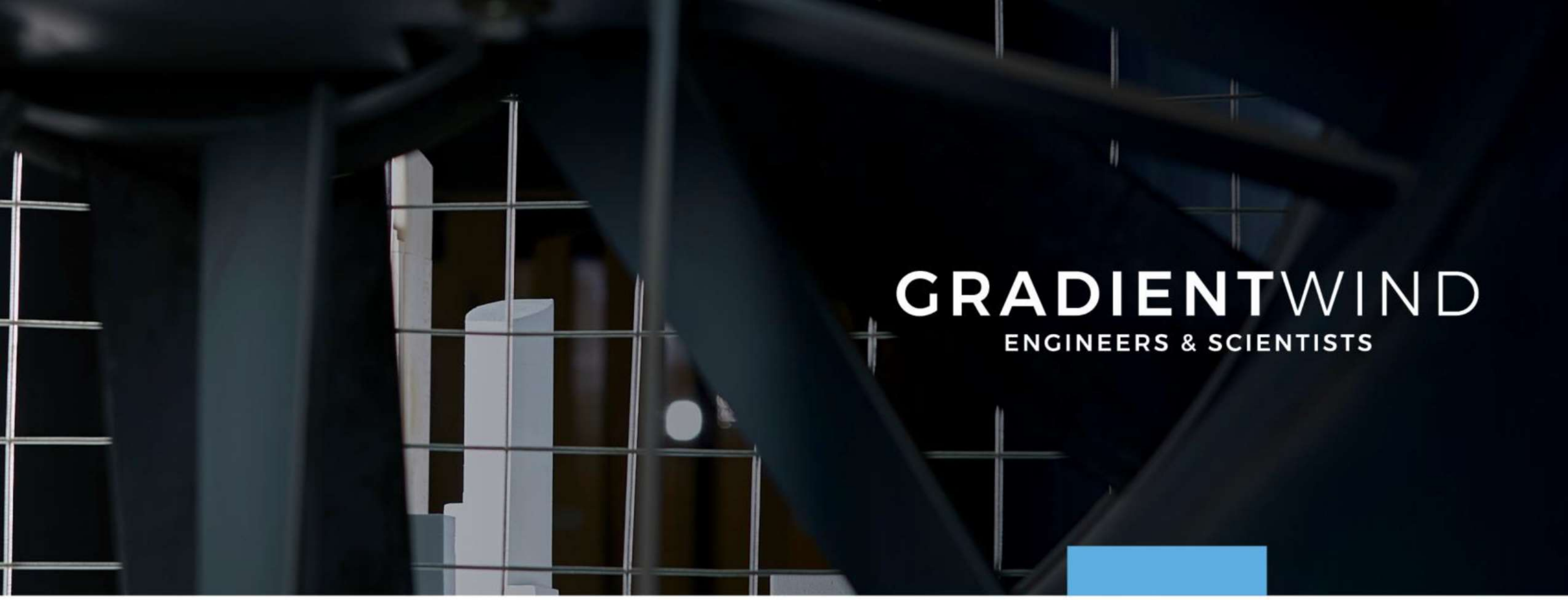
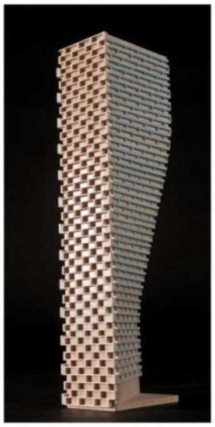


PEDESTRIAN LEVEL WIND STUDY

420-468 South Service Road East
Oakville, Ontario

Report: 24-208-PLW-2025



October 8, 2025

PREPARED FOR
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EXECUTIVE SUMMARY

This report describes a pedestrian level wind (PLW) study undertaken to satisfy Official Plan Amendment application resubmission requirements for the proposed multi-building development located at 420-468 South Service Road East in Oakville, Ontario (hereinafter referred to as "subject site"). 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 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. Since the City of Oakville does not specify wind criteria, the City of Toronto wind criteria were used, as they represent the standards applied in a nearby city and are consistent with industry standards. A complete summary of the predicted wind conditions is provided in Section 5 and illustrated in Figures 3A-9, and is summarized as follows:

1) Most grade-level areas within and surrounding the subject site are predicted to experience conditions that are considered acceptable for their intended pedestrian uses throughout the year. Specifically, conditions over most surrounding sidewalks, neighbouring existing laneways and surface parking lots, and over most proposed drive aisles, are considered acceptable.

2) Isolated regions of conditions that may occasionally be considered uncomfortable for walking are predicted within the subject site, affecting limited areas beyond the property limits. The windier conditions at grade are primarily attributed to a combination of factors:

    a. The proposed development is exposed to prevailing winds from multiple directions, owing to the surrounding sparse suburban context, and the windy conditions are expected following the introduction of the building development in its surroundings.

b. Salient winds from the southeast and from the southwest clockwise to the north are predicted to downwash over the tower and podia façades and around the exposed corners of the podia within the subject site, in combination with prevailing winds accelerating and channelling between Towers B and D, Towers E and F, Towers H and M, Towers C and I, Towers I and K, Towers L and M, Blocks 1 and 2, and Blocks 3 and 4.

c. The noted conditions are predicted to impact sections of the public sidewalks along South Service Road East, Davis Road, the central north-south arterial road, and the drive aisles serving Towers K and L, as well as within the strata parks.

d. Mitigation measures that may be considered by the design team as the design of the proposed development progresses are summarized in Section 5.1, including modest revisions to built forms, canopies extending from select podia elevations, and wind barriers to reduce and limit wind channelling. It is recommended to relocate or recess building access points that are currently located at windier areas, as noted in Section 5.1.

e. As required by programming, wind comfort conditions at sensitive-use areas within the exterior common amenities and park areas within the subject site may be improved by implementing targeted landscaping elements adjacent to sensitive-use areas, including elements such as tall wind screens and coniferous plantings in dense arrangements in combination with strategically placed seating with high-back benches and other local wind mitigation. The extent of the mitigation measures is dependent on programming.

f. The proposed landscaping plan includes significant proposed plantings throughout the site, including medium and large trees as well as shrubs, which are expected to improve wind conditions throughout the proposed parks and public spaces at grade during the typical use period. The 2-storey heritage building to the north of the strata park within Block 1 is similarly expected to provide modest shielding to northwest winds for the neighbouring park areas, improving wind conditions for the noted strata park.

3) Regarding the common amenity terraces serving each block at the podia rooftops, which were modelled with 1.8-m-tall wind screens along their full perimeters, wind comfort conditions are predicted to be suitable for mostly standing, or better, during the typical use period (May to October, inclusive), with isolated areas of walking conditions.

    a. If seating areas are to be programmed in the windier areas of these terraces, mitigation in the form of targeted elements inboard of the terrace perimeters in combination with canopies extending from select tower façades is recommended, in addition to the 1.8-m-tall perimeter screens.

    b. The extent of mitigation measures is dependent on the programming of the terraces. If required by programming, an appropriate mitigation strategy may be developed in collaboration with the building and landscape architects as the design of the proposed development progresses. This work would be expected to support the future Zoning By-Law Amendment application and Site Plan Control application submissions.

4) The foregoing statements and conclusions apply to common weather systems, during which three regions within the vicinity of the subject site may experience conditions that approach the wind safety threshold, as defined in Section 4.4. Specifically, the safety criterion may be exceeded on an annual basis within isolated regions to the southeast of Tower B, southwest of Tower F, and southwest of Tower H at grade. It is recommended that an appropriate mitigation strategy to resolve potential wind safety exceedances and to improve comfort over these areas be developed and confirmed as the design of the proposed development progresses. This work would be expected to support the future Zoning By-Law Amendment and Site Plan Control applications.

