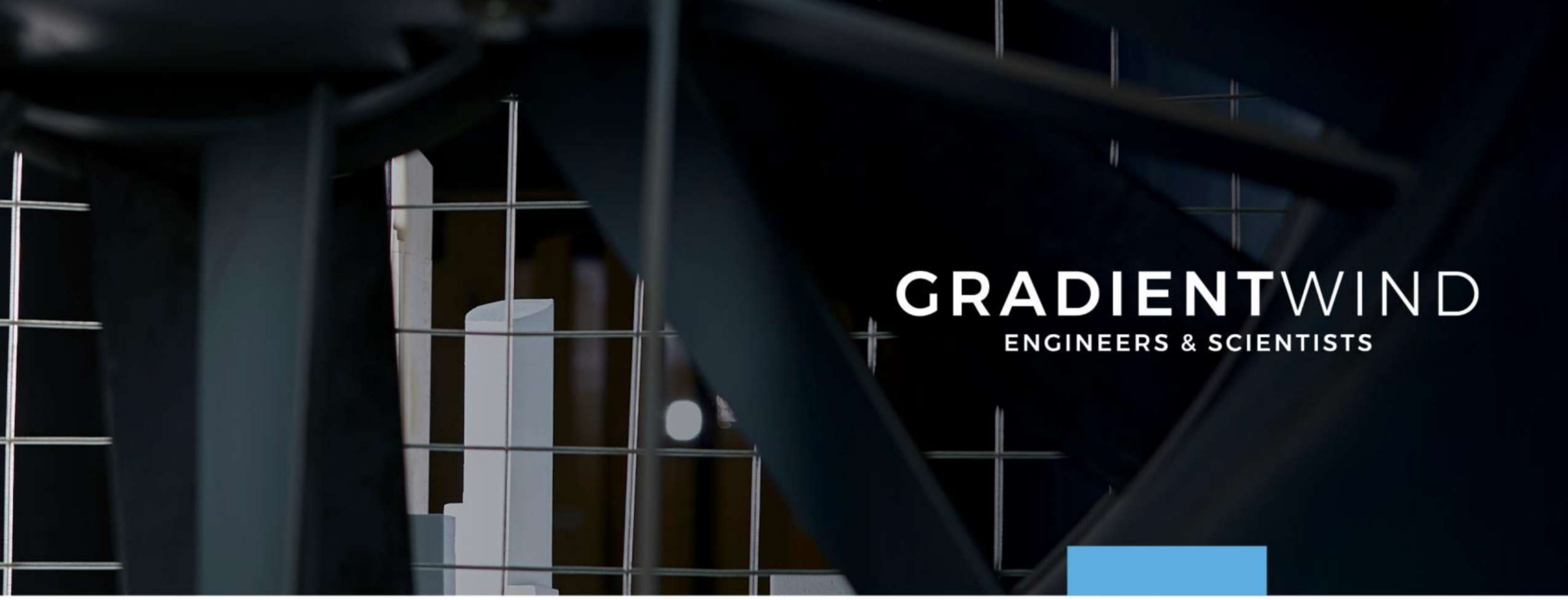
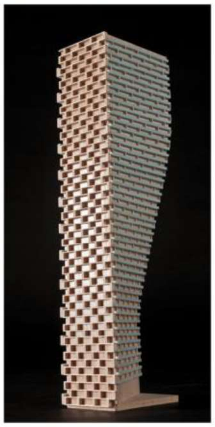


PEDESTRIAN LEVEL WIND STUDY

5872, 5880, and 5884 Hazeldean Road
and 7 Savage Drive
Ottawa, Ontario

Report: 24-256-PLW-Sept 2025



September 19, 2025

PREPARED FOR
Hazeldean Heights Inc.
5872, 5880, and 5884 Hazeldean Road
Stittsville, ON K2S 1Z2

PREPARED BY
Omar Rioseco, B.Eng., Junior Wind Scientist
David Huitema, M.Eng., P.Eng., CFD Lead Engineer

EXECUTIVE SUMMARY

This report describes a pedestrian level wind (PLW) study undertaken to satisfy Zoning By-Law Amendment (ZBLA) resubmission requirements for the proposed mixed-use residential development located 5872, 5880, and 5884 Hazeldean Road and 7 Savage Drive in Ottawa, Ontario (hereinafter referred to as "subject site" or "proposed development"). 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 selected 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 Ottawa wind comfort and safety criteria. The results and recommendations derived from these considerations are detailed in the main body of the report (Section 5), illustrated in Figures 3-9, and summarized as follows:

1) The current study includes several mitigation measures implemented for grade-level areas and the amenity terraces, including three canopies above grade at the north corners of Buildings A and B and at the north corner of the podium serving Building A, as well as perimeter wind screens for the three amenity terraces above grade with wraparound canopies at the northwest corner of Building B and the southeast corner of Building A at Level 6, and a canopy extending from the MPH Level above the Level 20 terrace serving Building A.

2) Most areas at grade within and surrounding the proposed development are predicted to receive conditions considered acceptable for the intended pedestrian uses throughout the year. Specifically, conditions over nearby transit stops, the proposed surface parking, most building access points, and most surrounding public sidewalks and proposed walkway areas are considered acceptable.

a. Owing to the mostly suburban environs of the subject site, prevailing winds are predicted to downwash over the east and north façades of Buildings A and B, accelerating around the north corner of Building B and between Buildings A and B. Isolated areas of conditions that may occasionally be considered uncomfortable for walking during the spring and winter seasons are predicted at the north corner of Building B and over an isolated area between Buildings A and B during the spring season.

b. It is recommended to recess the west entrance to commercial unit B105 and the entrances to the indoor amenities serving Buildings A and C along their north and northwest elevations, respectively, at least 2 m into their respective façades.

c. Of importance, proposed trees and other vegetation between Buildings A and B and along Hazeldean Road are expected to help further buffer against the modestly adverse wind conditions to reduce the predicted walking comfort exceedances. Furthermore, the conditions at the north corner of Building B are mostly located over the roadway surface and away from pedestrian-accessible areas.

3) Regarding the Level 5 common amenity terraces serving Buildings A and B, which were modelled with 1.8-m-tall wind screens along their outer perimeters, wind conditions during the typical use period (May to October, inclusive) are predicted to be suitable for a mix of sitting and standing.

a. Further mitigation may take the form of additional wind screens, raised planters, or other common landscape elements acting as targeted wind barriers located inboard of the terrace perimeters and targeted adjacent to designated seating or lounging areas, in combination with overhead pergolas/trellises. The extent of mitigation is dependent on the programming of the terrace.

4) Wind conditions at the Level 20 common amenity terrace serving Building A, which was modelled with 2-m-tall wind screens along their outer perimeter, and a canopy extending from the MPH façade to the west, are predicted to be suitable for sitting during the typical use period. The noted conditions are considered acceptable.

5) 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 cover.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Hazeldean Heights Inc. to undertake a pedestrian level wind (PLW) study to satisfy Zoning By-Law Amendment (ZBLA) resubmission requirements for the proposed mixed-use residential development located at 5872, 5880, and 5884 Hazeldean Road and 7 Savage Drive in Ottawa, Ontario (hereinafter referred to as "subject site" or "proposed development"). A PLW study was conducted in February 2025[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.

Our work is based on industry standard computer simulations using the computational fluid dynamics (CFD) technique and data analysis procedures, City of Ottawa wind comfort and safety criteria, architectural drawings prepared by Figurr Architects Collective in July 2025, surrounding street layouts and existing and approved future building massing information obtained from the City of Ottawa, as well as recent satellite imagery.

2. TERMS OF REFERENCE

The subject site is located at 5872, 5880, and 5884 Hazeldean Road and 7 Savage Drive in Ottawa, situated to the northeast at the intersection of Hazeldean Road and 7 Savage Drive. The proposed development comprises three buildings: a 19-storey building with a 4-storey podium (Building A) located at the west of the subject site fronting Hazeldean Road and Savage Drive, a 25-storey building with a 4-storey 'L'-shaped podium (Building B) located at the northeast corner of the subject side fronting Hazeldean Road, and a 4-storey building (Building C) located along the southeast perimeter of the subject site. All three proposed buildings are topped with a mechanical penthouse (MPH).

[1] Gradient Wind Engineering Inc., '*5872, 5880, and 5884 Hazeldean Road and 7 Savage Drive – Pedestrian Level Wind Study*', [Feb 10, 2025]

An 'L'-shaped drive aisle extends from Hazeldean Road along the northeast perimeter of the subject site, turning to the southwest to connect to Savage Drive near the northwest elevation of Building C. A central courtyard is provided between Buildings A and B. Two levels of underground parking are accessible via a parking ramp extending from the drive aisle into the southeast elevation of Building B and surface parking is proposed to the north of Building C.

