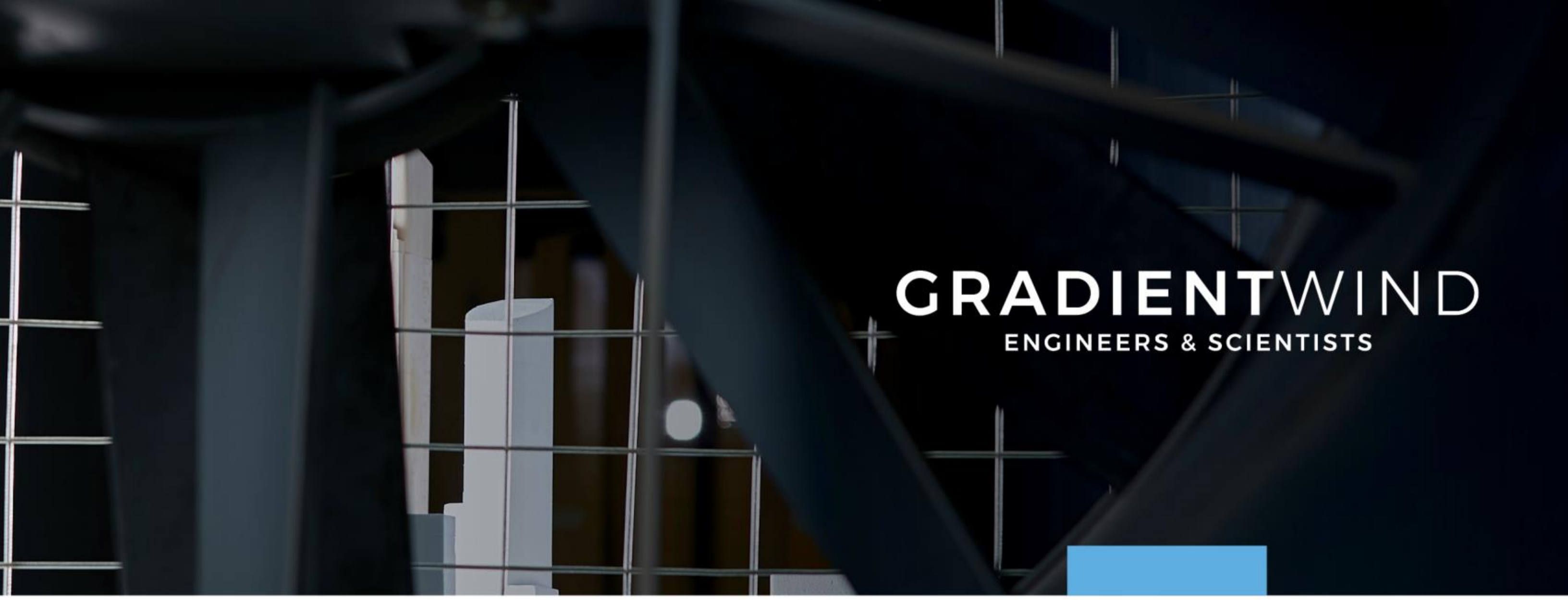

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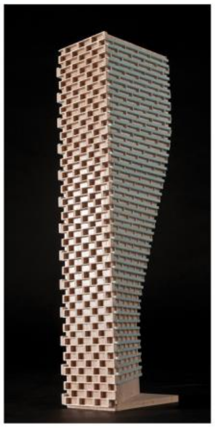
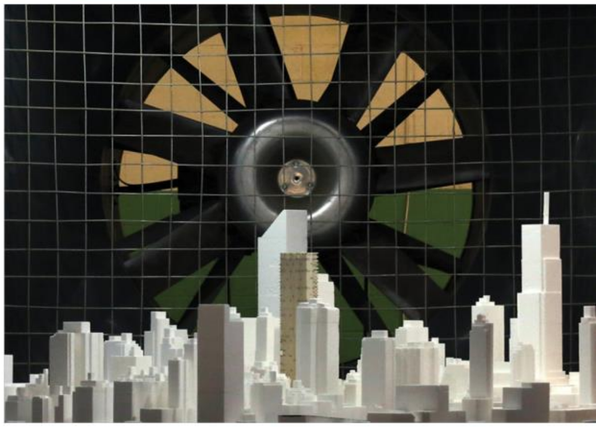
PEDESTRIAN LEVEL WIND STUDY