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ENGINEERS & SCIENTISTS

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1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by South Service Holding Corp. to undertake a pedestrian level wind (PLW) study to satisfy Official Plan Amendment application resubmission requirements for the proposed multi-building development located at 420-468 South Service Road East in Oakville, Ontario (hereinafter referred to as the "subject site" or "proposed development"). A PLW study was conducted in October 2024[1] for the previous design of the proposed development. 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 pedestrian activities so that mitigation measures may be considered, where required.

The study is based on industry standard computer simulations using the computational fluid dynamics (CFD) technique and data analysis procedures, industry standard wind comfort and safety guidelines, architectural drawings provided by Graziani + Corazza Architects Inc. in September 2025, surrounding street layouts and existing and approved future building massing information obtained from the City of Oakville, and recent site imagery. Since the City of Oakville does not specify wind criteria, the City of Toronto wind criteria were used, as they represent the standards applied in a nearby city and are consistent with industry standards.

2. TERMS OF REFERENCE

The subject site is located at 420-468 South Service Road East in Oakville, situated approximately 250 metres (m) north-northeast of the intersection of South Service Road East and Davis Road on a parcel of land bordered by South Service Road East to the northwest, low-rise commercial buildings to the northeast and southwest, and green space and the Canadian National (CN) railway to the southeast. Throughout this report, South Service Road East is considered as project north.

A north-south arterial road and Davis Road extending east-west divide the proposed development into four blocks – Block 1, Block 2, Block 3, and Block 4 – situated to the northwest, northeast, southwest, and southeast, respectively. Additionally, Cross Avenue extends along the south site boundary and Street A and Street B border the west and east perimeters of the subject site, respectively. Each block is served by

[1] Gradient Wind Engineering Inc., '*420-468 South Service Road East – Pedestrian Level Wind Study*', [Oct 16, 2024]

four underground parking levels. The subject site comprises a downwards slope towards the rear parkland, with a future overpass connecting to North Service Road East from the arterial road and an east-west pedestrian overpass provided to the south, between Blocks 2 and 3. Strata parks are situated central to each block, parklands are provided to the south of Blocks 3 and 4, a potential parkland extension is at the southeast corner of Block 4, and privately-owned publicly accessible spaces (POPS) are located at the intersection of the north-south arterial road and Davis Road, at the southwest corner of Block 3, and to the south of Block 4. All towers rise above 6-storey podia and the podia rooftops at Level 7 are served by common amenity terraces.

Block 1 comprises four towers: Tower A (45 storeys) to the northwest, Tower B (48 storeys) to the north, Tower C (40 storeys) to the southwest, and Tower D (45 storeys) to the southeast. Towers A and B rise above a shared podium. Block 2 similarly comprises four towers: Tower E (45 storeys) to the southwest, Tower F (48 storeys) to the north, Tower G (45 storeys) to the northeast, and Tower H (40 storeys) to the southeast. Towers F and G rise above a shared podium. Block 3 comprises three towers: Tower I (40 storeys) to the northwest, Tower J (35 storeys) to the southwest, and Tower K (45 storeys) to the northeast. Towers I and J rise above a shared podium. Block 4 also comprises three towers: Tower L (45 storeys) to the northwest, Tower M (40 storeys) to the northeast, and Tower N (35 storeys) to the southeast. Towers M and N rise above a shared podium.

Regarding wind exposures, the near-field surroundings (defined as an area falling within a 200-m-radius of the subject site) comprises low-rise commercial buildings with surface parking lots and vacant lots and green spaces in all directions with a mid-rise office building to the south-southwest and Cornwall Road Park to the southeast. Notably, the CN railway extends from the east to the south-southeast. The far-field surroundings (defined as the area beyond the near field and within a 2-kilometre (km) radius) include low-rise massing in all directions with isolated mid-rise buildings to the northeast and isolated clusters of mid- and high-rise buildings from the southeast clockwise to the northwest. Hogs Back Park is located approximately 1.4 km to the southwest and Lake Ontario is located approximately 2 km to the southeast.

A site plan for the proposed massing scenario is illustrated in Figure 1. Figures 2A-2D illustrate the computational models used to conduct the study.

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 Greater Toronto Area wind climate, and synthesis of computational data with wind criteria. Since the City of Oakville does not specify wind criteria, the City of Toronto wind criteria[2] were used, as they represent the standards applied in a nearby city and are consistent wind industry standards. The following sections describe the analysis procedures, including a discussion of the noted pedestrian wind criteria.

4.1 Computer-Based Context Modelling

A computer based PLW study was performed to determine the influence of the wind environment on pedestrian comfort over the proposed development 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 in Mississauga, Ontario.

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 stronger wind speed values.

[2] Toronto, *Pedestrian Level Wind Study Terms of Reference Guide*, 2022
https://www.toronto.ca/wp-content/uploads/2022/03/8f9c-CityPlanning-ToR-Wind-Guide.pdf

4.2 Wind Speed Measurements

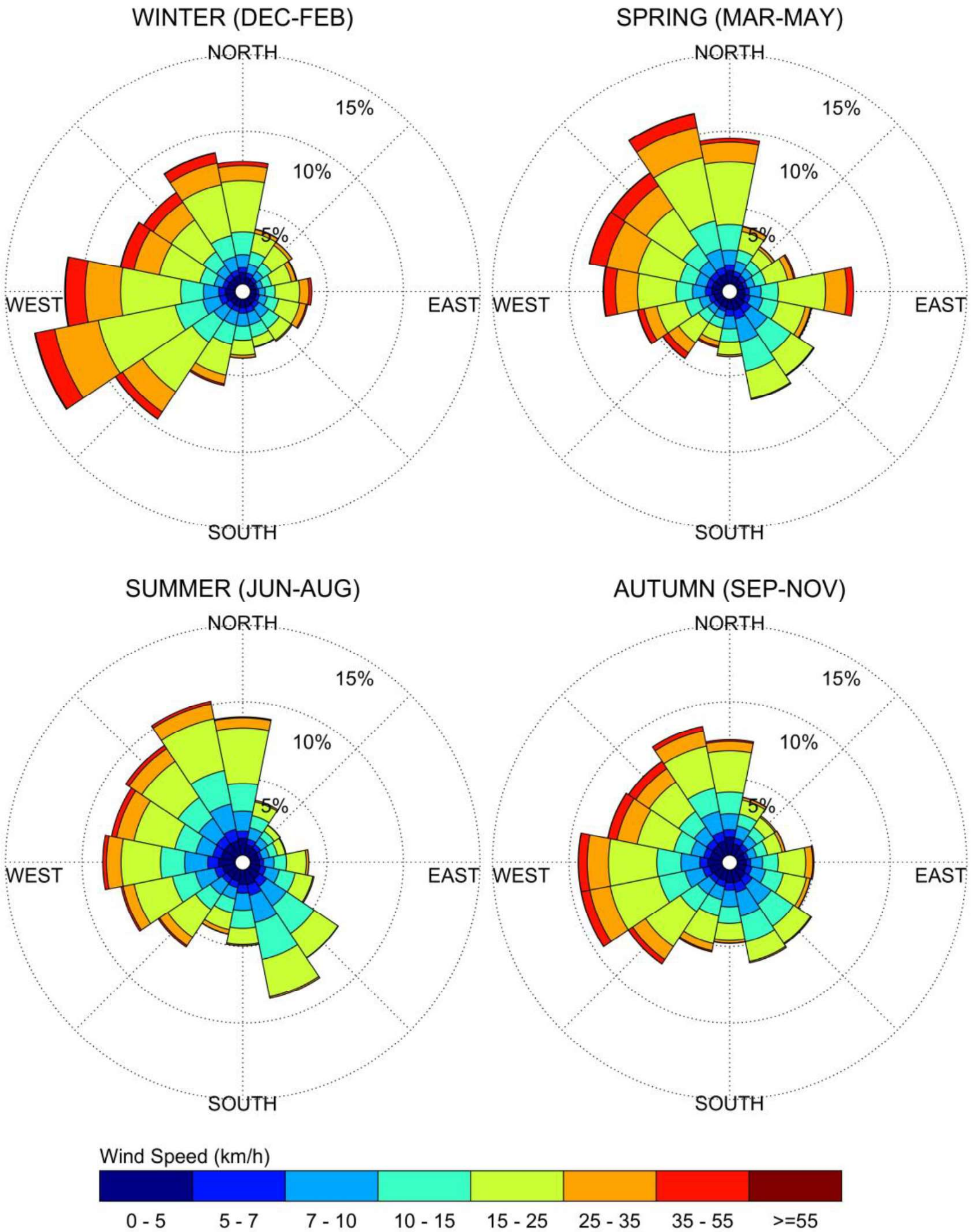
The PLW analysis was performed by simulating wind flows and gathering velocity data over a CFD model of the subject site for 16 wind directions. The CFD simulation model was centered on the proposed development, complete with surrounding massing within a radius of approximately 630 m. Mean and peak wind 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 and the common amenity terraces serving the proposed development 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 Oakville 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 four distinct seasons. Specifically, spring is defined as March through May, summer is defined as June through August, autumn is defined as September through November, and winter is defined as December through February, inclusive.