At the ground floor, Building A includes a residential lobby to the west fronting Savage Drive, commercial space within its northern wing fronting Hazeldean Road, Savage Drive, and the internal courtyard, an indoor amenity to the east, and residential units to the south. Levels 2-4, which are reserved for residential use, overhang grade from the south clockwise to the northeast. At Level 5, the building steps back from all compass directions, and the podium roof to the east accommodates a common amenity terrace. This level includes an indoor amenity to the east and residential units throughout the remainder of the level. Levels 6-19 rise with typical tower planforms, and are reserved for residential occupancy. The MPH Level is served by a common amenity terrace within setbacks from the south and west elevations.

The ground floor of Building B includes a residential lobby at the northeast corner, as well as commercial spaces at the north corner fronting Hazeldean Road, residential units to the east, a commercial garbage space to the south corner, and an indoor amenity to the west, fronting the internal courtyard. Canopies are located at the bend of the 'L'-shaped planform. Levels 2-4, which are reserved for residential use, overhang grade from the northwest clockwise to the east. At Level 5, the building steps back from all compass directions and a common amenity terrace is located to the west atop the podium. This level includes an indoor amenity to the west and residential units throughout the remainder of the level. Levels 6-25 rise with typical tower planforms, and are reserved for residential occupancy.

Building C includes a residential lobby at the west corner, an indoor amenity to the north, and residential units elsewhere throughout the level. Levels 2 and above for Building C, which are reserved for residential occupancy, overhang the north and west elevations.

The near-field surroundings (defined as an area within 200 metres (m) of the subject site) comprise a mix of low-rise-residential and commercial massing from the southeast clockwise to the north and low-rise commercial massing to the northeast, including a large commercial storage yard serving Kanata Collision and Auto-Glass. The far-field surroundings (defined as an area beyond the near-field but within a 2-kilometre (km) radius of the subject site) are characterized by mostly low-rise massing in all compass directions with farmland, green spaces, and vacant lots located approximately 1 km and 1.4 km northeast and north-northwest, respectively, green space located to the north, northeast, east, and west, and the Amberwood Village Golf and Recreation Club located approximately 800 m to the south.

The site plan for the proposed scenario is illustrated in Figure 1, while Figures 2A-2D illustrate the computational model used to conduct the study. The proposed massing scenario includes the existing massing with the proposed development and any developments that have been approved by the City of Ottawa.

3. OBJECTIVES

The principal objectives of this study are to (i) determine pedestrian level wind conditions at key areas within and surrounding the development 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 pedestrian 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 Ottawa area wind climate, and synthesis of computational data with City of Ottawa wind comfort and safety criteria[2]. The following sections describe the analysis procedures, including a discussion of the noted pedestrian wind criteria.

[2] City of Ottawa Terms of References: Wind Analysis
https://documents.ottawa.ca/sites/documents/files/wind_analysis_tor_en.pdf

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 Ottawa Macdonald-Cartier 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 planned 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 site for 16 wind directions. The CFD simulation model was centered on the proposed development, complete with surrounding massing within a radius of approximately 490 m.

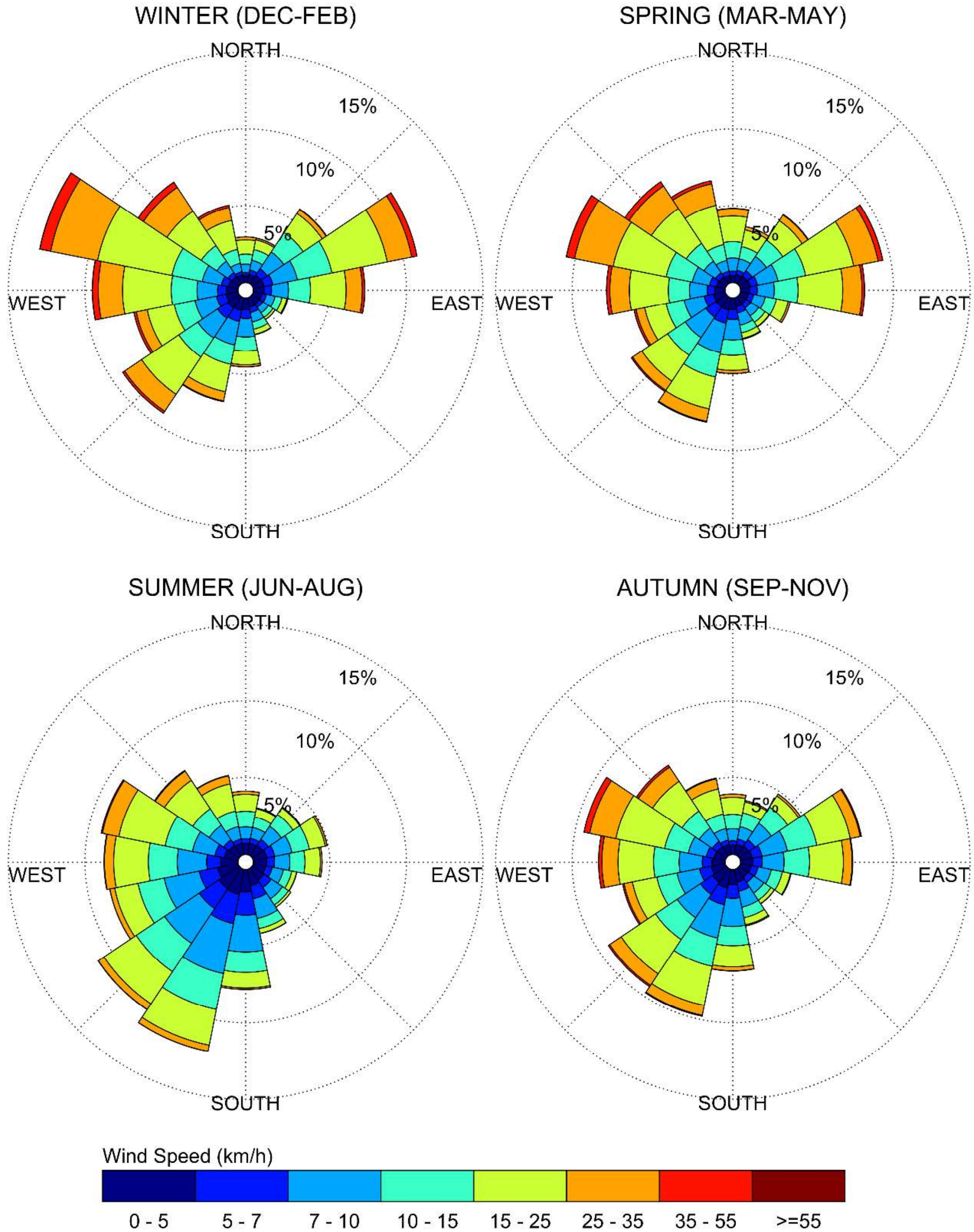
Mean and peak wind speed data obtained over the subject site for each wind direction were interpolated to 36 wind directions at 10° intervals, representing the full compass azimuth. Measured wind speeds approximately 1.5 m above local grade and above the common amenity terraces serving the proposed development 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 Ottawa was developed from approximately 40 years of hourly meteorological wind data recorded at Ottawa Macdonald-Cartier 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, as stipulated in the wind criteria. Specifically, the spring season is defined as March through May, the summer season is defined as June through August, the autumn season is defined as September through November, and the winter season is defined as December through February, inclusive.

The statistical model of the Ottawa 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 prominent wind speeds and directions can be identified by the longer length of the bars. For Ottawa, 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 prominence and relative magnitude of wind speed changes somewhat from season to season.

SEASONAL DISTRIBUTION OF WIND
OTTAWA MACDONALD-CARTIER INTERNATIONAL AIRPORT



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 Ottawa

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. Five pedestrian comfort classes based on 20% non-exceedance mean wind speed ranges are used to assess pedestrian comfort: (1) Sitting; (2) Standing; (3) Strolling; (4) Walking; and (5) Uncomfortable. The gust speeds, and equivalent mean speeds, are selected based on the Beaufort scale, which describes the effects of forces produced by varying wind speed levels on objects. Wind conditions suitable for sitting are represented by the colour blue, standing by green, strolling by yellow, and walking by orange; uncomfortable conditions are represented by the colour magenta. Specifically, the comfort classes, associated wind speed ranges, and limiting criteria are summarized as follows:

PEDESTRIAN WIND COMFORT CLASS DEFINITIONS

Wind Comfort Class	Mean Speed (km/h)	Description
SITTING	≤ 10	Mean wind speeds no greater than 10 km/h occurring at least 80% of the time. The equivalent gust wind speed is approximately 16 km/h.
STANDING	≤ 14	Mean wind speeds no greater than 14 km/h occurring at least 80% of the time. The equivalent gust wind speed is approximately 22 km/h.
STROLLING	≤ 17	Mean wind speeds no greater than 17 km/h occurring at least 80% of the time. The equivalent gust wind speed is approximately 27 km/h.
WALKING	≤ 20	Mean wind speeds no greater than 20 km/h occurring at least 80% of the time. The equivalent gust wind speed is approximately 32 km/h.
UNCOMFORTABLE	> 20	Uncomfortable conditions are characterized by predicted values that fall below the 80% target for walking. Brisk walking and exercise, such as jogging, would be acceptable for moderate excesses of this criterion.