3085 Hurontario Street
Mississauga, Ontario

REPORT: GW24-012-WTPLW





September 17, 2024

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EXECUTIVE SUMMARY

This report describes a wind tunnel pedestrian level wind study undertaken to assess wind conditions for a proposed multi-building mixed-use development located at 3085 Hurontario Street in Mississauga, Ontario. Five configurations were studied: (i) *existing scenario*, including all approved, surrounding developments and without the proposed development, (ii) *proposed scenario* with the proposed development in place, (iii) *future scenario* with the proposed development in place and nearby proposed developments, (iv) *proposed scenario with mitigation* including the proposed development and recommended mitigation in place, and (v) *future scenario with mitigation* including the proposed development and recommended mitigation in place and nearby proposed developments. The study involves wind tunnel measurements of pedestrian wind speeds using a physical scale model, combined with meteorological data integration, to assess pedestrian comfort at key areas within and surrounding the study site. Grade-level areas investigated include sidewalks, laneways, landscaped spaces, parks, parking areas, and potential building access points. Wind comfort is also evaluated over the Level 4 and Level 7 outdoor amenity spaces. The results and recommendations derived from these considerations are summarized in the following paragraphs and detailed in the subsequent report.

Our work is based on industry standard wind tunnel testing and data analysis procedures, architectural drawings provided by Kirkor Architects and Planners in August 2024, surrounding street layouts, as well as existing and approved future building massing information obtained from the City of Mississauga, and recent site imagery.

A complete summary of the predicted wind conditions is provided in Section 5 of this report and is also illustrated in Figures 2A through 10B, as well as the various tables in the appendices. Based on wind tunnel test results, meteorological data analysis, and experience with similar developments in Mississauga, we conclude that the conditions over most grade-level pedestrian wind sensitive areas within and surrounding the study site will be acceptable for the intended uses on a seasonal basis. With respect to the *proposed scenario*, windier conditions are measured at walkway locations between T2 and T3, northeast of T1 and northwest of T3, as well as the southwest retail entrances to T1 and T2, the retail patio east of T1, and the outdoor amenity northwest of T2, for which mitigation is recommended and tested, as described in Section 5.4.

The T1 and T3 terraces, as well as the Level 4 terrace on T2 will be comfortable for sitting or more sedentary activities during the summer. To ensure similarly calm conditions over the remaining Level 4 and Level 7 terraces, some mitigation is recommended as described in Section 5.4.

With the inclusion of recommended wind barriers and canopies in the *proposed with mitigation* scenario, all noted areas improved to acceptable wind conditions. Regarding the T1 north lobby and amenity entrances, conditions marginally worsen, and mitigation is proposed in described Section 5.4.

Concerning the *future* scenario, most areas, grade-level and elevated terraces, will experience a slight improvement in wind conditions with the addition of nearby proposed developments. However, mitigation remains applicable for the previously noted T2 retail entrance, the T1 retail patio, the T2 outdoor amenity, and the T2 Level 7 terrace. Additionally, the south elevation of T4 will experience windier conditions, requiring mitigation at the primary lobby entrance. Many of these areas are improved with the inclusion of mitigation in the *future with mitigation* scenario, however, the south elevation of T4 remains unsuitable for the lobby entrance, and mitigation remains recommended to improve conditions.

Within the context of typical weather patterns, which exclude anomalous localized storm events such as tornadoes and downbursts, no areas over the study site were found to experience conditions that could be considered unsafe.

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TABLE OF CONTENTS

1. INTRODUCTION

This report describes a wind tunnel pedestrian level wind (PLW) study undertaken to assess wind conditions for the proposed multi-building mixed-use development located at 3085 Hurontario Street in Mississauga, Ontario. Five configurations were studied: (i) *existing scenario*, including all approved, surrounding developments and without the proposed development, (ii) *proposed scenario* with the proposed development in place, (iii) *future scenario* with the proposed development in place and nearby proposed developments, (iv) *proposed scenario with mitigation* including the proposed development and recommended mitigation in place, and (v) *future scenario with mitigation* including the proposed development and recommended mitigation in place and nearby proposed developments The study was performed in accordance with industry standard wind tunnel testing techniques, architectural drawings provided by Kirkor Architects and Planners in August 2024, surrounding street layouts and existing and approved future building massing information, as well as recent site imagery.

