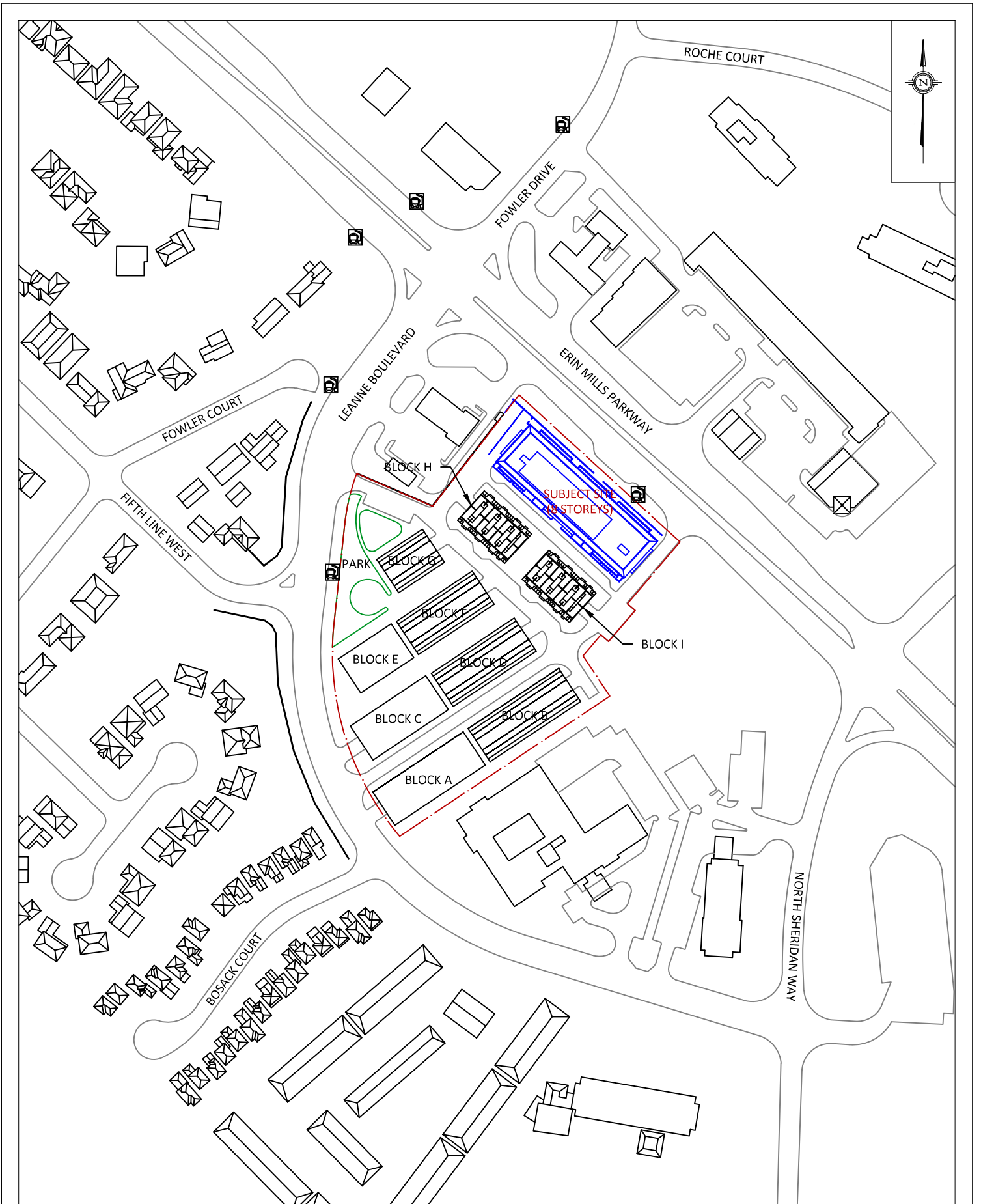


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PROJECT

2155 LEANNE BOULEVARD, OTTAWA
PEDESTRIAN LEVEL WIND STUDY

SCALE

1:2500

DRAWING NO.