Regarding wind safety, the pedestrian safety wind speed criterion is based on the approximate threshold that would cause a vulnerable member of the population to fall. A 0.1% exceedance gust wind speed of 90 km/h is 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. Notably, pedestrians tend to be more sensitive to wind gusts than to steady winds for lower wind speed ranges. For strong winds approaching dangerous levels, this effect is less important because the mean wind can also create problems for pedestrians.

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 a mean wind speed of 10 km/h (equivalent gust wind speed of approximately 16 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 mean wind speed of 20 km/h (equivalent gust wind speed of approximately 32 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 on the following page. 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	Sitting / Standing
Café / Patio / Bench / Garden	Sitting / Standing
Transit Stop (Without Shelter)	Standing
Transit Stop (With Shelter)	Walking
Public Park / Plaza	Sitting / Standing
Garage / Service Entrance	Walking
Parking Lot	Walking
Vehicular Drop-Off Zone	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 conditions over the common amenity terraces serving the proposed development at Level 5 of Buildings A and B, and Level 20 of Building A. Conditions are presented as continuous contours of wind comfort throughout the subject site and correspond to the comfort classes presented 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 during this period at grade level and over the noted amenity terraces serving the proposed development, respectively, consistent with the comfort classes illustrated in Section 4.4.

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

For existing conditions, refer to the February 2025, PLW study report as referenced in Section 1.

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. Prevailing winds from the northwest and northeast are predicted to downwash over the east and north facades, accelerating around the north corner of Building B and between Buildings A and B.

Based on the results from the February 2025 study, a mitigation strategy was developed in collaboration with the design team to reduce downwash and acceleration effects at the above-noted areas. Specifically, 2-m-deep canopies have been implemented extending from the podia at Level 2, wrapping around the north corner of both buildings, and to the east of Building A over the courtyard. Additionally, landscaping elements in the form of proposed planters along the courtyard, the west of Building A, and to the east of Building B, have been included in the current model.

With the noted mitigation, wind comfort conditions within the subject site are predicted to improve. Specifically, the extent of the uncomfortable conditions to the north and northeast of Building B previously observed during spring and winter, have been reduced, while the uncomfortable conditions to the east of the Building A indoor amenity, over the courtyard, have been eliminated during the winter. Wind comfort conditions to the north and northeast of Building B are predicted to be suitable for walking for at least 74% of the time during the spring and winter, representing exceedances of 6% of the walking comfort threshold. Of importance, the windiest conditions are mostly located over the roadway surface, and the impact on pedestrian-accessible areas is limited. The design team may consider a further extension of the canopy along the northwest elevation of Building B to farther along the northwest elevation, providing additional relief from downwashing winds. Furthermore, landscaping elements that could not be included in the simulation model, as described in Section 4.1, particularly the proposed trees along Hazeldean Road as noted on the grade-level landscape plan[3], would be expected to reduce the exceedance of the walking criterion in this area.

---

[3] Levstek Consultants Inc., '*5872, 5880, 5884 Hazeldean Rd and 7 Savage Drive, Landscape Plan, Drawing L1.01*,' [Jan 2025]

Wind comfort conditions over the courtyard to the east of the indoor amenity serving Building A, are predicted to be suitable for walking for at least 78% of the time, representing an exceedance of 2% of the walking threshold during the spring. Of note, the noted windier area is isolated in extent and seasonality, and the exceedance of the criterion may be considered as marginal. Proposed landscaping elements located within the area between the two buildings, particularly the eight trees located within raised planters, are expected to further buffer against the modestly adverse wind conditions.

Sidewalks along Hazeldean Road: With the exception of the above-noted isolated region that may be considered occasionally uncomfortable for walking at the north corner of Building B, wind comfort conditions over the nearby public sidewalks along Hazeldean Road following the introduction of the proposed development are predicted to be suitable for a mix of sitting, standing, and strolling during the summer and walking, or better, during the remainder of the year.

Nearby Transit Stops along Hazeldean Road: Following the introduction of the proposed development, wind comfort conditions in the vicinity of the nearby transit stops along Hazeldean Road are predicted to be suitable for standing, or better, throughout the year. The noted conditions are considered acceptable.

Sidewalks along Savage Drive: Following the introduction of the proposed development, wind conditions over the nearby sidewalks along Savage Drive are predicted to be suitable for standing during the summer and walking, or better, throughout the remainder of the year, which is considered acceptable.

Proposed Drive Aisle, Surface Parking, and Walkways within the Subject Site: Wind conditions over the proposed surface parking are predicted to be suitable for mostly strolling, or better, throughout the year, which is considered acceptable.

Conditions over most of the proposed drive aisle and most of the walkways serving the proposed development are predicted to be suitable for strolling, or better, during the summer, and walking, or better, throughout the remainder of the year.

Building Access Points: Wind comfort conditions in the vicinity of the commercial access point serving the northwest commercial unit within Building B (B105), at the west corner of the podium, are predicted to be suitable for standing during the summer and autumn and a mix of strolling and walking during the spring and winter. Conditions in the vicinity of the entrances to the indoor amenities serving Buildings A and C along their north and northwest elevations, respectively, are predicted to be suitable for strolling during the spring and winter and mostly standing the summer and autumn. It is recommended to recess the noted access points into their respective façades by at least 2 m.

Wind conditions in the vicinity of the secondary access points and the remaining primary access points serving the proposed development are predicted to be suitable for standing, or better, throughout the year and are considered acceptable.

5.2 Wind Comfort Conditions – Common Amenity Terraces

Level 5, Buildings A and B: The Level 5 common amenity terraces serving Buildings A and B atop their podia were modelled using 1.8-m-tall wind screens along the full perimeter of the terraces, and with canopies with depths of 1.5 m that wrap around the southeast and northwest corners of Buildings A and B, respectively. Wind conditions within these terraces during the typical use period are predicted to be suitable for a mix of sitting and standing. Standing conditions are situated over the southeast portion of the terrace serving Building A and centrally over the terrace serving Building B. Within the terrace serving Building A, where conditions are suitable for standing, they are also predicted to be suitable for sitting at least 75% of the time during the same period, where the target is 80% to achieve the sitting comfort class. Within the terrace serving Building B, conditions are predicted to be suitable for sitting at least 72% of the typical use period.

Mitigation inboard of the terrace perimeter may take the form of wind screens, raised planters, overhead pergolas/trellises, or other common landscape elements that are targeted around designated seating areas. The extent of mitigation is dependent on the programming of the terraces and may continue to be further developed as the design of the proposed development progresses and the programming of the terraces is defined.

Level 20, Building A: The Level 20 common amenity terrace serving Buildings A was modelled using 2-m-tall wind screens along the full perimeter of the terrace, and with a 2-m-deep canopy extending west from the MPH facade. With these measures, wind comfort conditions over the noted terrace are predicted to be suitable for sitting during the typical use period. The noted conditions are considered acceptable.

5.3 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 wind conditions that could be considered dangerous, as defined in Section 4.4.

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 and illustrated in Figures 3-9. Based on computer simulations using the CFD technique, meteorological data analysis of the Ottawa wind climate, City of Ottawa wind comfort and safety criteria, and experience with numerous similar developments, the study concludes the following:

1) The current study includes several mitigation measures implemented for grade-level areas and the amenity terraces, including three canopies above grade at the north corners of Buildings A and B and at the north corner of the podium serving Building A, as well as perimeter wind screens for the three amenity terraces above grade with wraparound canopies at the northwest corner of Building B and the southeast corner of Building A at Level 6, and a canopy extending from the MPH Level above the Level 20 terrace serving Building A.