2. TERMS OF REFERENCE

The focus of this pedestrian wind study is the proposed multi-building mixed-use development located at 3085 Hurontario Street in Mississauga, Ontario. With reference to project north, the study site is situated approximately 100 metres to the east of the intersection of Hurontario Street and Kirwin Avenue on a nominally 'L'-shaped parcel of land with its short axis oriented to the southeast.

The proposed development is divided into three phases: Phase 1, Phase 2, and Phase 3, situated from the west counterclockwise to the northeast of the subject site. Phase 1 comprises T1 (36 storeys) and T2 (39 storeys), Phase 2 comprises T3 (33 storeys), and Phase 3 comprises T4 (31 storeys). Each tower rises above 11-storey podia, and are topped by mechanical penthouses. A drive aisle extends from Hurontario Street to Kirwin Avenue, providing access to temporary surface parking to the northeast of T1, the pick-up/drop-off areas to the south, east, and west of T2, T3, and T4, respectively, and underground parking ramps located at the northwest corner of T3 and at the northeast corner of T2.

6-storey

Primary residential entrances are located near the centre of the west and east elevations of T1 and T3, near the centre of the north and south elevations of T2, and near the centre of the west elevation of T4. Retail spaces are accommodated at the ground floors of T1 and T2, located to the west and south of the ground floor of T1, and to the west of the ground floor of T2. At Levels 4 and 7, common amenity terraces are accommodated within setbacks from the south elevation of T1, T3, and T4, and from the west elevation of T2.

Regarding wind exposures, the near-field surroundings (defined as an area falling within a 200 m radius of the subject site) include low-rise commercial buildings with surface parking lots from the southeast clockwise to the northwest and mid-rise residential buildings from the north-northwest clockwise to the southeast, with isolated high-rise residential buildings to the west-southwest and northeast. High-rise residential buildings are located approximately 120 m and 60 m to the south and west, respectively, and two high-rise residential towers are located approximately 150 m to the northeast. The far-field surroundings (defined as the area beyond the near field and within a 2-kilometre (km) radius) include low-rise suburban exposure in all directions, with a concentrated cluster of mid- and high-rise buildings approximately 1.2 km to the northwest along Hurontario Street, and clusters of mid- and high-rise buildings to the southeast along Hurontario Street and to the west-northwest near Mississauga City Centre.

The *future* scenario includes additional developments proposed nearby, including 3115 Hurontario Street (42-storeys), 25 Hillcrest Avenue & 3154 Hurontario Street (34-, 39-, 43-, 43-, and 46-storeys), and 60 Dundas Street East (36-storeys).

Grade-level areas investigated include sidewalks, laneways, landscaped spaces, parks, parking areas, and building access points. Wind comfort is also evaluated over the Level 4 and Level 7 outdoor amenity spaces. Figures 1A, 1B, and 1C illustrates the *existing, proposed,* and *future* study sites and surrounding context, respectively, and Photographs 1 through 14 depict the wind tunnel model used to conduct the study.

3. OBJECTIVES

The principal objectives of this study are to (i) determine pedestrian level wind comfort and safety 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; (iii) recommend suitable mitigation measures, where required; and (iv) evaluate the influence of the proposed development, and of future surrounding developments, on the site wind conditions.

4. METHODOLOGY

The approach followed to quantify pedestrian wind conditions over the site is based on wind tunnel measurements of wind speeds at selected locations on a reduced-scale physical model, meteorological analysis of the Mississauga area wind climate and synthesis of wind tunnel data with industry-accepted guidelines[1]. The following sections describe the analysis procedures, including a discussion of the pedestrian comfort and safety guidelines.

4.1 Wind Tunnel Context Modelling

A detailed PLW study is performed to determine the influence of local winds at the pedestrian level for a proposed development. The physical model of the proposed development and relevant surroundings, illustrated in Photographs 1 through 14 following the main text, was constructed at a scale of 1:400. The wind tunnel model includes all existing buildings and approved future developments within a full-scale diameter of approximately 840 metres. The general concept and approach to wind tunnel modelling is to provide building and topographic detail in the immediate vicinity of the study site on the surrounding model, and to rely on a length of wind tunnel upwind of the model to develop wind properties consistent with known turbulent intensity profiles that represent the surrounding terrain.

An industry standard practice is to omit trees, vegetation, and other existing and planned landscape elements from the wind tunnel model due to the difficulty of providing accurate seasonal representation of vegetation. The omission of trees and other landscaping elements produces slightly more conservative wind speed values.