26-025-PLW-1A

DATE

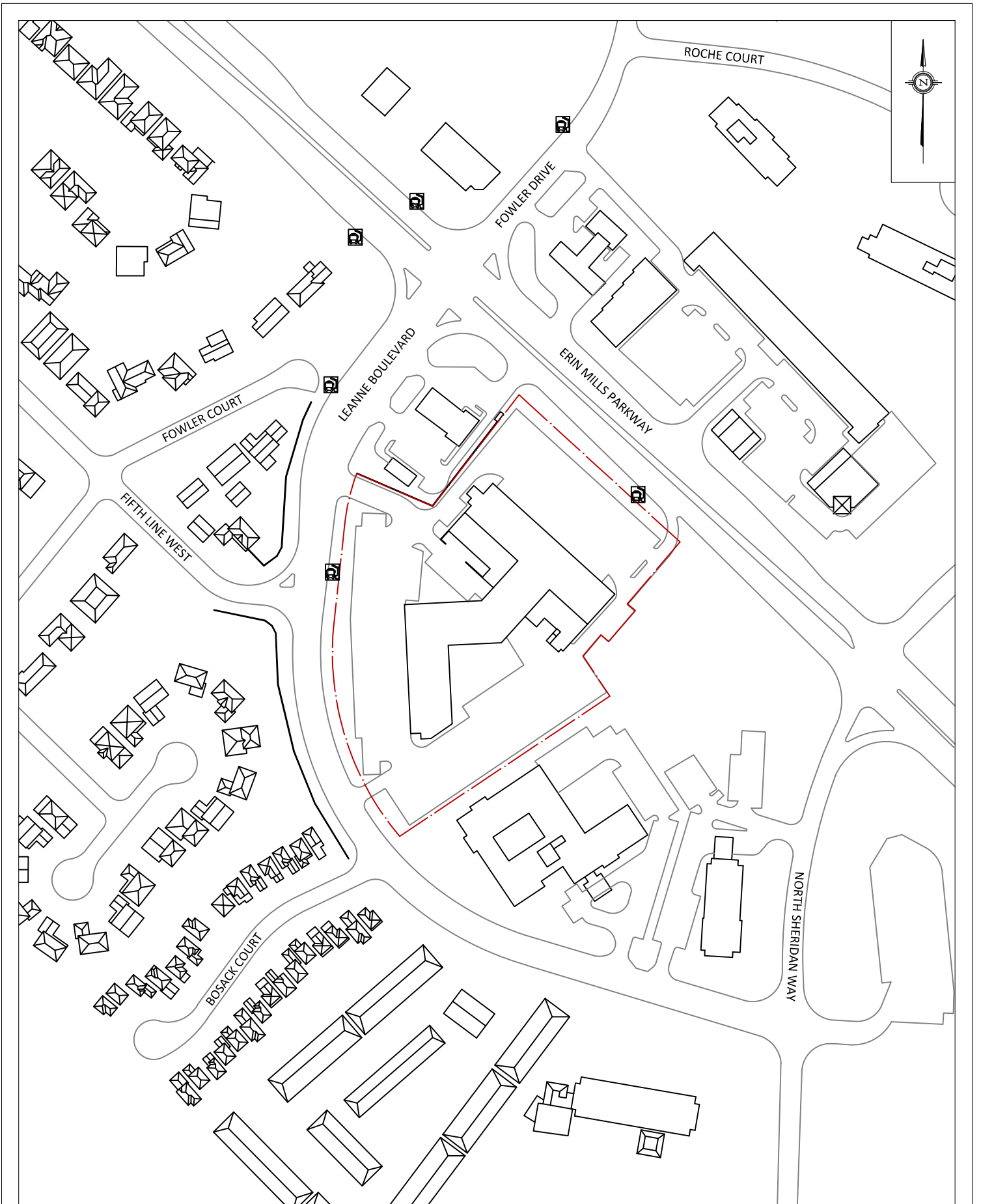
MARCH 24, 2026

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S.K.