The statistical model of the Greater Toronto 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 the Greater Toronto Area, representative of Oakville, the most common winds occur for westerly wind directions, followed by those from the east, 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 EASONAL 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 Guidelines

Pedestrian wind comfort and safety guidelines are based on the mechanical effects of wind without consideration of other meteorological conditions (that is, temperature and relative humidity). The comfort guidelines 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 Toronto Pedestrian Level Wind Study Terms of Reference Guide. Specifically, the guidelines 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. Specifically, the comfort classes, associated wind speed ranges, and limiting targets 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 subject site, the assessment of pedestrian comfort involves determining the suitability of the predicted wind conditions for discrete regions within and surrounding the subject 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
Café / Patio / Bench / Garden	Sitting / Standing
Transit/Bus Stop (Without Shelter)	Standing
Transit/Bus Stop (With Shelter)	Walking
Public Park / Plaza / Amenity Space	Sitting / Standing
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 3-6, which illustrate wind conditions at grade level for the proposed massing scenario, and by Figures 8A-D, which illustrate wind conditions over the common amenity terraces serving each tower at their podia rooftops. 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.

Wind comfort conditions are also reported for the typical use period, which is defined as May to October, inclusive. Figures 7 and 9 illustrate wind comfort conditions at grade level and over the noted common amenity terraces, respectively, during this period, consistent with the comfort classes 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

The mostly suburban environs of the subject site and the limited built-up massing in the vicinity of the proposed development exposes the subject site to prevailing winds from multiple directions. Salient winds from the southeast and from the southwest clockwise to the north are predicted to downwash over the tower and podia façades and around the exposed corners of the podia within the subject site. These prevailing winds are also predicted to accelerate and be channelled between the blocks and buildings within the subject site.

Specifically, during the autumn season, isolated regions of conditions that may be considered as occasionally uncomfortable for walking are predicted between Towers B and D, Towers E and F, and Towers H and M. During the spring season, isolated regions of conditions considered uncomfortable for walking are predicted at these locations as well to the northwest of Tower A and northeast of Tower G, and between Towers C and I, Towers I and K, Towers L and M, Blocks 1 and 2, and Blocks 3 and 4. During the winter, regions of uncomfortable conditions are predicted at these locations as well as to the southwest of Tower J.

Notably, an existing 2-storey heritage building will be retained to the northeast of Block 1, providing modest shielding from the prevailing winds coming from the northwest and modestly improving wind comfort conditions over the northern region of the strata park within Block 1. Additionally, dense vegetation comprising a combination of large- and medium-sized deciduous and coniferous trees as well as shrubs are planned over the strata parks serving all four blocks and over the parkland to the south, as noted in the landscaping plans[3]. Additional planned vegetation is located along Streets A and B as well as Cross Avenue and Davis Road. Of particular note, the dense vegetation within the parkland and the strata parks is expected to be significant in improving the predicted wind conditions over the noted areas during the typical use period (May to October, inclusive) when the vegetation is in full foliage. Where coniferous trees are implemented, conditions are expected to be improved in their vicinity throughout the year.

As the design of the proposed development progresses, mitigation strategies for wind control and mitigation may be further considered in collaboration with the building and landscape architects. Proposed elements include increased building setbacks, particularly from west, north, and east elevations, canopies that extend from select podia elevations to diffuse downwashing winds, the introduction of façade protrusions such as large vertical fins to diffuse wind accelerations along façades, corner treatments such as chamfering of podia and tower corners to reduce corner acceleration, and elements at grade such as overhead canopies and targeted placement and installation of vertical wind barriers.

Sidewalks along Davis Road, Street A, Street B, Cross Avenue, North-South Arterial Road, and South Service Road East: Predicted wind comfort conditions over most sidewalks in the vicinity of the proposed development are predicted to be suitable for walking, or better, throughout the year. Of note, conditions over Cross Avenue are predicted to be suitable for mostly standing, or better, throughout the year.

Neighbouring Existing Laneways and Surface Parking Lots: Following the introduction of the proposed development, wind comfort conditions over the nearby existing laneways and surface parking lots in the vicinity of the subject site are predicted to be suitable for mostly walking, or better, throughout the year. The noted conditions are considered acceptable.

[3] The Rose Corporation, '*Landscape Plan – Ground Floor Plan*', [September 17, 2025]

Strata Parks, POPS, Parkland, and Potential Parkland Extension: During the typical use period, wind comfort conditions over the parklands to the south of Blocks 3 and 4, the potential parkland extension at the southeast corner of Block 4, and the POPS at the southwest corner of Block 3 and to the south of Block 4 are predicted to be suitable for a mix of sitting and standing. Conditions over the POPS serving each tower facing the intersection of the north-south arterial road and Davis Road are predicted to be suitable for standing during the typical use period, with isolated regions suitable for walking to the northeast of Tower K. During the same period, conditions over the strata parks serving each block are predicted to be suitable for mostly walking, or better.

Comfort conditions at sensitive-use areas within these common outdoor areas may be improved by implementing targeted landscaping elements adjacent to sensitive-use areas, including elements such as tall wind screens and coniferous plantings in dense arrangements in combination with strategically placed seating with high-back benches and other local wind mitigation. The extent of the mitigation measures is dependent on the programming of the noted spaces. As noted above, the proposed landscaping includes significant proposed plantings, including medium and large trees as well as shrubs, which are expected to improve wind conditions throughout these public areas during the typical use period.

Proposed Drive Aisles and Pedestrian Overpass: Wind conditions over the pedestrian overpass to the south of the subject site are predicted to be suitable for standing throughout the year, while conditions over the drive aisles serving Blocks 1 and 2, Towers I and J, and Tower M and N are predicted to be suitable for standing, or better, during the summer and autumn, becoming suitable for walking, or better, during the winter and spring. The noted conditions are considered acceptable.

Building Access Points: It is recommended that primary building entrances be located where conditions are predicted to be suitable for standing, or better, throughout the year. If not relocated, where primary or secondary building access points are located where conditions are predicted to be uncomfortable for walking, it is recommended to recess these entrances into the building façades by 2 m, while where conditions are suitable for walking, it is similarly recommended to recess primary building entrances by at least 2 m or to include flanking wind barriers rising at least 1.8 m in height.

5.2 Wind Comfort Conditions – Common Amenity Terraces

Each block is served by common amenity terraces at the podia rooftops. The terraces were modelled with 1.8-m-tall wind screens along their full perimeters, which is recommended to provide shielding from the direct exposure to prevailing winds. Wind comfort conditions within the noted common amenity terraces are predicted to be suitable for standing, or better, during the typical use period, with isolated areas of walking conditions.