4.2 Wind Speed Measurements

The PLW study was performed by testing a total of 139 sensor locations on the scale model in Gradient Wind's wind tunnel. Of these 139 sensors, 131 were located at grade and the remaining eight sensors were located over the various Level 4 and Level 7 amenity terraces. Wind speed measurements were performed for each of the 139 sensors for 36 wind directions at 10° intervals. Figures 1A through 1C

[1] City of Mississauga Urban Design Terms of Reference, Wind Comfort and Safety Studies, February 2023

illustrates the *existing*, *proposed and future* study sites and surrounding context, respectively, while sensor locations used to investigate wind conditions are illustrated in Figures 2A through 10B.

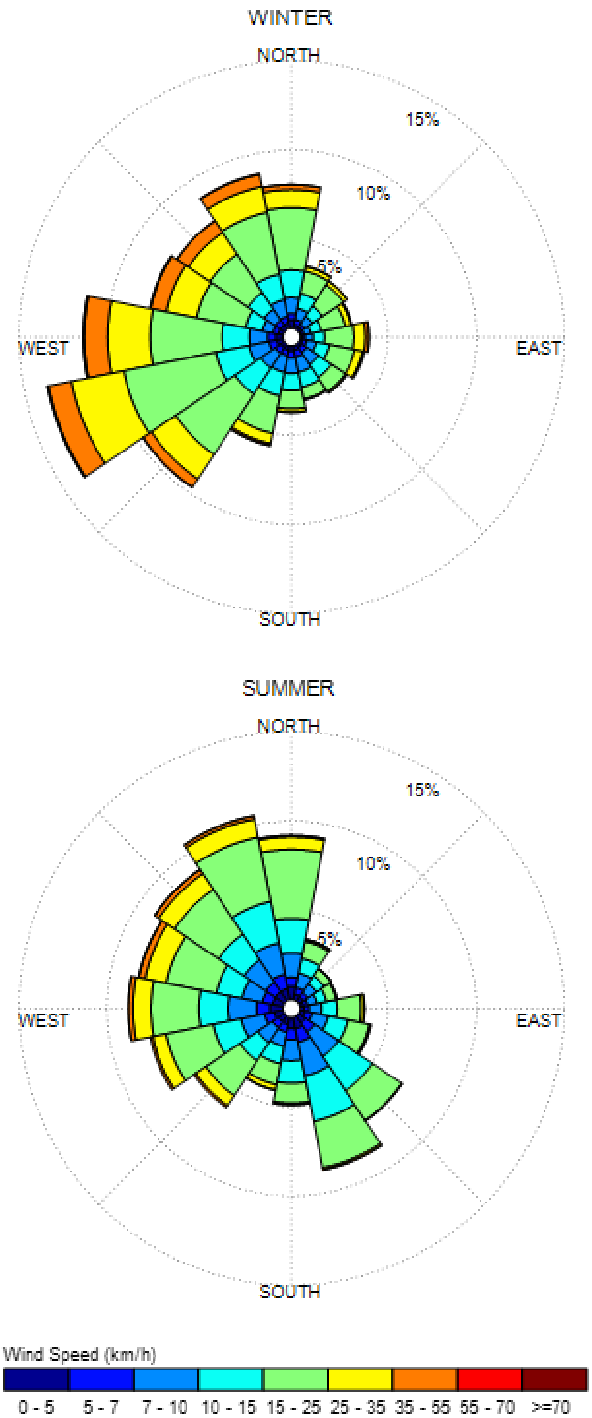
Mean and peak wind speed values for each location and wind direction were calculated from real-time pressure measurements, recorded at a sample rate of 500 samples per second, and taken over a 60-second time period. This period at model-scale corresponds approximately to one hour in full-scale, which matches the time frame of full-scale meteorological observations. Measured mean and gust wind speeds at grade were referenced to the wind speed measured near the ceiling of the wind tunnel to generate mean and peak wind speed ratios. Ceiling height in the wind tunnel represents the depth of the boundary layer of wind flowing over the earth's surface, referred to as the gradient height. Within this boundary layer, mean wind speed increases up to the gradient height and remains constant thereafter. Appendices E and F provide greater detail of the theory behind wind speed measurements. Wind tunnel measurements for this project, conducted in Gradient Wind's wind tunnel facility, meet or exceed guidelines found in the National Building Code of Canada (NBC 2015) and of 'Wind Tunnel Studies of Buildings and Structures', ASCE Manual 7 Reports on Engineering Practice No 67.