2) Most areas at grade within and surrounding the proposed development are predicted to receive conditions considered acceptable for the intended pedestrian uses throughout the year. Specifically, conditions over nearby transit stops, the proposed surface parking, most building access points, and most surrounding public sidewalks and proposed walkway areas are considered acceptable.

a. Owing to the mostly suburban environs of the subject site, prevailing winds are predicted to downwash over the east and north façades of Buildings A and B, accelerating around the north corner of Building B and between Buildings A and B. Isolated areas of conditions that may occasionally be considered uncomfortable for walking during the spring and winter seasons are predicted at the north corner of Building B and over an isolated area between Buildings A and B during the spring season.

b. It is recommended to recess the west entrance to commercial unit B105 and the entrances to the indoor amenities serving Buildings A and C along their north and northwest elevations, respectively, at least 2 m into their respective façades.

c. Of importance, proposed trees and other vegetation between Buildings A and B and along Hazeldean Road are expected to help further buffer against the modestly adverse wind conditions to reduce the predicted walking comfort exceedances. Furthermore, the conditions at the north corner of Building B are mostly located over the roadway surface and away from pedestrian-accessible areas.

3) Regarding the Level 5 common amenity terraces serving Buildings A and B, which were modelled with 1.8-m-tall wind screens along their outer perimeters, wind conditions during the typical use period (May to October, inclusive) are predicted to be suitable for a mix of sitting and standing.

a. Further mitigation may take the form of additional wind screens, raised planters, or other common landscape elements acting as targeted wind barriers located inboard of the terrace perimeters and targeted adjacent to designated seating or lounging areas, in combination with overhead pergolas/trellises. The extent of mitigation is dependent on the programming of the terrace.

4) Wind conditions at the Level 20 common amenity terrace serving Building A, which was modelled with 2-m-tall wind screens along their outer perimeter, and a canopy extending from the MPH façade to the west, are predicted to be suitable for sitting during the typical use period. The noted conditions are considered acceptable.

5) 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 cover.

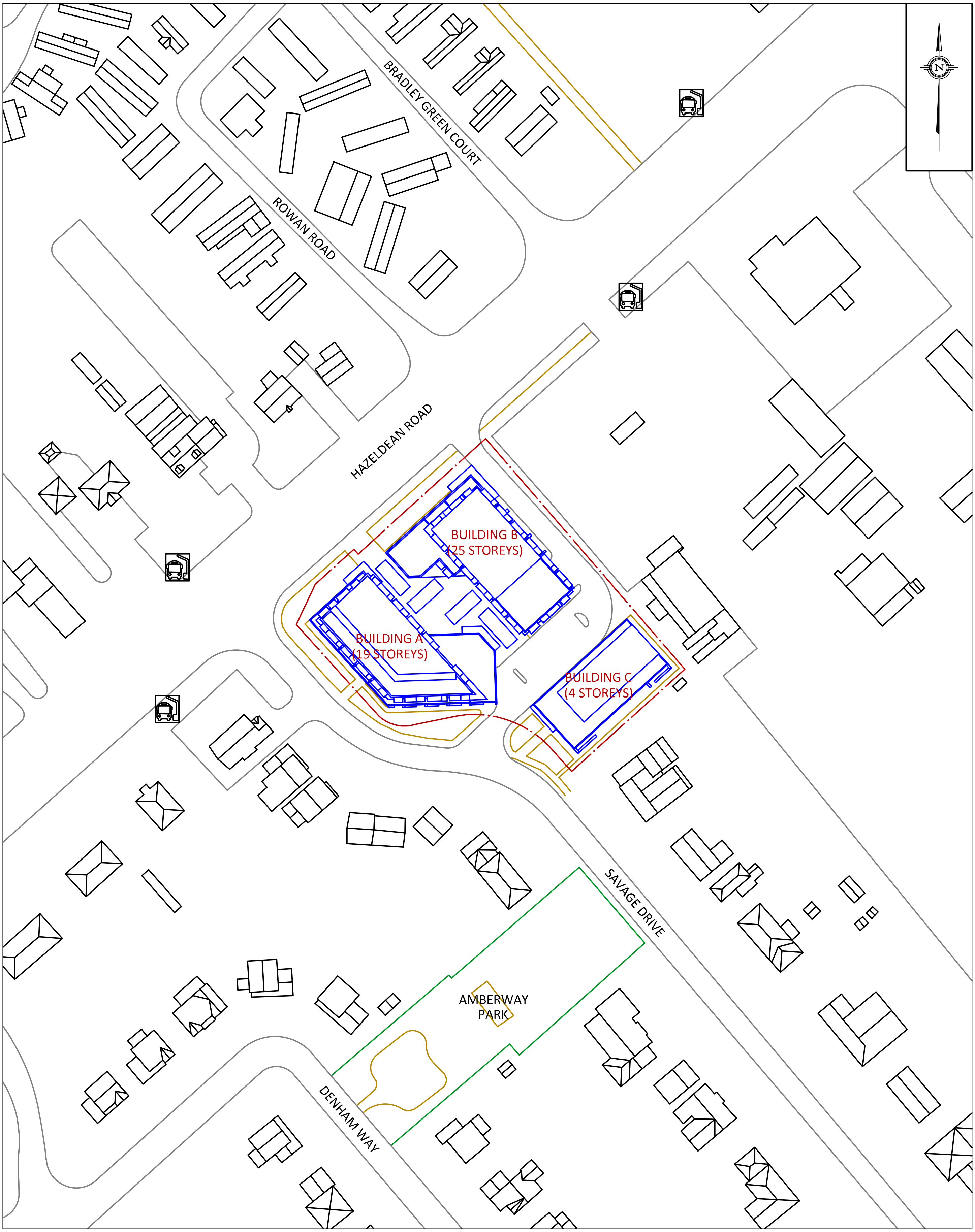
Sincerely,

Gradient Wind Engineering Inc.

LICENSED PROFESSIONAL ENGINEER
D. T. HUITEMA
100561777
September 19, 2025
PROVINCE OF ONTARIO

Omar Rioseco, B.Eng.
Junior Wind Scientist

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



GRADIENTWIND
ENGINEERS & SCIENTISTS

127 WALGREEN ROAD, OTTAWA, ON
613 836 0934 • GRADIENTWIND.COM

PROJECT	5872, 5880, 5884 HAZELDEAN ROAD AND 7 SAVAGE DRIVE, OTTAWA PEDESTRIAN LEVEL WIND STUDY
SCALE	1:1500
DRAWING NO.	24-256-PLW-2025-1
DATE	JULY 11, 2025
DRAWN BY	S.K.
DESCRIPTION	FIGURE 1: PROPOSED SITE PLAN AND SURROUNDING CONTEXT