DESCRIPTION

FIGURE 1A:
PROPOSED SITE PLAN AND SURROUNDING CONTEXT



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DESCRIPTION

FIGURE 1B:
EXISTING SITE PLAN AND SURROUNDING CONTEXT

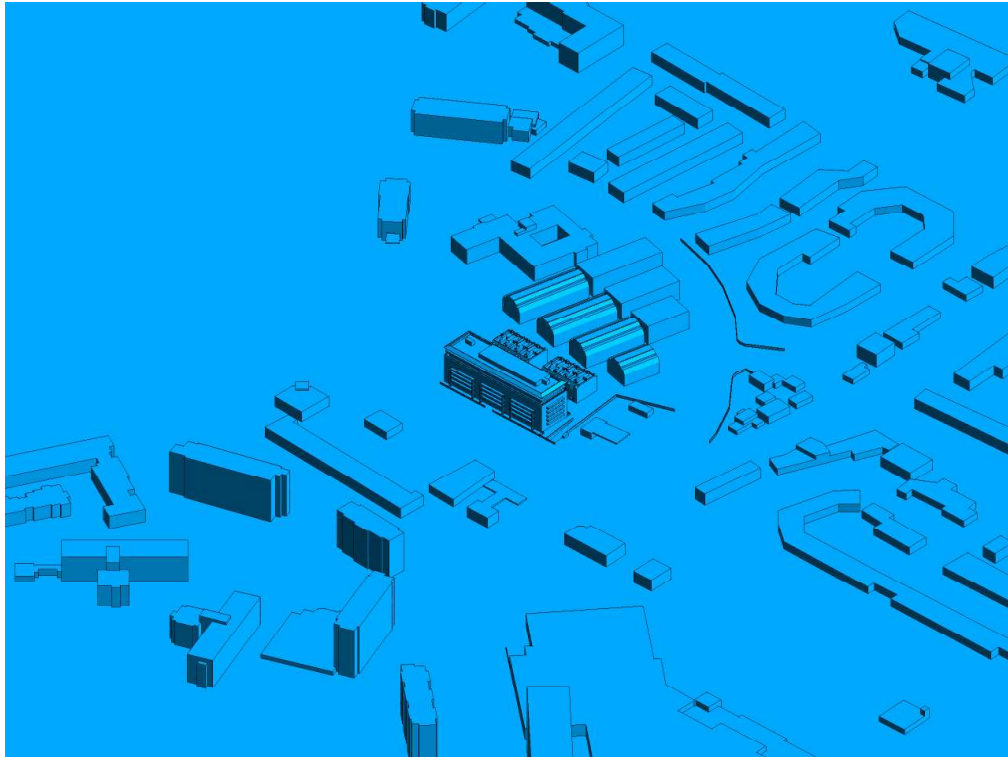


FIGURE 2A: COMPUTATIONAL MODEL, PROPOSED MASSING, NORTH PERSPECTIVE

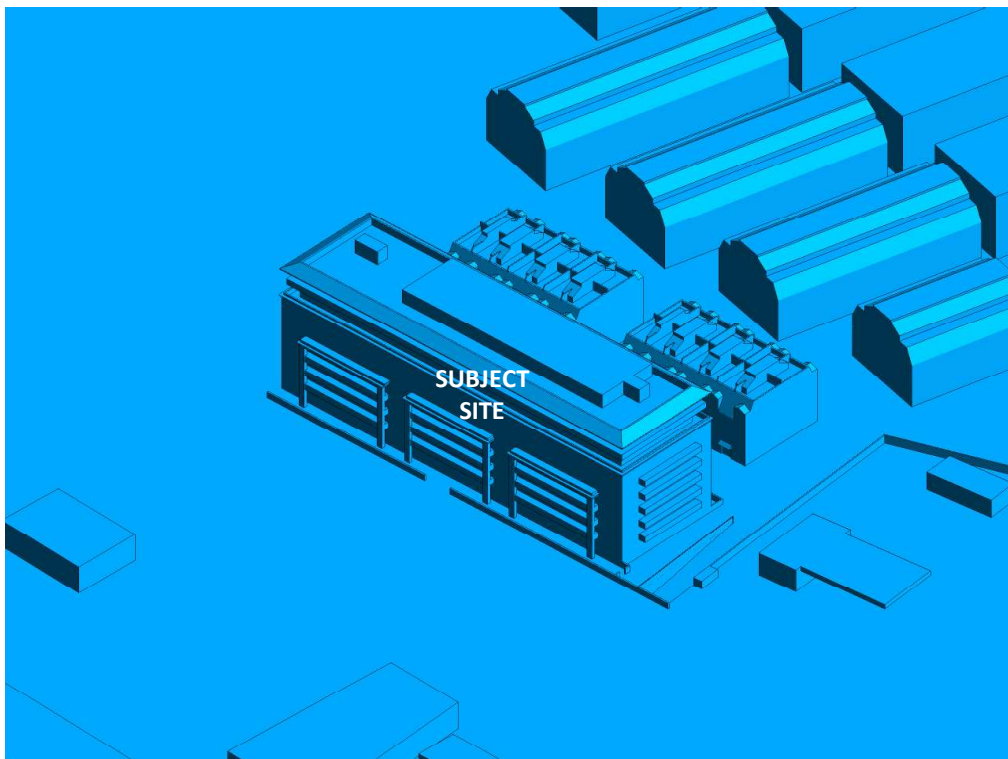


FIGURE 2B: CLOSE UP OF FIGURE 2A





FIGURE 2C: COMPUTATIONAL MODEL, EXISTING MASSING, NORTH PERSPECTIVE

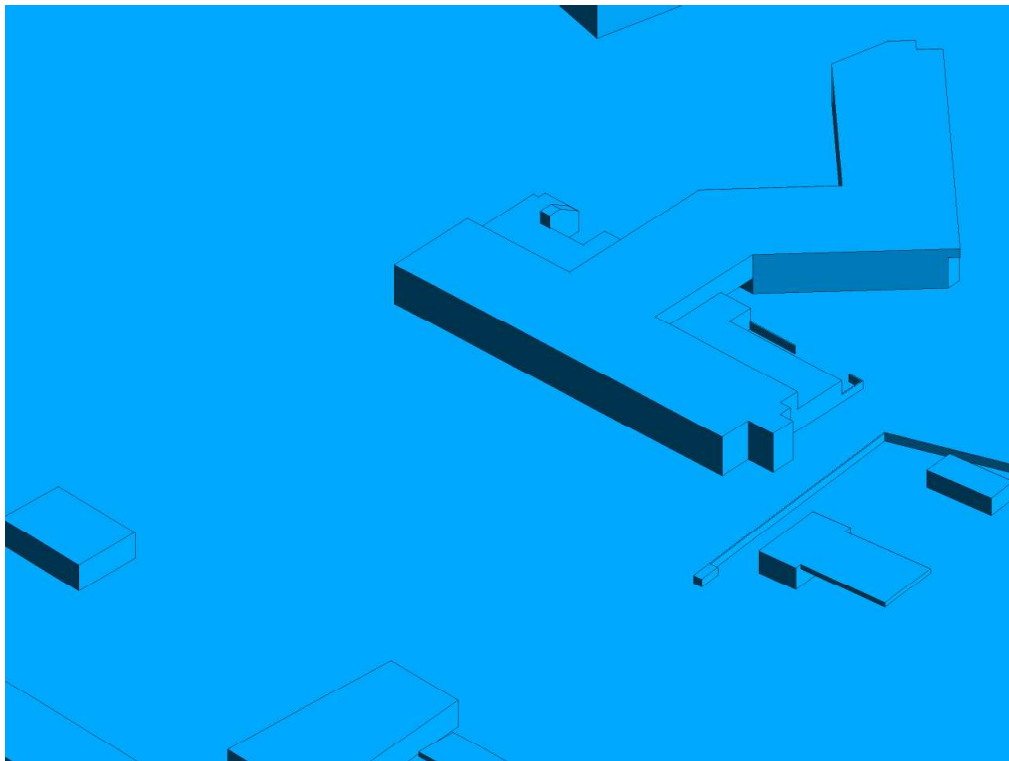


FIGURE 2D: CLOSE UP OF FIGURE 2C



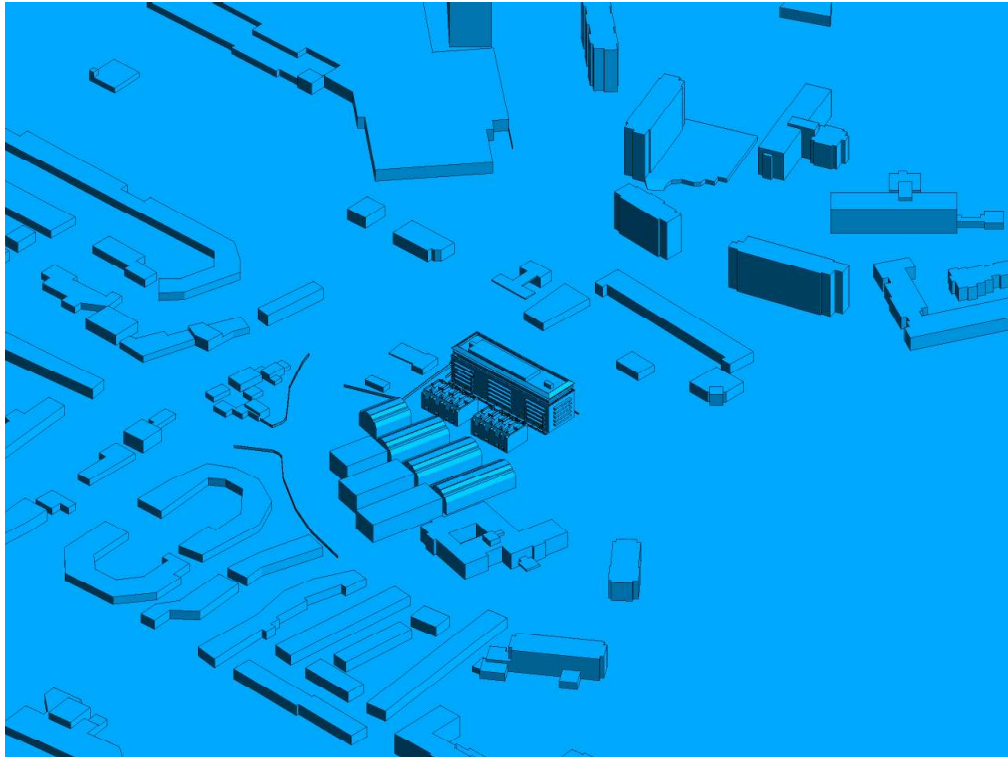


FIGURE 2E: COMPUTATIONAL MODEL, PROPOSED MASSING, SOUTH PERSPECTIVE

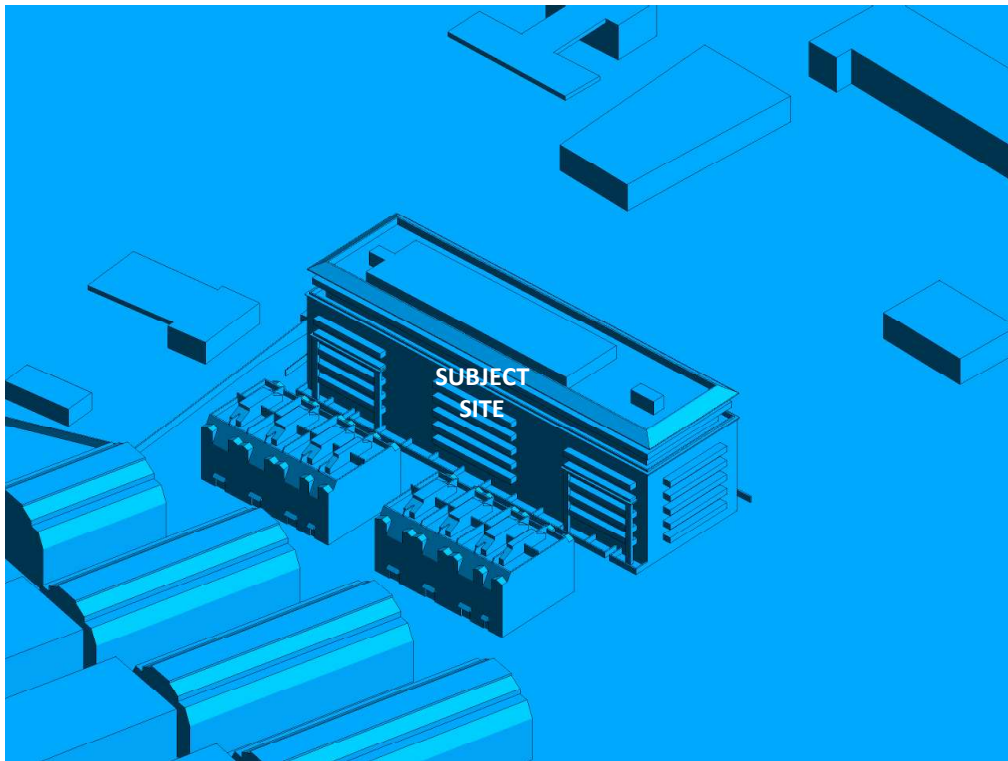


FIGURE 2F: CLOSE UP OF FIGURE 2E



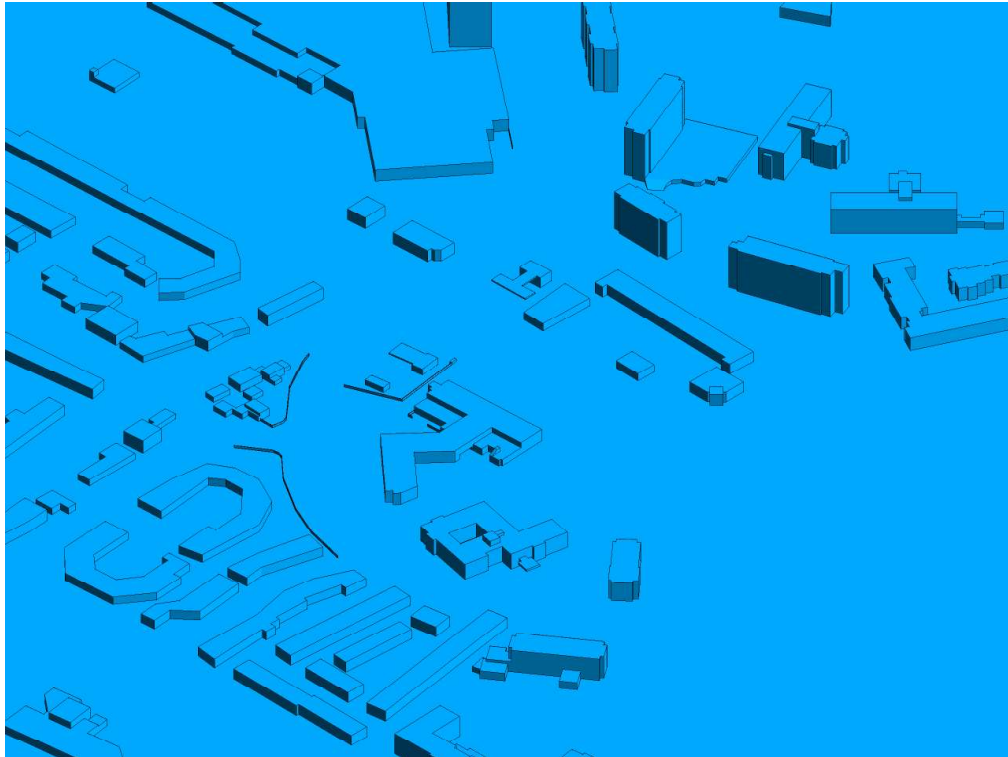


FIGURE 2G: COMPUTATIONAL MODEL, EXISTING MASSING, SOUTH PERSPECTIVE