4.3 Meteorological Data Analysis - Pearson International Airport

A statistical model for winds in Mississauga was developed from over 50 years of hourly meteorological wind data recorded at Pearson International Airport. Wind speed and direction data were analyzed for each month of the year in order to determine the statistically prominent wind directions and corresponding speeds, and to characterize similarities between monthly weather patterns. Based on this portion of the analysis, the four seasons are represented by grouping data from consecutive months based on similarity of weather patterns, and not according to the traditional calendar method.

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 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 Pearson International Airport, the most common winds concerning pedestrian comfort occur from the southwest clockwise to the north, as well as those from the east. The directional preference and relative magnitude of the wind speed varies somewhat from season to season, with the summer months displaying the calmest winds relative to the remaining seasonal periods.

SEASONAL DISTRIBUTION OF WINDS FOR VARIOUS PROBABILITIES
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 Comfort and Safety Guidelines

Pedestrian comfort and safety guidelines are based on the mechanical effects of wind without consideration of other meteorological conditions (i.e. temperature, relative humidity). The comfort guidelines assume that pedestrians are appropriately dressed for a specified outdoor activity during any given season. Four pedestrian comfort classes are based on 80% non-exceedance Guest Equivalent Mean (GEM) wind speed ranges, which include (i) Sitting; (ii) Standing; (iii) Walking; and (iv) Uncomfortable. More specifically, the comfort classes and associated GEM wind speed ranges are summarized as follows:

(i) **Sitting** – A wind speed below 10 km/h (i.e. 0 – 10 km/h) would be considered acceptable for sedentary activities, including sitting.

(ii) **Standing** – A wind speed below 15 km/h (i.e. 10 km/h – 15 km/h) is acceptable for activities such as standing or leisurely strolling.

(iii) **Walking** – A wind speed below 20 km/h (i.e. 15 km/h – 20 km/h) is acceptable for walking or more vigorous activities.

(iv) **Uncomfortable** – A wind speed over 20 km/h is classified as uncomfortable from a pedestrian comfort standpoint. Brisk walking and exercise, such as jogging, would be acceptable for moderate excesses of this criterion.

The pedestrian safety wind speed guideline 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 greater than 90 km/h is classified as dangerous.

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 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 or more sedentary activities. Similarly, if 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 most of 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 at tested locations, the assessment of pedestrian comfort involves determining the suitability of the predicted wind conditions for their associated spaces. This step involves comparing the predicted comfort class to the desired comfort class, which is dictated by the location type represented by the sensor (i.e. a sidewalk, building entrance, amenity space, or other). An overview of common pedestrian location types and their desired comfort classes are summarized below.

DESIRED PEDESTRIAN COMFORT CLASSES FOR VARIOUS LOCATION TYPES

Location Types	Desired Comfort Classes
Primary Building Entrance	Standing
Secondary Building Access Point	Walking
Public Sidewalks / Pedestrian Walkways	Walking
Outdoor Amenity Spaces	Sitting / Standing
Cafés / Patios / Benches / Gardens	Sitting / Standing
Plazas	Standing / Walking
Transit Stops	Standing
Public Parks	Sitting / Walking
Garage / Service Entrances	Walking
Vehicular Drop-Off Zones	Walking
Laneways / Loading Zones	Walking

5. RESULTS AND DISCUSSION

Tables A1 and A2 in Appendix A provide a summary of seasonal comfort predictions for each sensor location under the *existing* massing scenario. Similarly, Tables B1 through B4 in Appendix B provide the seasonal comfort predictions under the *proposed* massing scenario, Tables C1 through C4 in Appendix C provide the seasonal comfort predictions under the *future* massing scenario, Tables D1 through D4 in Appendix D provide the seasonal comfort predictions under the *proposed with mitigation* massing scenario, and Tables E1 through E4 in Appendix E provide the seasonal comfort predictions under the *future with mitigation* massing scenario. The tables indicate the 80% non-exceedance GEM wind speeds and corresponding comfort classifications as defined in Section 4.4. In other words, a wind speed threshold of 19.1 for the summer season indicates that 80% of the measured data falls at or below 19.1 km/h during the summer months and conditions are therefore suitable for walking, as the 80% threshold value falls within the exceedance range of 15-20 km/h for walking. The tables include the predicted threshold values for each sensor location during each season, accompanied by the corresponding predicted comfort class (i.e. sitting, standing, walking, etc.).