If seating areas are to be programmed in the windier areas of these terraces, mitigation in the form of targeted mitigation inboard of the terrace perimeters in combination with canopies extending from select tower façades and the tall perimeter wind screens as noted above, is expected to be required to achieve suitable wind conditions at sensitive-use areas within the windier areas of the terraces. This inboard mitigation could take the form of tall wind screens or clusters of coniferous plantings located around sensitive areas, and canopies located above designated seating areas.

The extent of mitigation measures is dependent on the programming of the terraces. If required by programming, an appropriate mitigation strategy may be developed in collaboration with the building and landscape architects as the design of the proposed development progresses. This work would be expected to support the future Zoning By-Law Amendment application and Site Plan Control application submissions.

5.3 Wind Safety

Within the context of typical weather patterns, which exclude anomalous localized storm events such as tornadoes and downbursts, three pedestrian areas within the subject site may occasionally experience wind conditions that approach the wind safety threshold, as defined in Section 4.4. Specifically, the wind safety threshold may be exceeded on an annual basis within isolated regions to the southeast of Tower B, southwest of Tower F, and southwest of Tower H at grade. It is recommended that an appropriate mitigation strategy to resolve potential wind safety exceedances and to improve pedestrian wind comfort over these areas be developed and confirmed as the design of the proposed development progresses. This work would be expected to support the future Zoning By-Law Amendment application and Site Plan Control application submissions.

5.4 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-9. Based on computer simulations using the CFD technique, meteorological data analysis, and experience with numerous similar developments, the study concludes the following:

1) Most grade-level areas within and surrounding the subject site are predicted to experience conditions that are considered acceptable for their intended pedestrian uses throughout the year. Specifically, conditions over most surrounding sidewalks, neighbouring existing laneways and surface parking lots, and over most proposed drive aisles, are considered acceptable.

2) Isolated regions of conditions that may occasionally be considered uncomfortable for walking are predicted within the subject site, affecting limited areas beyond the property limits. The windier conditions at grade are primarily attributed to a combination of factors:

    a. The proposed development is exposed to prevailing winds from multiple directions, owing to the surrounding sparse suburban context, and the windy conditions are expected following the introduction of the building development in its surroundings.

    b. Salient winds from the southeast and from the southwest clockwise to the north are predicted to downwash over the tower and podia façades and around the exposed corners of the podia within the subject site, in combination with prevailing winds accelerating and channelling between Towers B and D, Towers E and F, Towers H and M, Towers C and I, Towers I and K, Towers L and M, Blocks 1 and 2, and Blocks 3 and 4.

c. The noted conditions are predicted to impact sections of the public sidewalks along South Service Road East, Davis Road, the central north-south arterial road, and the drive aisles serving Towers K and L, as well as within the strata parks.

d. Mitigation measures that may be considered by the design team as the design of the proposed development progresses are summarized in Section 5.1, including modest revisions to built forms, canopies extending from select podia elevations, and wind barriers to reduce and limit wind channelling. It is recommended to relocate or recess building access points that are currently located at windier areas, as noted in Section 5.1.

e. As required by programming, wind comfort conditions at sensitive-use areas within the exterior common amenities and park areas within the subject site may be improved by implementing targeted landscaping elements adjacent to sensitive-use areas, including elements such as tall wind screens and coniferous plantings in dense arrangements in combination with strategically placed seating with high-back benches and other local wind mitigation. The extent of the mitigation measures is dependent on programming.

f. The proposed landscaping plan includes significant proposed plantings throughout the site, including medium and large trees as well as shrubs, which are expected to improve wind conditions throughout the proposed parks and public spaces at grade during the typical use period. The 2-storey heritage building to the north of the strata park within Block 1 is similarly expected to provide modest shielding to northwest winds for the neighbouring park areas, improving wind conditions for the noted strata park.

3) Regarding the common amenity terraces serving each block at the podia rooftops, which were modelled with 1.8-m-tall wind screens along their full perimeters, wind comfort conditions are predicted to be suitable for mostly standing, or better, during the typical use period (May to October, inclusive), with isolated areas of walking conditions.

a. If seating areas are to be programmed in the windier areas of these terraces, mitigation in the form of targeted elements inboard of the terrace perimeters in combination with canopies extending from select tower façades is recommended, in addition to the 1.8-m-tall perimeter screens.

b. The extent of mitigation measures is dependent on the programming of the terraces. If required by programming, an appropriate mitigation strategy may be developed in collaboration with the building and landscape architects as the design of the proposed development progresses. This work would be expected to support the future Zoning By-Law Amendment application and Site Plan Control application submissions.

4) The foregoing statements and conclusions apply to common weather systems, during which three regions within the vicinity of the subject site may experience conditions that approach the wind safety threshold, as defined in Section 4.4. Specifically, the safety criterion may be exceeded on an annual basis within isolated regions to the southeast of Tower B, southwest of Tower F, and southwest of Tower H at grade. It is recommended that an appropriate mitigation strategy to resolve potential wind safety exceedances and to improve comfort over these areas be developed and confirmed as the design of the proposed development progresses. This work would be expected to support the future Zoning By-Law Amendment and Site Plan Control applications.