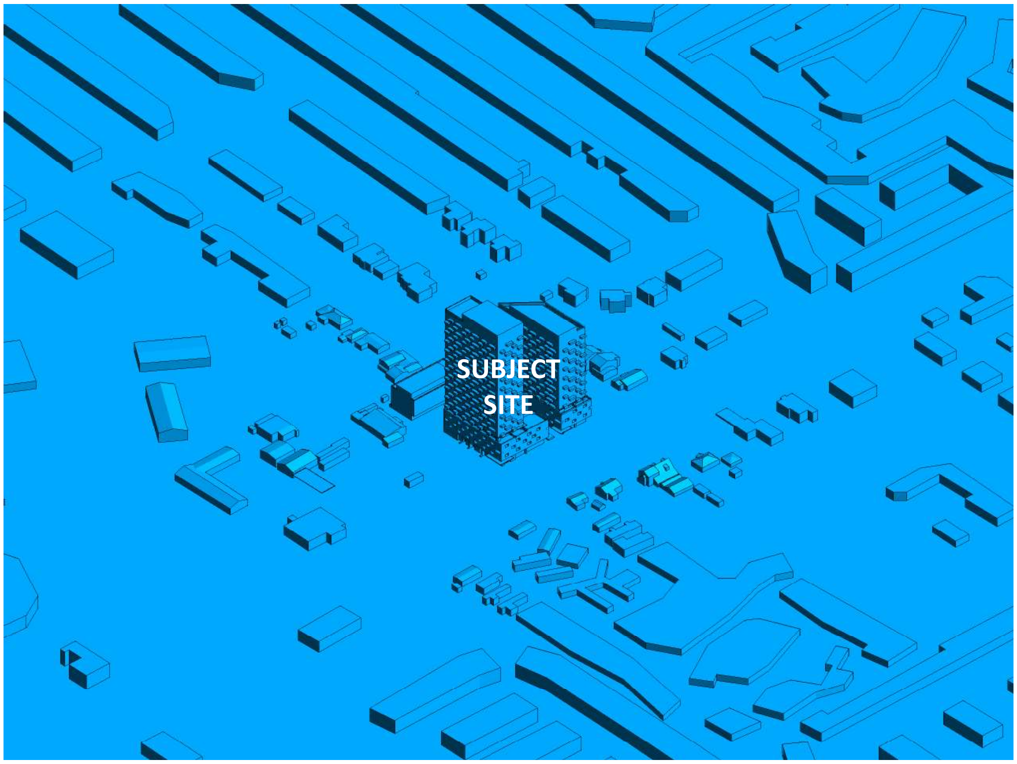


FIGURE 2A: COMPUTATIONAL MODEL, PROPOSED MASSING, NORTH PERSPECTIVE

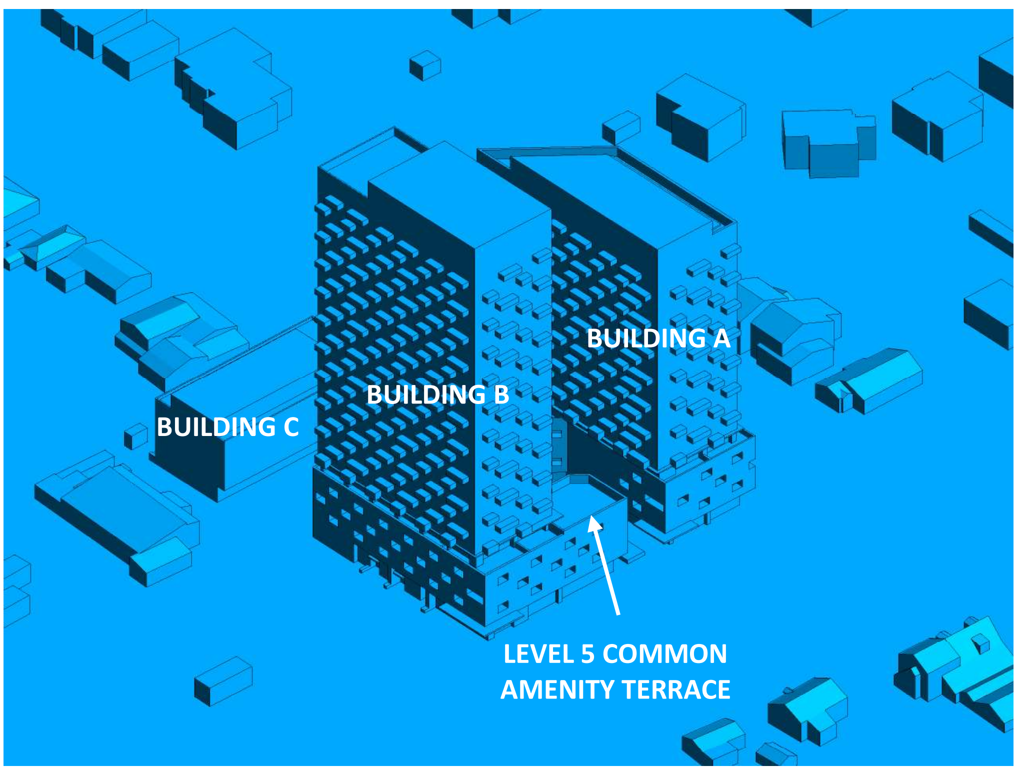


FIGURE 2B: CLOSE UP OF FIGURE 2A

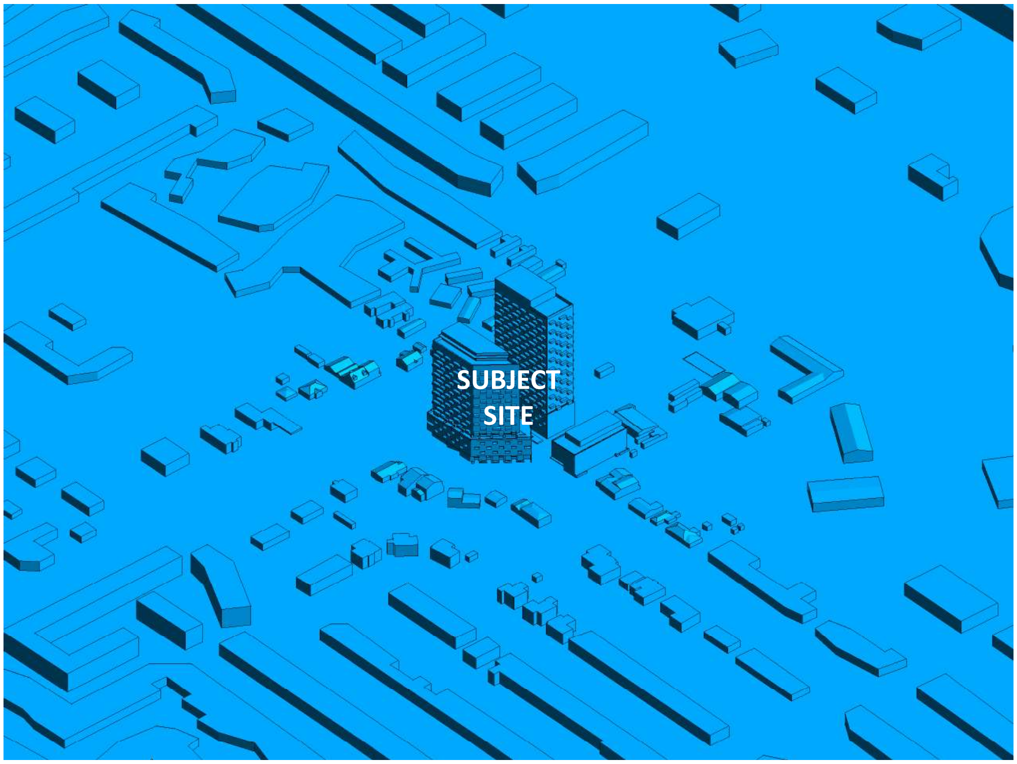


FIGURE 2C: COMPUTATIONAL MODEL, PROPOSED MASSING, SOUTH PERSPECTIVE

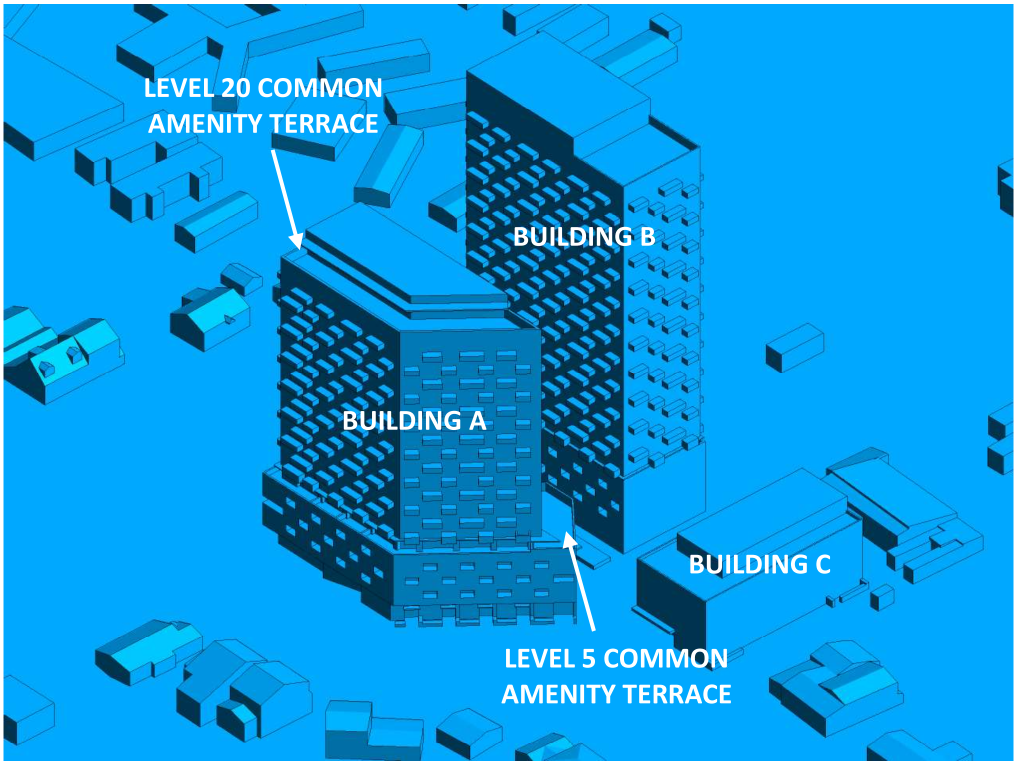


FIGURE 2D: CLOSE UP OF FIGURE 2E

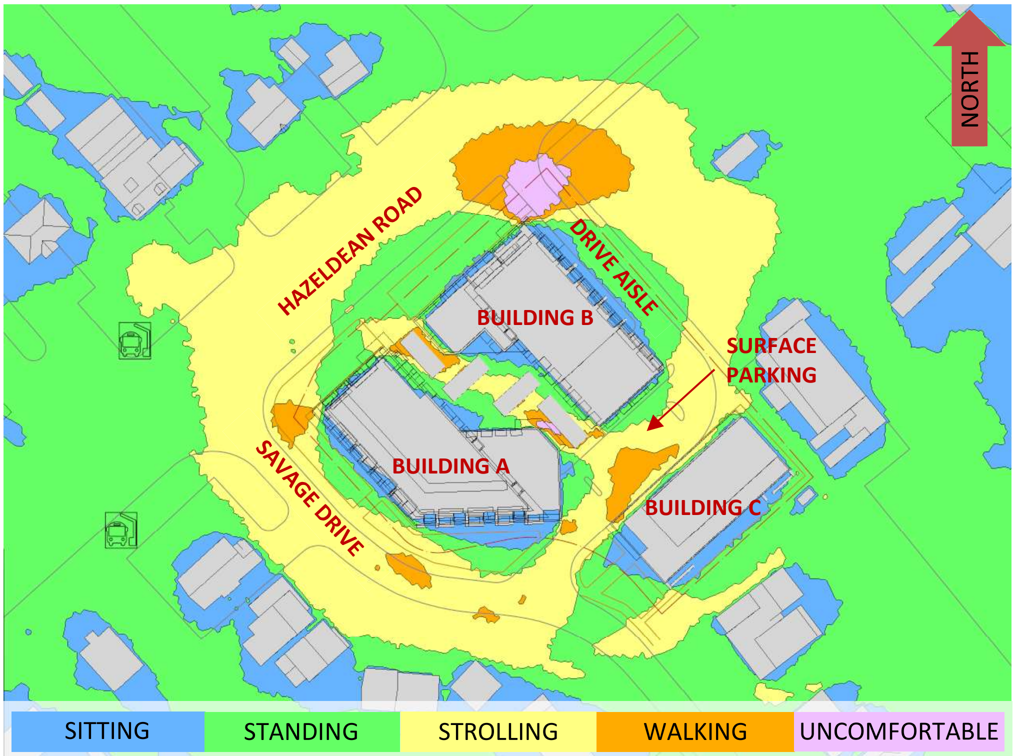


FIGURE 3: SPRING – WIND COMFORT, GRADE LEVEL – PROPOSED MASSING

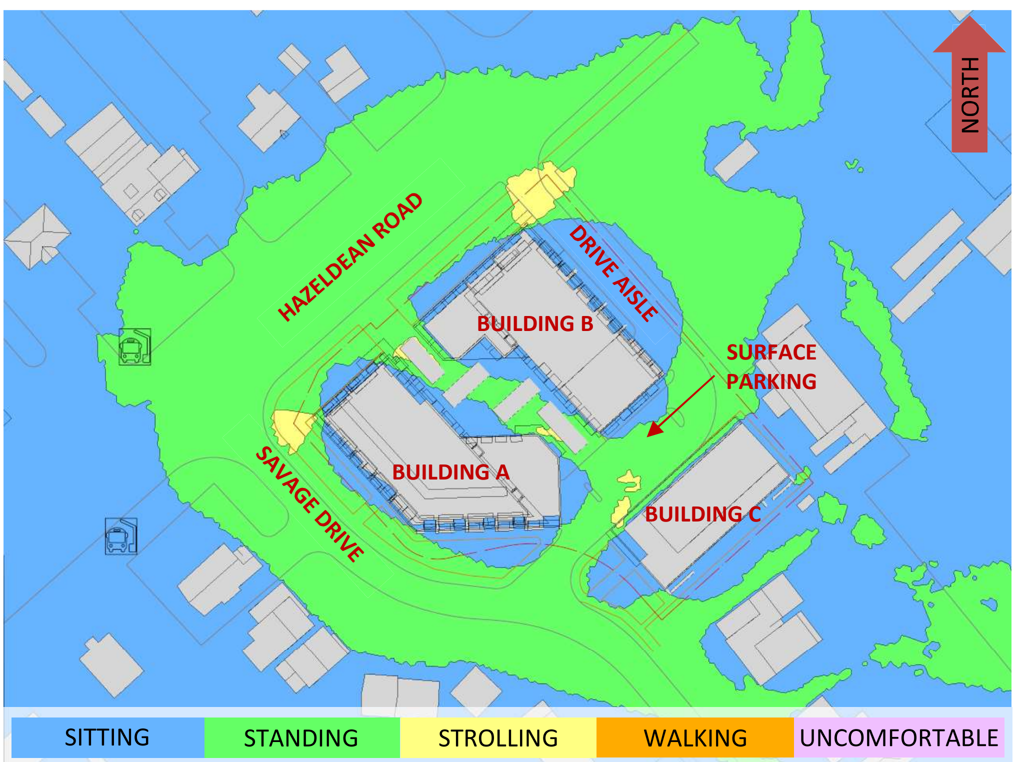