The most significant findings of the PLW study are summarized in Sections 5.1 through 5.5. To assist with understanding and interpretation, predicted conditions for the proposed development are also illustrated in colour-coded format in Figures 2A through 10B. Conditions suitable for sitting are represented by the colour blue, while standing is represented by green, and walking by yellow. Conditions considered uncomfortable for walking are represented by the colour orange. For locations where the wind safety criterion is exceeded, the sensor is highlighted in red.

5.1 Pedestrian Comfort Suitability – *Existing Scenario*

Based on the analysis of the measured data, consideration of local climate data, and the suitability descriptors provided in Tables A1-A2 in Appendix A and illustrated in Figures 2A and 2B, this section summarizes the significant findings of the PLW study with respect to the *existing scenario*, as follows:

1. All public sidewalks, laneways, landscaped spaces, and parking areas within and surrounding the proposed development currently experience wind conditions suitable for walking or better during each seasonal period.
2. The nearby transit stops along Hurontario Street (Sensors 1 & 12) currently experience standing or better conditions throughout the year.
3. Within the context of typical weather patterns, which exclude anomalous localized storm events such as tornadoes and downbursts, no areas over the study site were found to experience wind conditions that are considered unsafe.

5.2 Pedestrian Comfort Suitability – *Proposed Scenario*

Based on the analysis of the measured data, consideration of local climate data, and the suitability descriptors provided in Tables B1-B4 in Appendix B and illustrated in Figures 3A through 4B, this section summarizes the significant findings of the PLW study with respect to the *proposed scenario*, as follows:

1. Most public sidewalks, laneways, landscaped spaces, and parking areas within and surrounding the proposed development will experience wind conditions suitable for walking or better during throughout the year. Isolated areas will experience uncomfortable conditions during the winter, including the northwest corner of T4 along Kirwin Avenue (Sensor 21), southeast of T1 along Hurontario (Sensor 47), the walkway between Towers 2 and 3 (Sensors 80 & 81), at the northeast corner of T1 (Sensor 95) and between Towers 3 and 4 (Sensors 115 & 129). Additionally, an area between Towers 2 and 3 (Sensor 80) will also experience uncomfortable conditions during the summer.

   It is notable that several of the exceedances of the walking conditions will be marginal (< 1km/h) therefore the uncomfortable conditions at Sensors 21, 47, and 129 are considered acceptable, without the need for mitigation.

   Concerning the remaining noted areas, between Towers 2 and 3 (Sensor 80 & 81), the northwest corner of T3 (Sensor 115) and northeast corner of T1 (Sensor 95), targeted clusters of vertical wind barriers are recommended to provide protection from prevailing north and west winds accelerating around the corners and between the towers. Additionally, canopies are recommended at the southeast corner of T1 (Sensors 97, 104, & 105), the southwest corner of T2 (Sensors 92-94), the southwest corner of T4 (Sensors 23, 123, & 124), and the southeast corner of T4 (Sensors 127-130). The efficacy of such mitigation is described in detail in Section 5.4.

2. Concerning primary entrances throughout the study site, most will experience standing or better conditions throughout the year, which is appropriate. Exceptions include the southwest retail entrance to T2 (Sensor 93) and T1 (Sensor 104), which experience marginal walking conditions during the winter. To improve conditions at these entrances, it is recommended to either recess the doorway within the building façade or flank the entrance with vertical wind barriers, as well as provide overhead canopies. Alternatively, the T2 entrance could be relocated further to the southeast (Sensor 92) where conditions are calmer.

All secondary building access points within the development will be comfortable for walking or better throughout the year, which is acceptable.

3. Without mitigation, the retail patio east of T1 (Sensors 95-97) will experience a mix of sitting to walking conditions during the summer, with the windiest conditions occurring at the previously noted northeast corner (Sensor 95). To ensure calm conditions suitable for sitting or more sedentary activities, it is recommended to implement vertical wind barriers extending out from the building façade directly upwind of seating areas, particularly towards the north side of the space. Details of the mitigation confirmation testing is provided in Section 5.4.