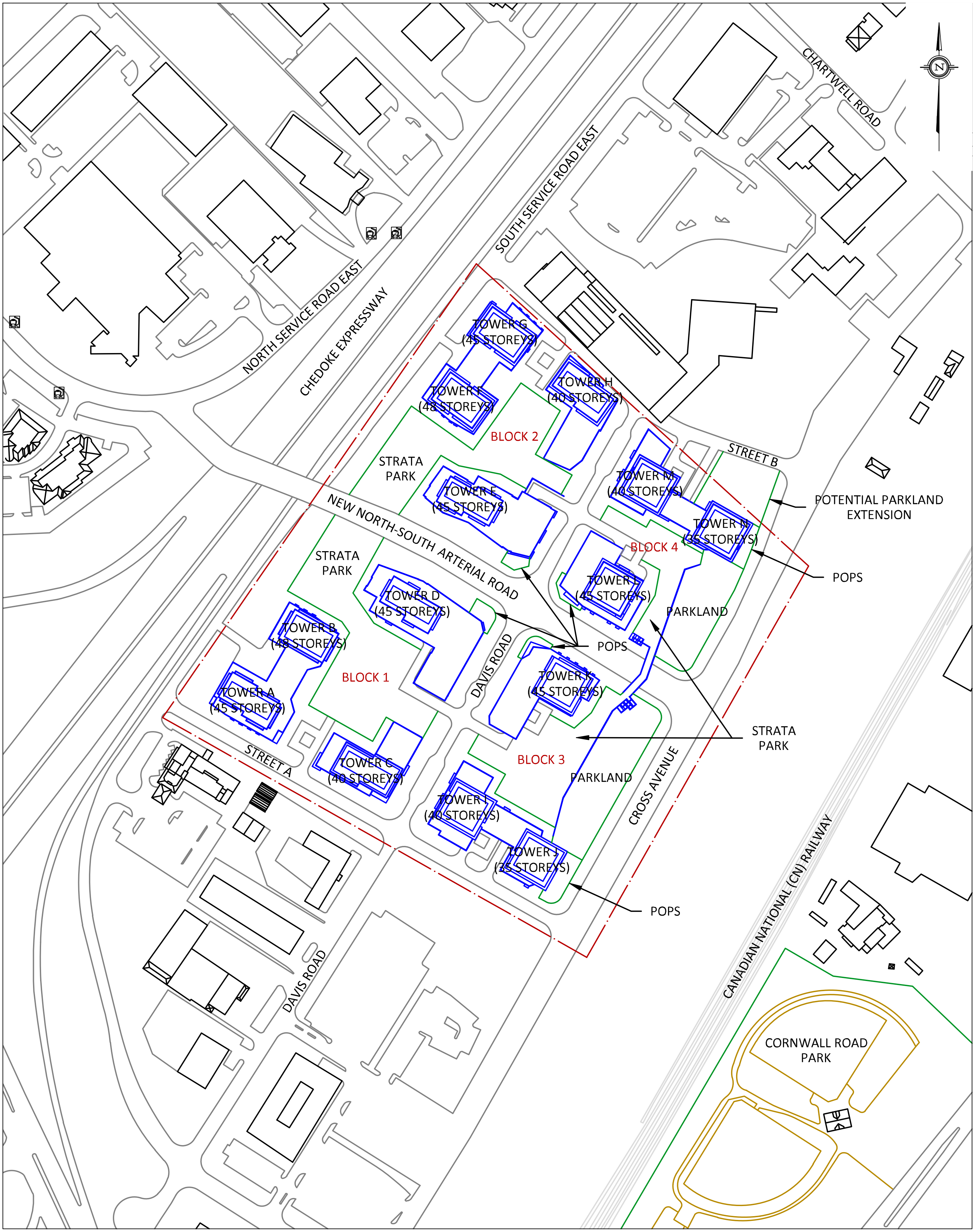
Sincerely,

Gradient Wind Engineering Inc.

Omar Rioseco, B.Eng.
Junior Wind Scientist

David Huitema, M.Eng., P.Eng.
CFD Lead Engineer

Sunny Kang, B.A.S.
Project Coordinator



GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT: 420-468 SOUTH SERVICE ROAD EAST, OAKVILLE PEDESTRIAN LEVEL WIND STUDY SCALE: 1:3500 DRAWING NO.: 24-208-PLW-2025-1 DATE: OCTOBER 3, 2025 DRAWN BY: S.K.	DESCRIPTION: FIGURE 1: PROPOSED SITE PLAN AND SURROUNDING CONTEXT