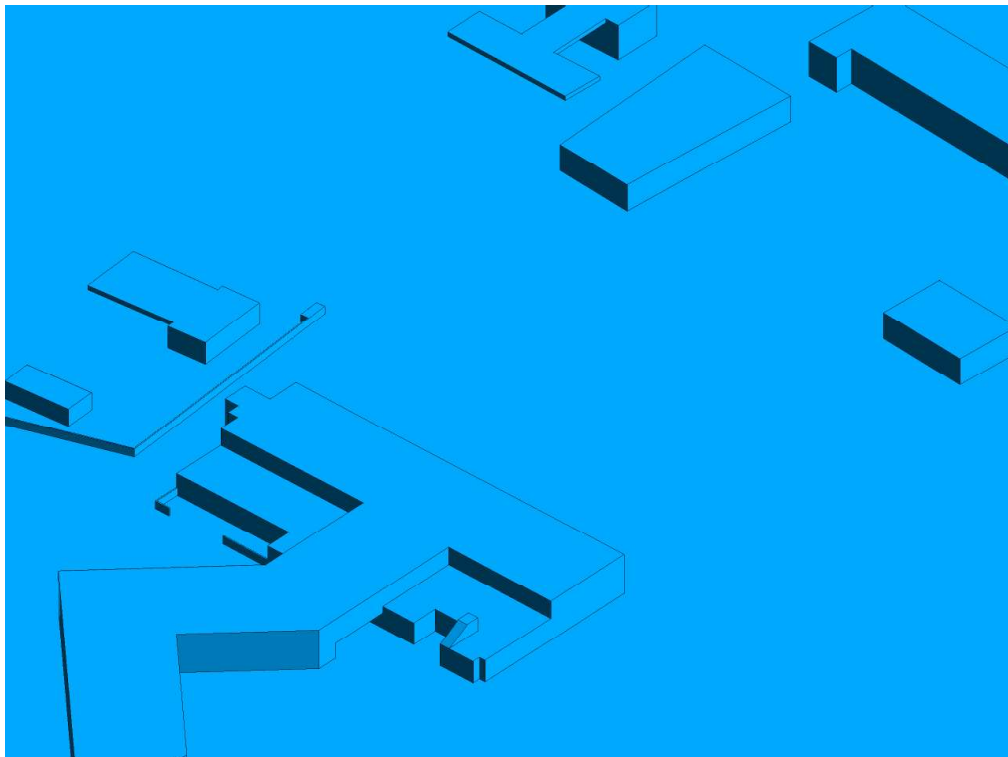


FIGURE 2H: CLOSE UP OF FIGURE 2G



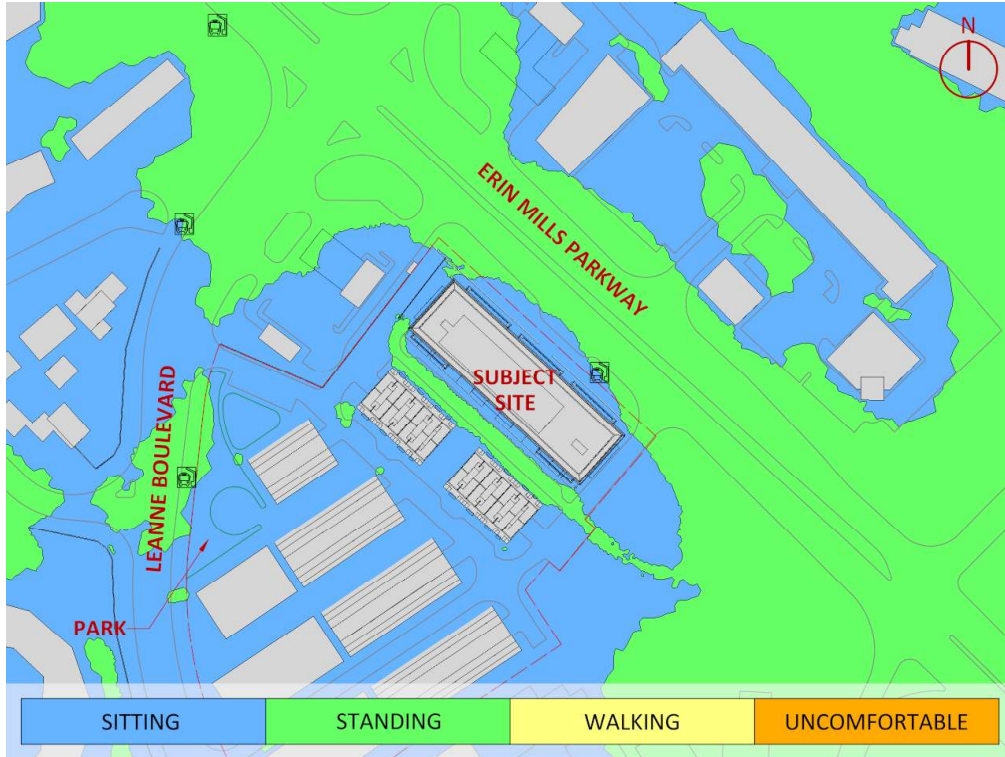


FIGURE 3A: SUMMER – WIND COMFORT, GRADE LEVEL – PROPOSED MASSING

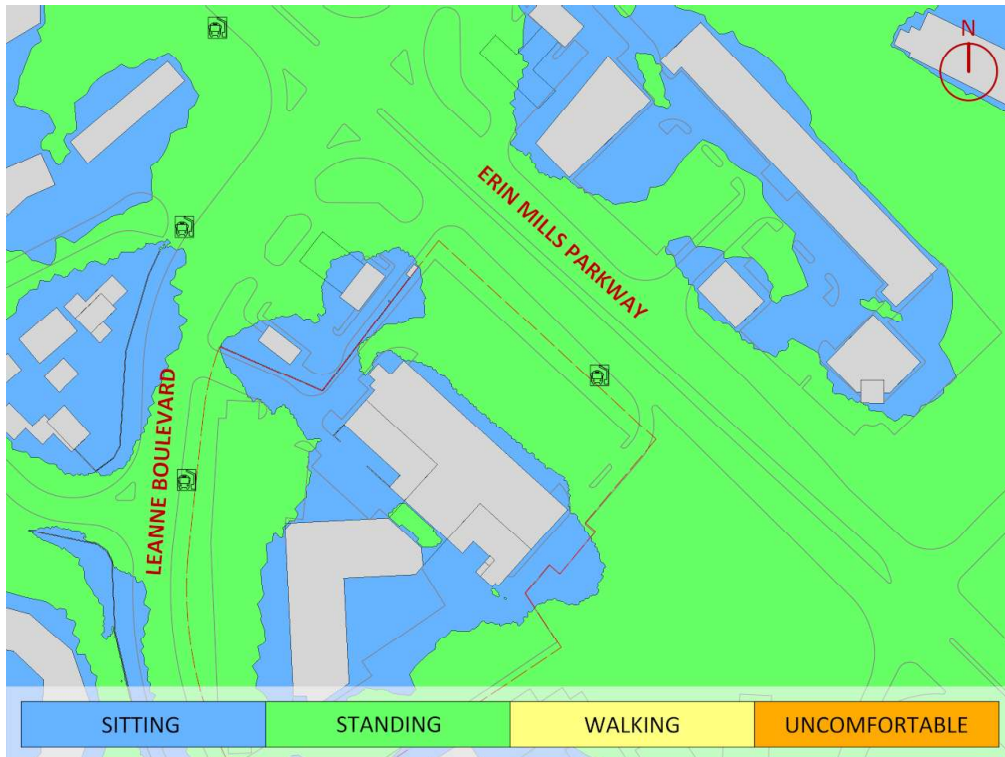


FIGURE 3B: SUMMER – WIND COMFORT, GRADE LEVEL – EXISTING MASSING



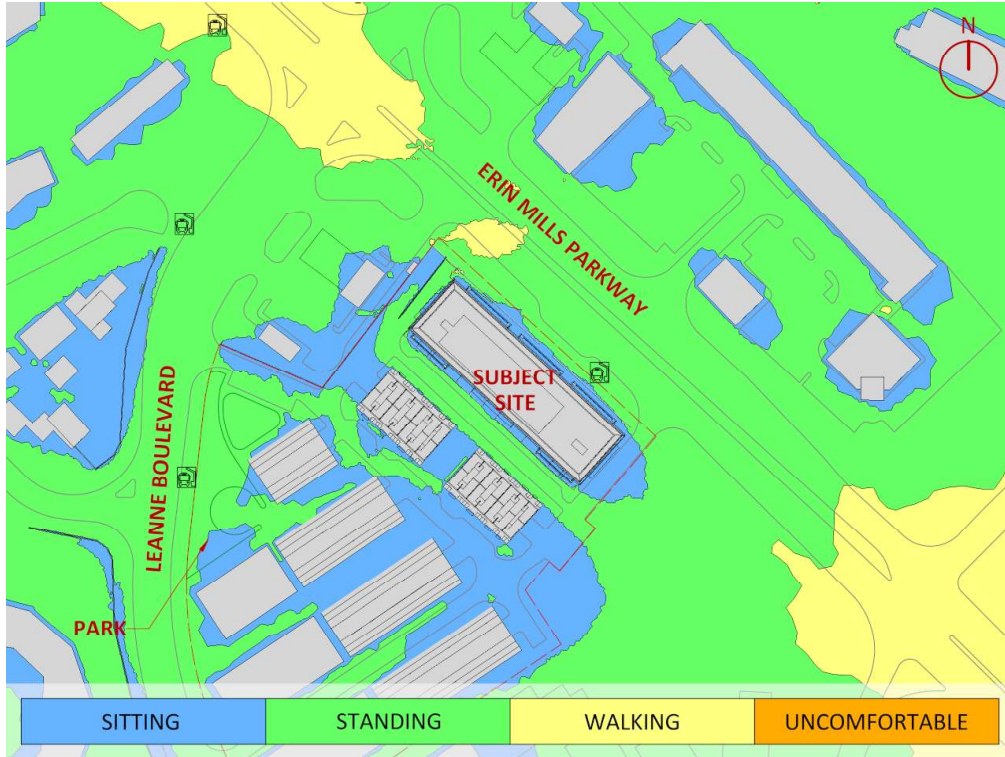


FIGURE 4A: WINTER – WIND COMFORT, GRADE LEVEL – PROPOSED MASSING

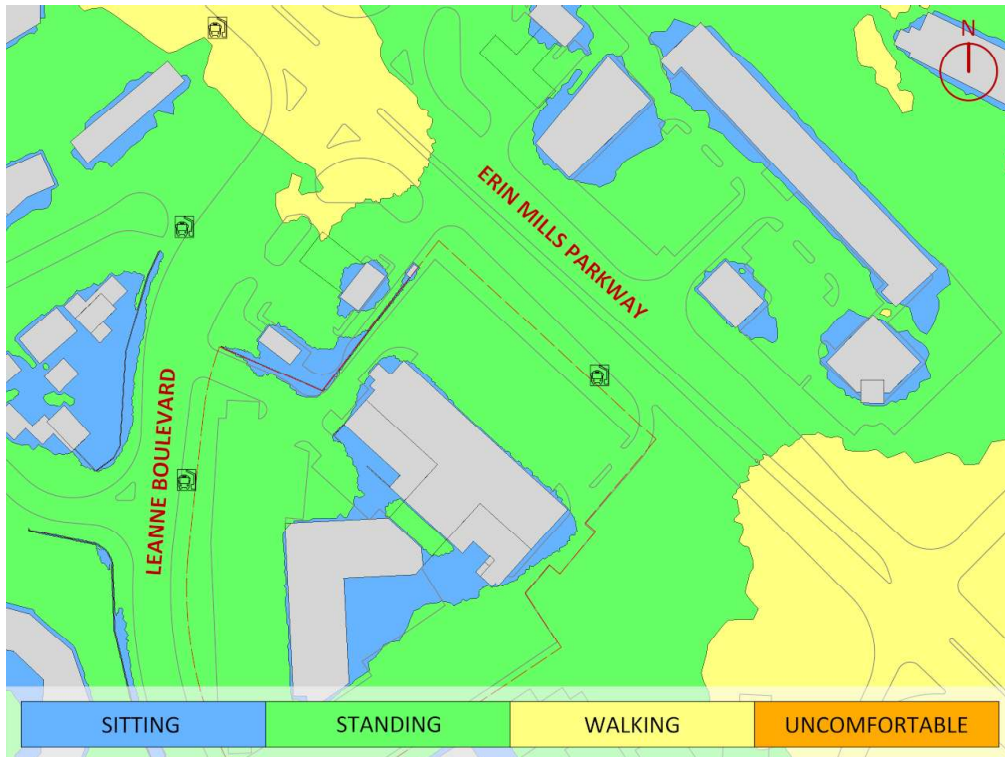
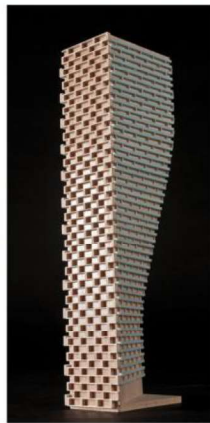


FIGURE 4B: WINTER – WIND COMFORT, GRADE LEVEL – EXISTING MASSING



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APPENDIX A

SIMULATION OF THE ATMOSPHERIC BOUNDARY LAYER

SIMULATION OF THE ATMOSPHERIC BOUNDARY LAYER