4. The outdoor amenity near the southwest corner of T2 (Sensor 94) will experience walking conditions throughout the year. To ensure calm conditions suitable for sitting or more sedentary activities, it is recommended to implement vertical wind barriers upwind of designated seating areas, deflecting salient northerly winds accelerating around the building corner and between T1 and T2.

5. The private terraces and residential unit entrances along the north elevation of T4 (Sensors 118-122) will generally be suitable for sitting during the summer, and standing during the winter, which is acceptable.

6. The nearby transit stops along Hurontario Street (Sensors 1 & 12) will continue to experience standing conditions during each seasonal period, which is appropriate.

7. Concerning the various Level 4 and Level 7 terraces, both T1 and T3 terraces (Sensors 132 & 133 and 136 & 137), as well as the T2 Level 4 terrace (Sensor 134) will be suitable for sitting during the summer, which is ideal. Without mitigation, the T2 Level 7 terrace (Sensor 135) and T4 terraces (Sensors 138 & 139) experience standing conditions during the summer. To improve conditions at the noted windier terraces, recommended mitigation is outlined in Section 5.4.

8. Within the context of typical weather patterns, which exclude anomalous localized storm events such as tornadoes and downbursts, no areas over the study site were found to experience wind conditions that are considered unsafe.

5.3 Pedestrian Comfort Suitability – *Future Scenario*

Based on the analysis of the measured data, consideration of local climate data, and the suitability descriptors provided in Tables C1-C4 in Appendix B and illustrated in Figures 5A through 6B, this section summarizes the significant findings of the PLW study with respect to the *future scenario*, as follows:

1. All public sidewalks, laneways, landscaped spaces, and parking areas within and surrounding the proposed development will experience wind conditions suitable for walking or better during throughout the year, which is an improvement compared to the *proposed* scenario.

2. Concerning primary entrances throughout the study site, most will experience standing or better conditions throughout the year, which is appropriate. The retail entrance mentioned in 5.2 (Sensor 93) will improve to standing conditions year-round, however, the lobby entrance to T4 (Sensor 125) will experience marginal walking conditions during the winter. For this lobby entrance, it may be necessary to either recess the doorway within the building façade or flank the entrance with vertical wind barriers.

   All secondary building access points within the development will remain comfortable for walking or better throughout the year, which is acceptable.

3. The retail patio east of T1 (Sensors 95-97) will experience a mix of standing and walking conditions during the summer, which is a marginal worsening compared to the *proposed* scenario. The windiest conditions remain at the previously noted northeast corner (Sensor 95). The mitigation recommended for this area in 5.2.3 remains applicable.

4. The outdoor amenity near the southwest corner of T2 (Sensor 94) will experience standing conditions during the summer and walking conditions during the winter, which is a marginal improvement compared to the *proposed* scenario. However, the mitigation recommended for this area in 5.2.4 remains applicable.

5. The private terraces and residential unit entrances along the north elevation of T4 (Sensors 118-122) remain generally suitable for sitting during the summer, and standing during the winter, which is acceptable.

6. The nearby transit stops along Hurontario Street (Sensors 1 & 12) will continue to experience standing conditions during each seasonal period, which is appropriate.

7. Concerning the various Level 4 and Level 7 terraces, most will remain or improve to sitting conditions during the summer (Sensors 132-134 & 136-139). The T2 Level 7 terrace will continue to experience standing conditions during the summer, and the mitigation recommended in Section 5.2 remains acceptable.

8. Within the context of typical weather patterns, which exclude anomalous localized storm events such as tornadoes and downbursts, no areas over the study site were found to experience wind conditions that are considered unsafe.

5.4 Pedestrian Comfort Suitability – *Proposed with Mitigation*

Based on the analysis of the measured data, consideration of local climate data, and the suitability descriptors provided in Tables D1-D4 in Appendix B and illustrated in Figures 7A through 8B, this section summarizes the significant findings of the PLW study with respect to the *proposed scenario* with the inclusion of recommended mitigation, as follows:

1. The previously measured uncomfortable conditions between Towers 2 and 3 (Sensor 80 & 81), the northwest corner of T3 (Sensor 115) and northeast corner of T1 (Sensor 95), improve to walking or better conditions with the inclusion of the targeted 2.0-metre-tall wind screens positions to deflect prominent northwest quadrant winds. Tested mitigation locations are illustrated schematically in Figures 7A and 7B. It is noteworthy that the extent of the wind screens is exaggerated due to the size of wind tunnel sensors, and exact specifications of implemented mitigation can be coordinated at a later date.