FIGURE 4: SUMMER – WIND COMFORT, GRADE LEVEL – PROPOSED MASSING

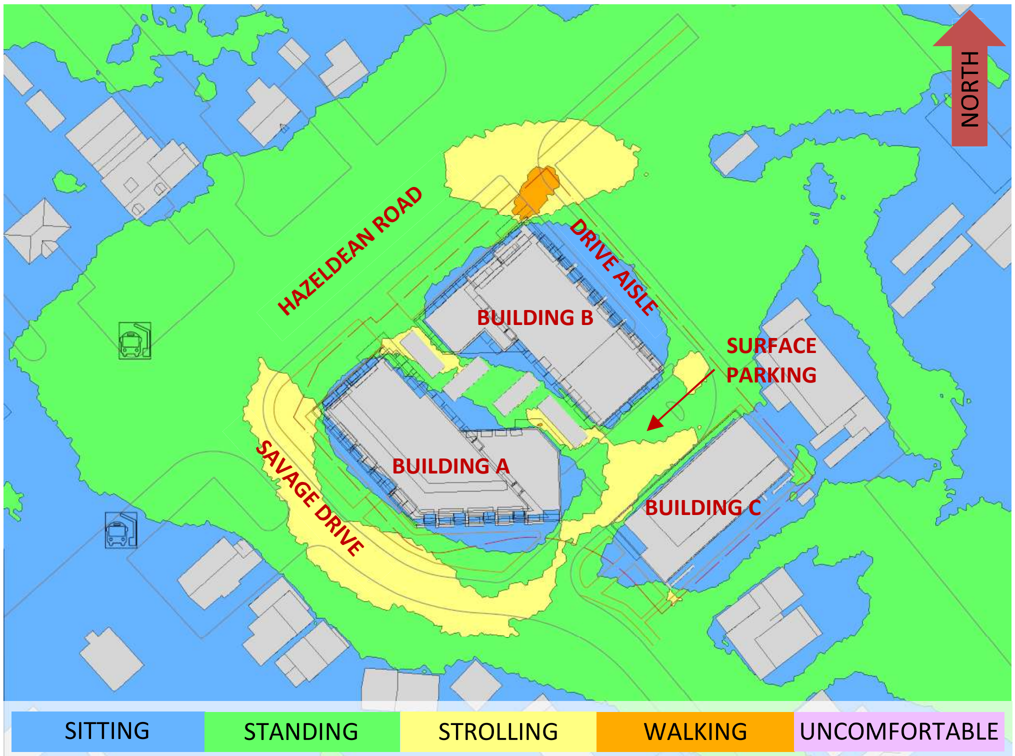


FIGURE 5: AUTUMN – WIND COMFORT, GRADE LEVEL – PROPOSED MASSING

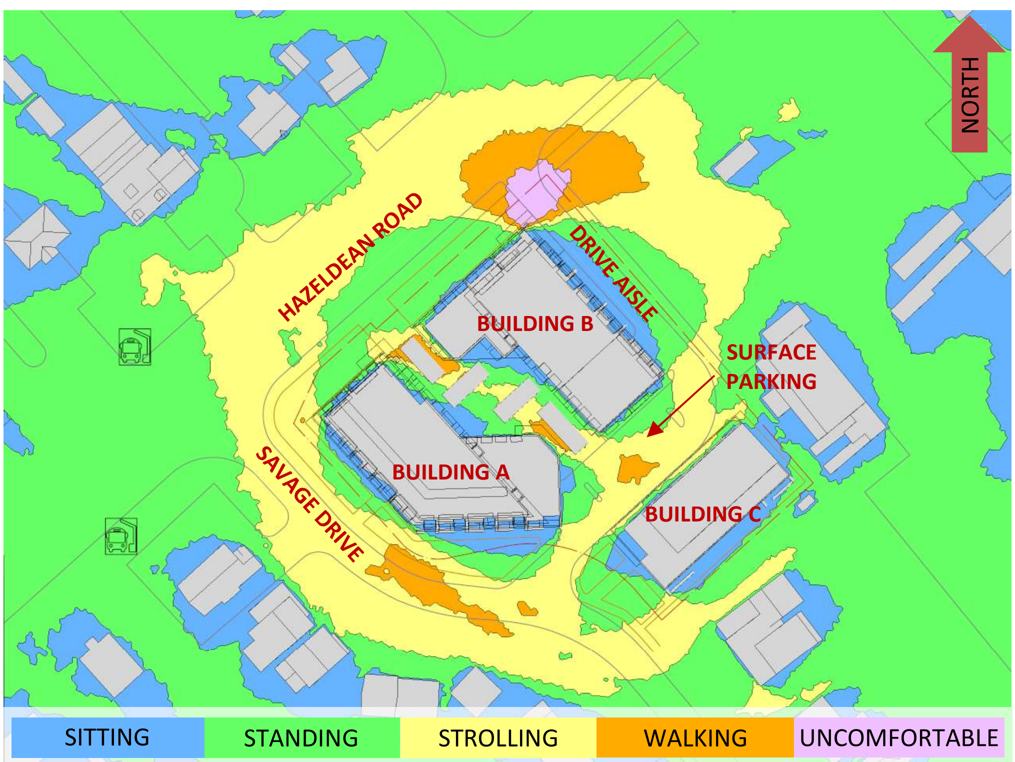


FIGURE 6: WINTER – WIND COMFORT, GRADE LEVEL – PROPOSED MASSING

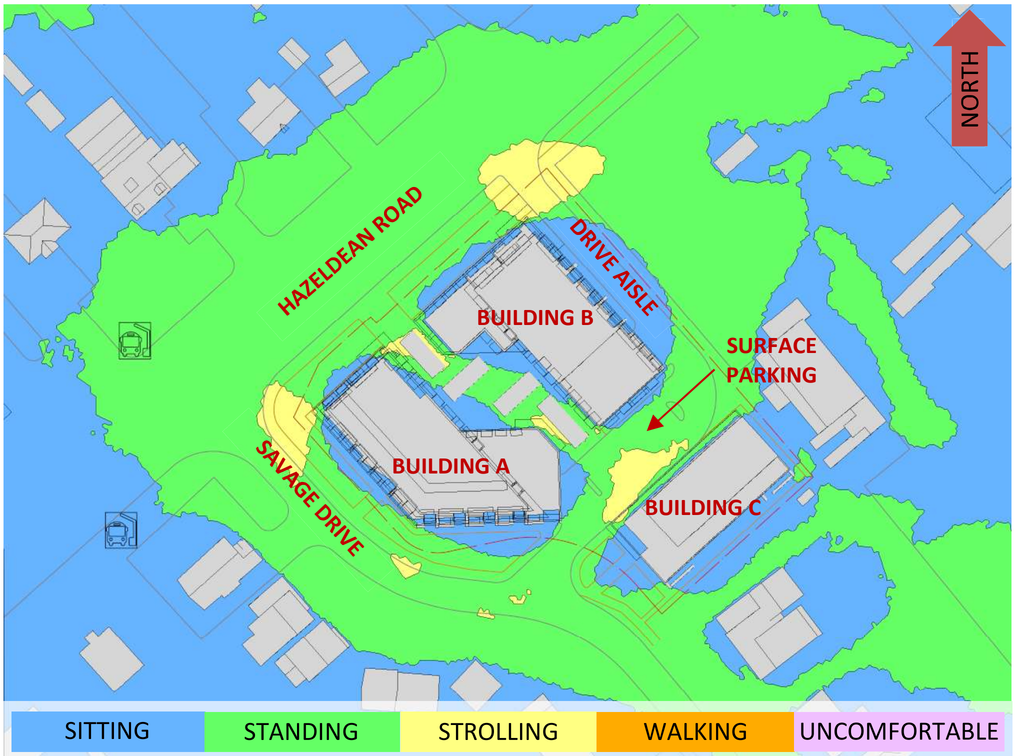


FIGURE 7: TYPICAL USE PERIOD – WIND COMFORT, GRADE LEVEL – PROPOSED MASSING

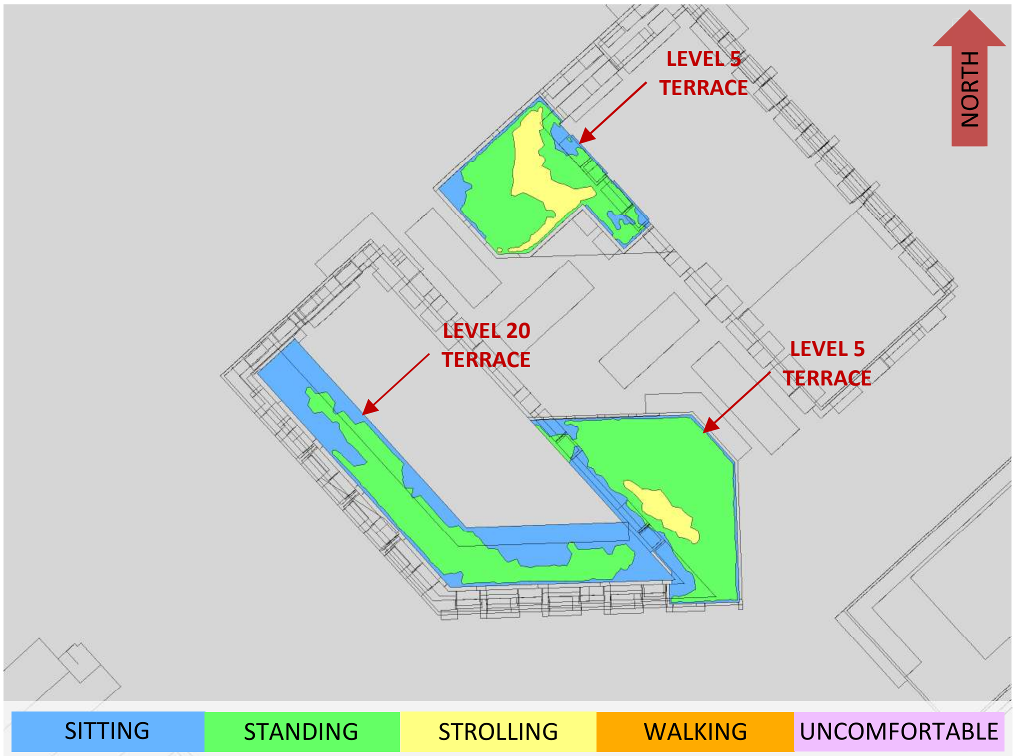


FIGURE 8A: SPRING – WIND COMFORT, COMMON AMENITY TERRACES