The atmospheric boundary layer (ABL) is defined by the velocity and turbulence profiles according to industry standard practices. The mean wind profile can be represented, to a good approximation, by a power law relation, Equation (1), giving height above ground versus wind speed (1), (2).

$$U = U_g \left(\frac{Z}{Z_g} \right)^\alpha \quad \text{Equation (1)}$$

where U = mean wind speed, U_g = gradient wind speed, Z = height above ground, Z_g = depth of the boundary layer (gradient height), and α is the power law exponent.

For the model, U_g is set to 6.5 metres per second (m/s), which approximately corresponds to the 50% mean wind speed for Mississauga based on historical climate data and statistical analyses. When the results are normalized by this velocity, they are relatively insensitive to the selection of gradient wind speed.

Z_g is set to 540 m. The selection of gradient height is relatively unimportant, so long as it exceeds the building heights surrounding the Clarkson TOC Site. The value has been selected to correspond to our physical wind tunnel reference value.

α is determined based on the upstream exposure of the far-field surroundings (that is, the area that is not captured within the simulation model).

Table 1 presents the values of α used in this study, while Table 2 presents several reference values of α . When the upstream exposure of the far-field surroundings is a mixture of multiple types of terrain, the α values are a weighted average with terrain that is closer to the site given greater weight.

TABLE 1: UPSTREAM EXPOSURE (ALPHA VALUE) VS TRUE WIND DIRECTION

Wind Direction (Degrees True)	Alpha Value (α)
0	0.23
22.5	0.23
45	0.21
67.5	0.22