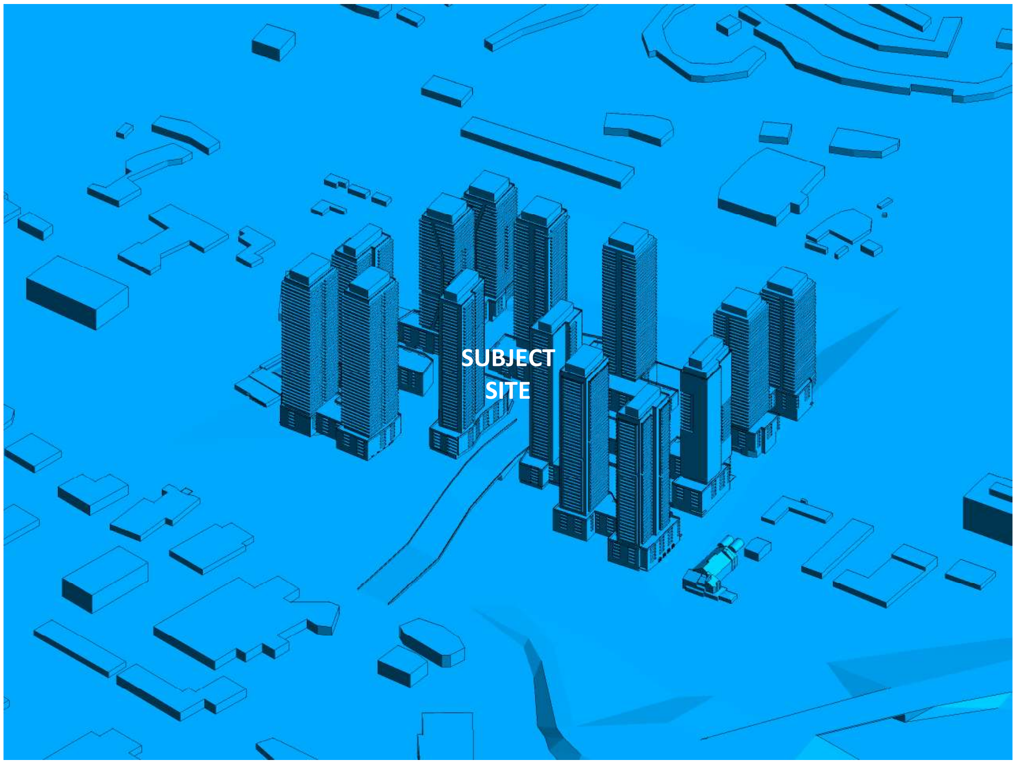


FIGURE 2A: COMPUTATIONAL MODEL, PROPOSED MASSING, WEST PERSPECTIVE

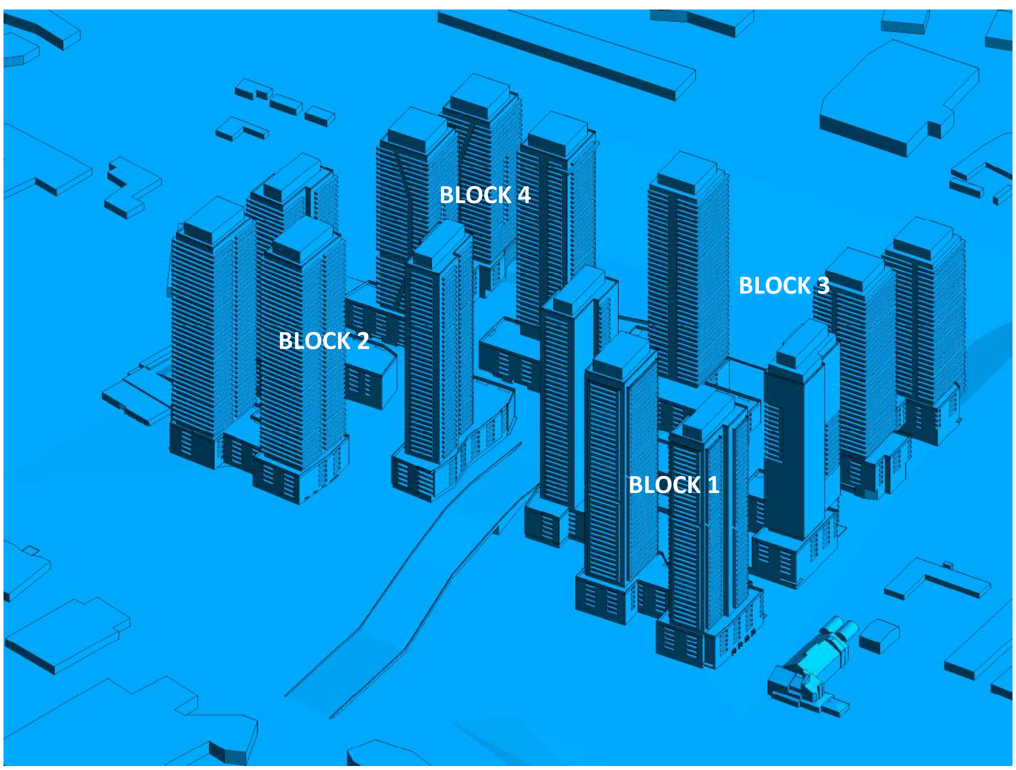


FIGURE 2B: CLOSE-UP VIEW OF FIGURE 2A

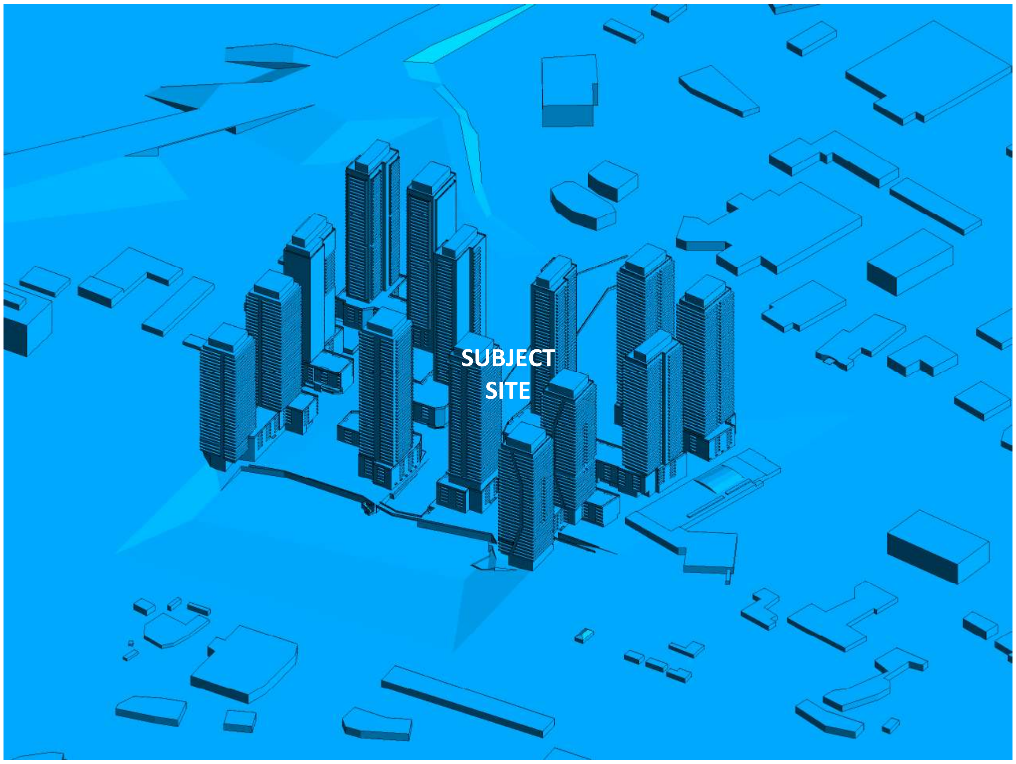


FIGURE 2C: COMPUTATIONAL MODEL, PROPOSED MASSING, EAST PERSPECTIVE

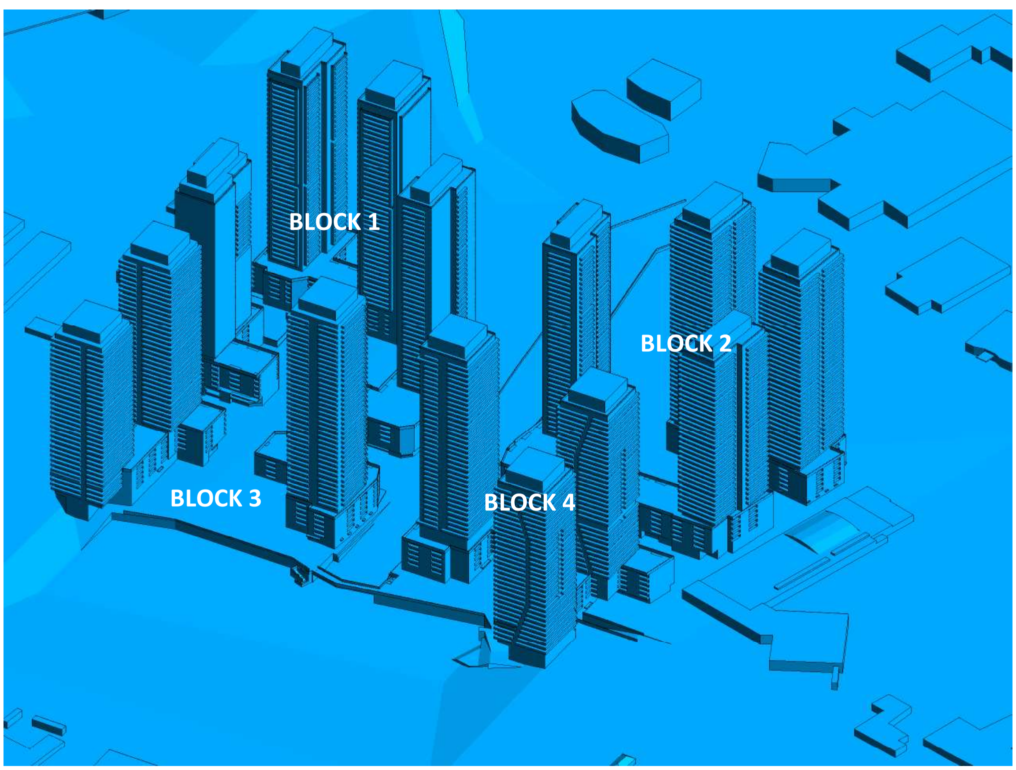


FIGURE 2D: CLOSE-UP VIEW OF FIGURE 2C

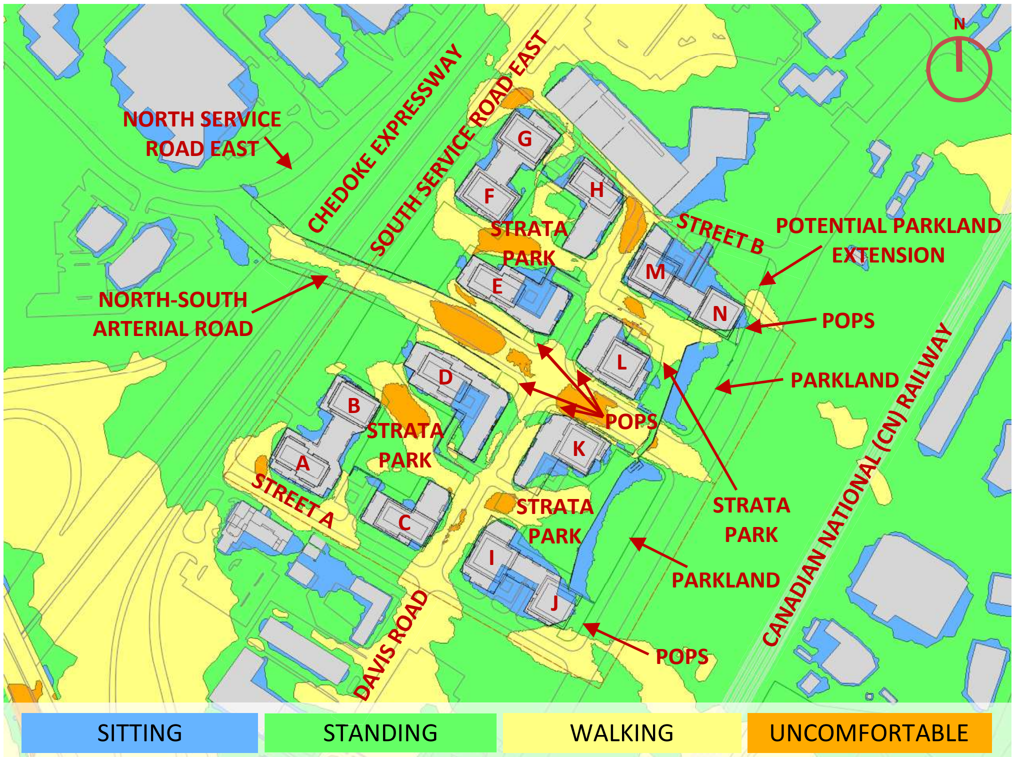


FIGURE 3: SPRING – WIND COMFORT, GRADE LEVEL – PROPOSED MASSING

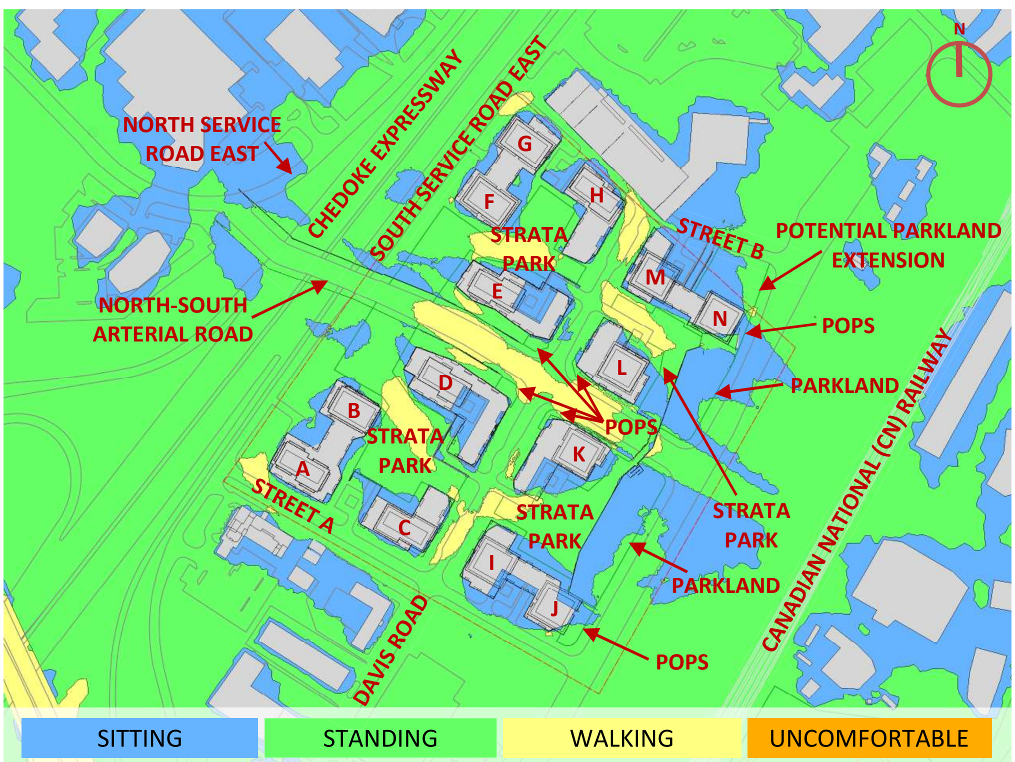


FIGURE 4: SUMMER – WIND COMFORT, GRADE LEVEL – PROPOSED MASSING

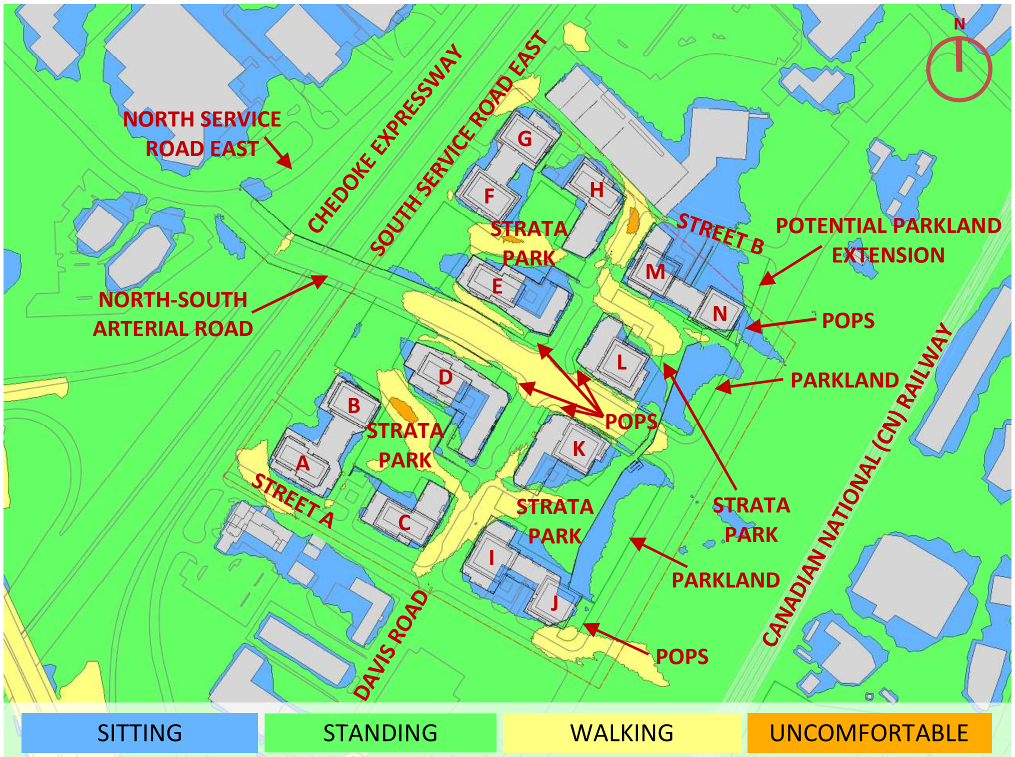


FIGURE 5: AUTUMN – WIND COMFORT, GRADE LEVEL – PROPOSED MASSING

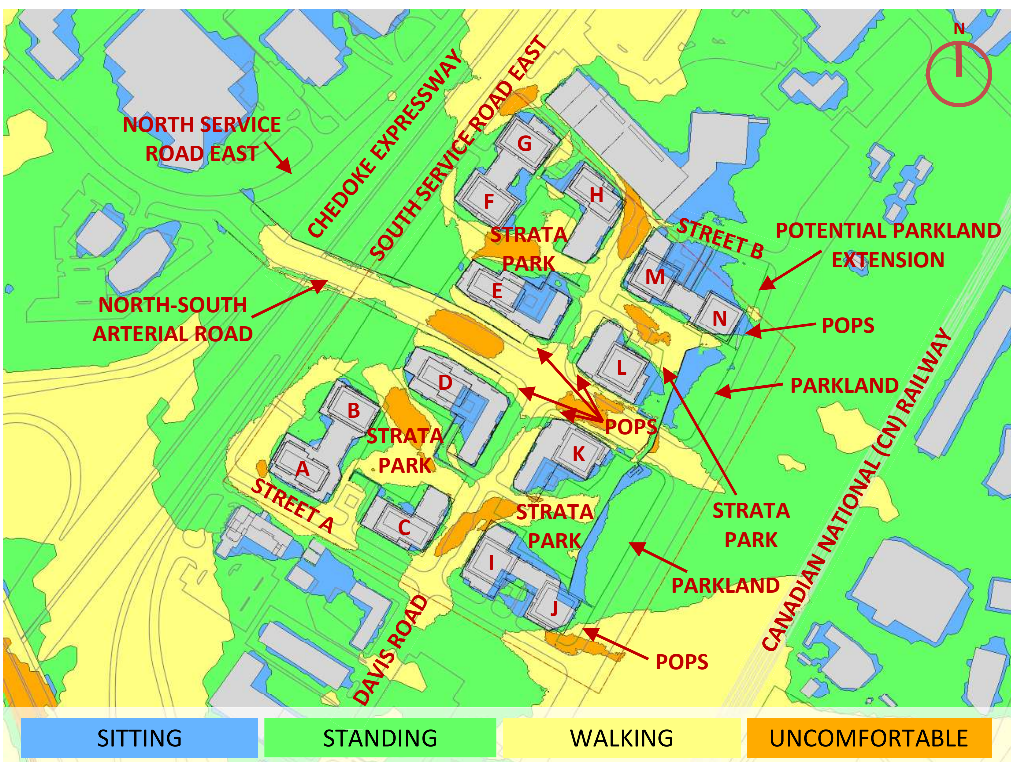


FIGURE 6: WINTER – WIND COMFORT, GRADE LEVEL – PROPOSED MASSING

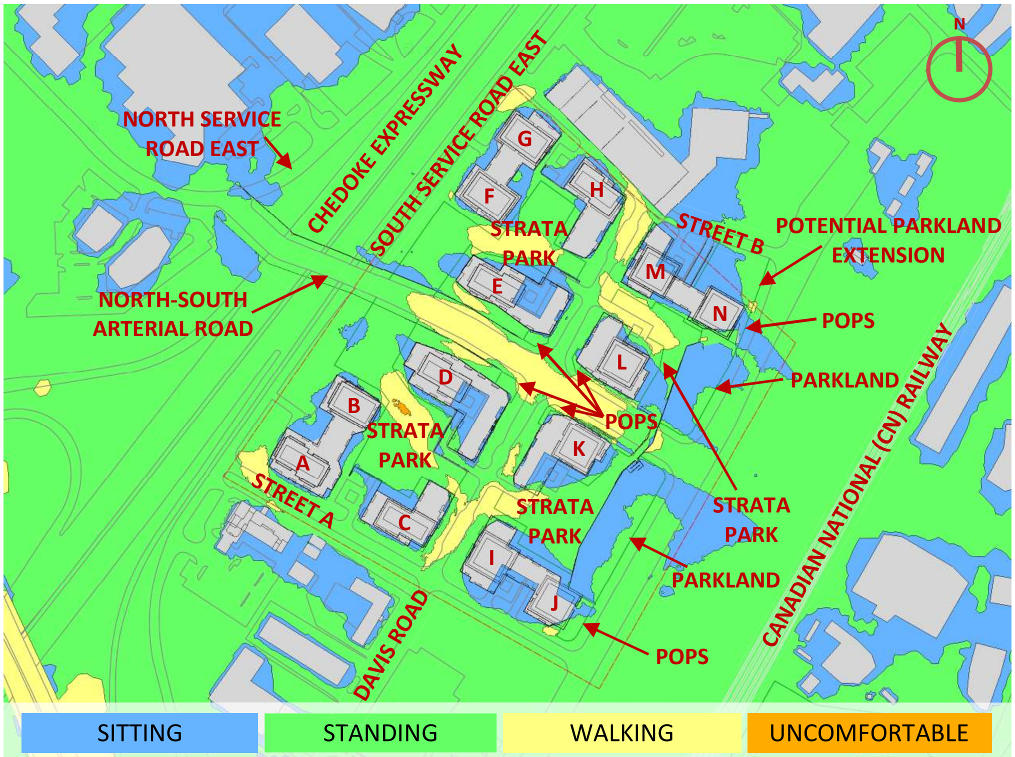


FIGURE 7: TYPICAL USE PERIOD – WIND COMFORT, GRADE LEVEL – PROPOSED MASSING

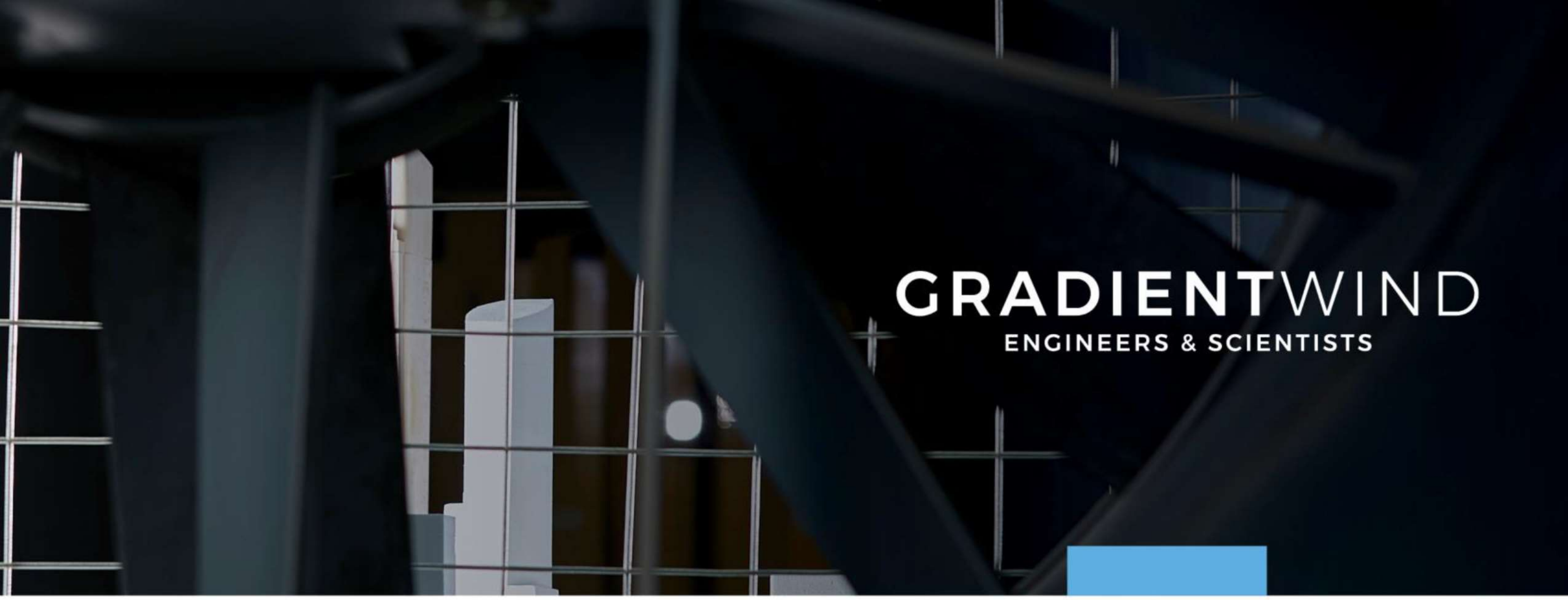