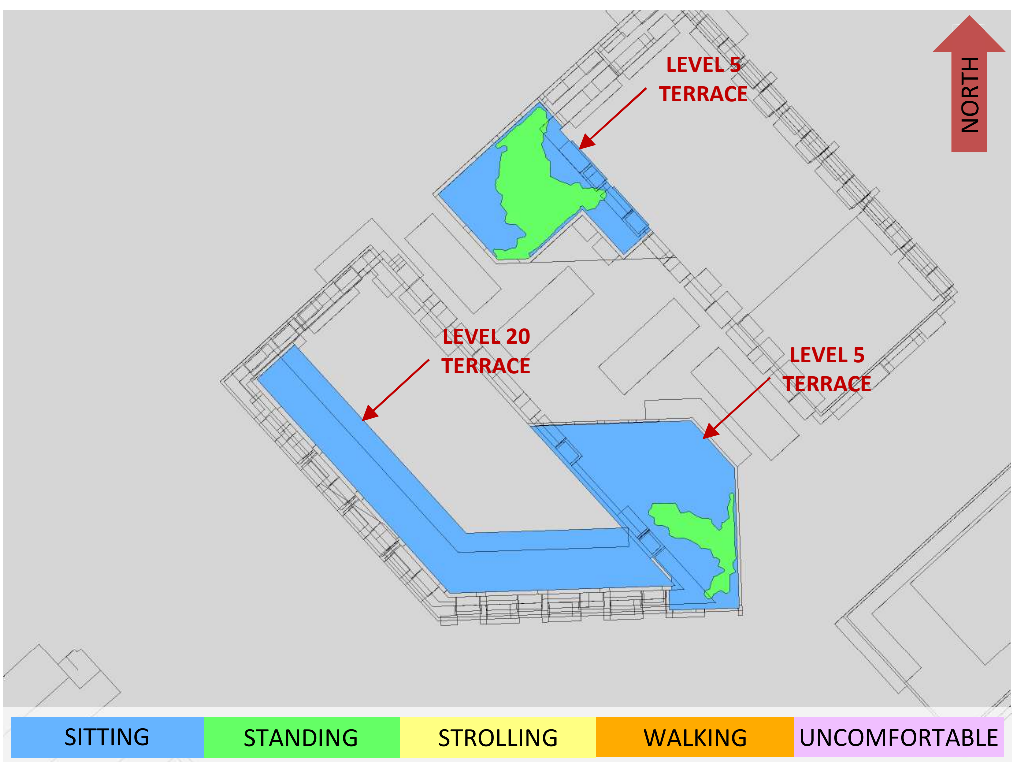


FIGURE 8B: SUMMER – WIND COMFORT, COMMON AMENITY TERRACES

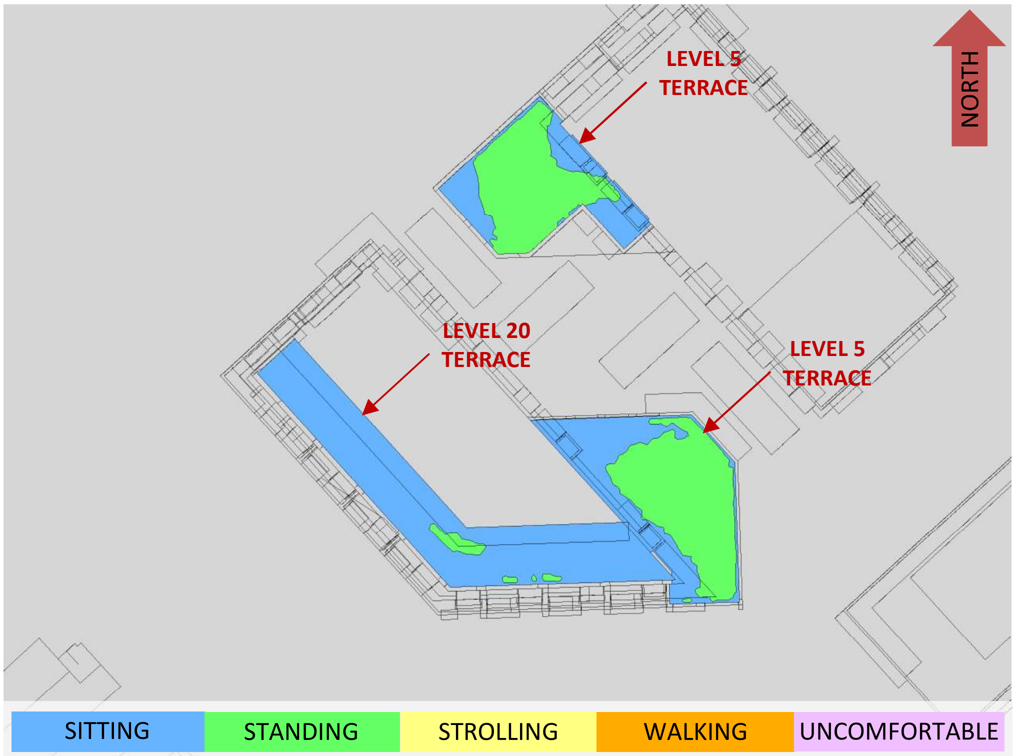


FIGURE 8C: AUTUMN – WIND COMFORT, COMMON AMENITY TERRACES

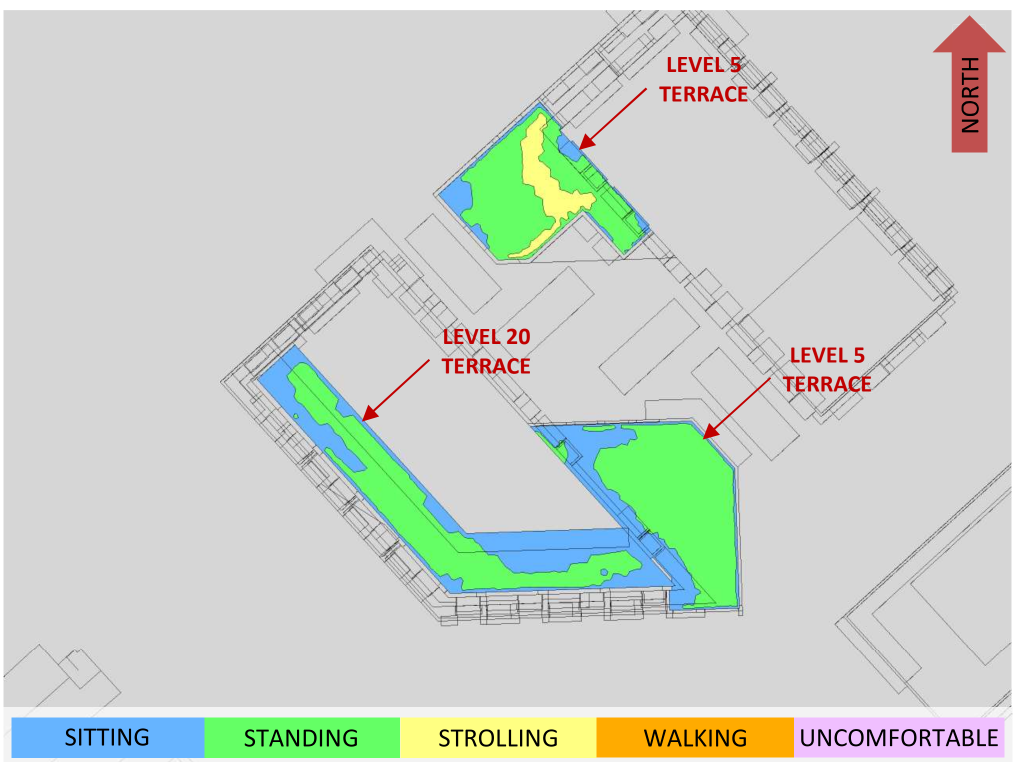


FIGURE 8D: WINTER – WIND COMFORT, COMMON AMENITY TERRACES

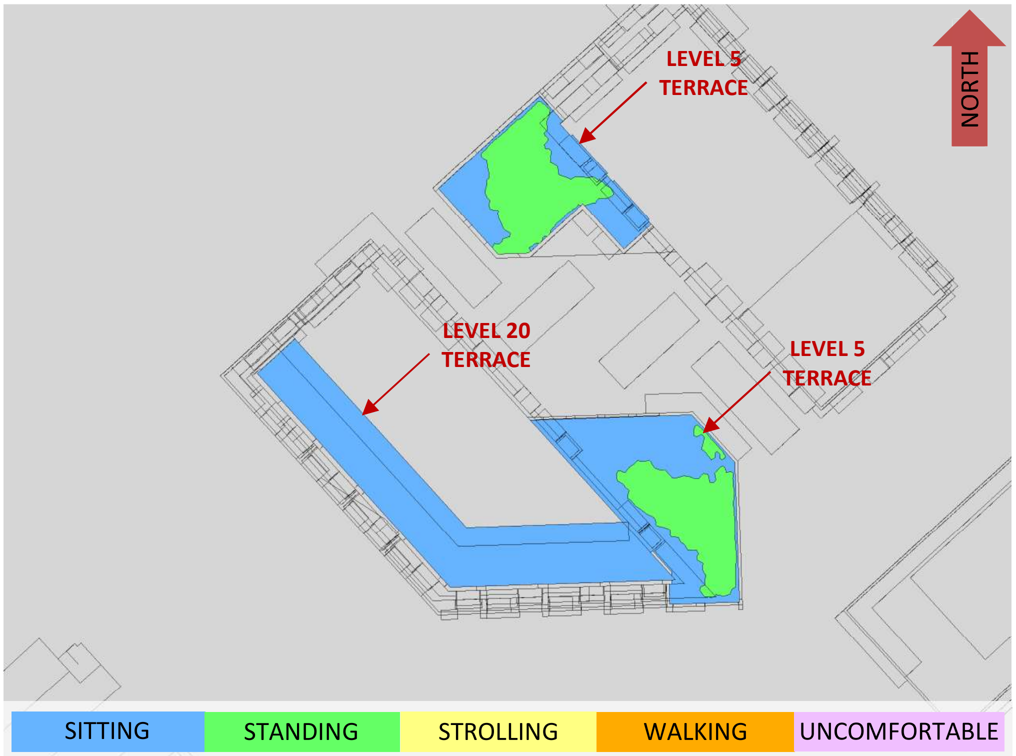


FIGURE 9: TYPICAL USE PERIOD, COMMON AMENITY TERRACES

APPENDIX A

SIMULATION OF THE ATMOSPHERIC BOUNDARY LAYER

127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
GRADIENTWIND.COM

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 60% mean wind speed for Ottawa 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 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	0.23
45	0.22
67.5	0.23
90	0.23
112.5	0.23
135	0.22
157.5	0.23
180	0.23
202.5	0.23
225	0.23
247.5	0.23
270	0.23
292.5	0.22
315	0.24
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).

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

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