90	0.23
112.5	0.23
135	0.22
157.5	0.22
180	0.23
202.5	0.22
225	0.21
247.5	0.22
270	0.23
292.5	0.24
315	0.23
337.5	0.24

TABLE 2: DEFINITION OF UPSTREAM EXPOSURE (ALPHA VALUE)

Upstream Exposure Type	Alpha Value (α)
Open Water	0.14-0.15
Open Field	0.16-0.19
Light Suburban	0.21-0.24
Heavy Suburban	0.24-0.27
Light Urban	0.28-0.30
Heavy Urban	0.31-0.33

The turbulence model in the computational fluid dynamics (CFD) simulations is a two-equation shear-stress transport (SST) model, and thus the ABL turbulence profile requires that two parameters be defined at the inlet of the domain. The turbulence profile is defined following the recommendations of the Architectural Institute of Japan for flat terrain (3).

$$I(Z) = \begin{cases} 0.1 \left(\frac{Z}{Z_g}\right)^{-\alpha-0.05}, & Z > 10 \text{ m} \\ 0.1 \left(\frac{10}{Z_g}\right)^{-\alpha-0.05}, & Z \leq 10 \text{ m} \end{cases} \quad \text{Equation (2)}$$

$$L_t(Z) = \begin{cases} 100 \text{ m} \sqrt{\frac{Z}{30}}, & Z > 30 \text{ m} \\ 100 \text{ m}, & Z \leq 30 \text{ m} \end{cases} \quad \text{Equation (3)}$$

where I = turbulence intensity, L_t = turbulence length scale, Z = height above ground, and α is the power law exponent used for the velocity profile in Equation (1).

Boundary conditions on all other domain boundaries are defined as follows: the ground is a no-slip surface; the side walls of the domain have a symmetry boundary condition; the top of the domain has a specified shear, which maintains a constant wind speed at gradient height; and the outlet has a static pressure boundary condition.

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