FIGURE 8A: SPRING – WIND COMFORT, PODIA ROOFROP AMENITY TERRACES

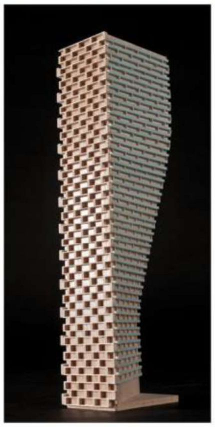
FIGURE 8B: SUMMER – WIND COMFORT, PODIA ROOFROP AMENITY TERRACES

FIGURE 8C: AUTUMN – WIND COMFORT, PODIA ROOFROP AMENITY TERRACES

FIGURE 8D: WINTER – WIND COMFORT, PODIA ROOFROP AMENITY TERRACES

FIGURE 9: TYPICAL USE PERIOD – WIND COMFORT, PODIA ROOFROP AMENITY TERRACES





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).

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

where $\boldsymbol{U}$ = mean wind speed, $\boldsymbol{U_g}$ = gradient wind speed, $\boldsymbol{Z}$ = height above ground, $\boldsymbol{Z_g}$ = 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 Oakville 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 subject 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 it 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 subject site given greater weight.

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

Wind Direction (Degrees True)	Alpha Value (α)
0	0.24
22.5	0.24
45	0.24
67.5	0.25
90	0.24
112.5	0.23
135	0.22
157.5	0.23
180	0.24
202.5	0.25
225	0.25
247.5	0.24
270	0.25
292.5	0.25
315	0.25
337.5	0.25

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).

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

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

where ***I*** = turbulence intensity, $\boldsymbol{L_t}$ = 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.

REFERENCES

[1] P. Arya, "Chapter 10: Near-neutral Boundary Layers," in *Introduction to Micrometeorology*, San Diego, California, Academic Press, 2001.

[2] S. A. Hsu, E. A. Meindl and D. B. Gilhousen, "Determining the Power-Law Wind Profile Exponent under Near-neutral Stability Conditions at Sea," vol. 33, no. 6, 1994.

[3] Y. Tamura, H. Kawai, Y. Uematsu, K. Kondo, and T. Okhuma, "Revision of AIJ Recommendations for Wind Loads on Buildings," in *The International Wind Engineering Symposium, IWES 2003*, Taiwan, 2003.