2. Concerning primary entrances throughout the study site, many will continue to experience standing or better conditions throughout the year, which is appropriate. For the T1 north lobby and amenity entrance (Sensor 66), marginal walking conditions are measured during the winter. To improve conditions at these entrances, it is recommended to either recess the doorways within the building façade or flank the entrances with vertical wind barriers.

3. With the addition of 2.0-metre-tall vertical wind barriers towards the northeast corner, the retail patio east of T1 (Sensors 95-97) will experience sitting conditions during the summer and a mix of sitting to standing conditions during the winter, which is appropriate.

4. With the addition of 2.0-metre-tall vertical wind barriers along the north perimeter of the space, the outdoor amenity near the southwest corner of T2 (Sensor 94) will experience sitting conditions during the summer and standing conditions during the winter, which is appropriate.

5. Concerning the windier amenity terraces, those at T2 Level 7, and T4 Levels 4 and 7 will benefit from a combination of raised terrace perimeter guards and overhead pergolas with solid side walls. Tested mitigation locations are indicated in Figures 8A and 8B, but it is noteworthy that locations are general suggestions, and pergola extent is exaggerated to fully cover the wind sensors. The exact configuration of implemented mitigation can be coordinated at a later date.

6. Within the context of typical weather patterns, which exclude anomalous localized storm events such as tornadoes and downbursts, no areas over the study site were found to experience wind conditions that are considered unsafe.

5.5 Pedestrian Comfort Suitability – *Future with Mitigation*

Based on the analysis of the measured data, consideration of local climate data, and the suitability descriptors provided in Tables E1-E4 in Appendix B and illustrated in Figures 9A through 10B, this section summarizes the significant findings of the PLW study with respect to the *future scenario* with the inclusion of recommended mitigation, as follows:

1. The retail patio east of T1 (Sensors 95-97) will continue to experience sitting conditions during the summer, which is acceptable.

2. The outdoor amenity near the southwest corner of T2 (Sensor 94) will experience standing conditions throughout the year, which is a marginal worsening compared to the *proposed* scenario with mitigation. However, the wind mitigation described in Section 5.4 is expected to ensure suitable sitting conditions for this location.

3. Concerning the various Level 4 and Level 7 terraces, all will continue to experience sitting conditions during the summer, assuming the mitigation described in Section 5.2 is maintained, which is ideal.

4. Within the context of typical weather patterns, which exclude anomalous localized storm events such as tornadoes and downbursts, no areas over the study site were found to experience wind conditions that are considered unsafe.

6. CONCLUSIONS AND RECOMMENDATIONS

This report summarizes the methodology, results, and recommendations related to a pedestrian level wind study for the proposed mixed-use development located at 3085 Hurontario Street in Mississauga, Ontario. The study was performed in accordance with industry standard wind tunnel testing and data analysis procedures.

A complete summary of the predicted wind conditions is provided in Section 5 of this report and is also illustrated in Figures 2A through 10B, as well as the various tables in the appendices. Based on wind tunnel test results, meteorological data analysis, and experience with similar developments in Mississauga, we conclude that the conditions over most grade-level pedestrian wind sensitive areas within and surrounding the study site will be acceptable for the intended uses on a seasonal basis. With respect to the *proposed scenario*, windier conditions are measured at walkway locations between T2 and T3, northeast of T1 and northwest of T3, as well as the southwest retail entrances to T1 and T2, the retail patio east of T1, and the outdoor amenity northwest of T2, for which mitigation is recommended and tested, as described in Section 5.4.

The T1 and T3 terraces, as well as the Level 4 terrace on T2 will be comfortable for sitting or more sedentary activities during the summer. To ensure similarly calm conditions over the remaining Level 4 and Level 7 terraces, some mitigation is recommended as described in Section 5.4.

With the inclusion of recommended wind barriers and canopies in the *proposed with mitigation* scenario, all noted areas improved to acceptable wind conditions. Regarding the T1 north lobby and amenity entrances, conditions marginally worsen, and mitigation is proposed in described Section 5.4.

Concerning the *future* scenario, most areas, grade-level and elevated terraces, will experience a slight improvement in wind conditions with the addition of nearby proposed developments. However, mitigation remains applicable for the previously noted T2 retail entrance, the T1 retail patio, the T2 outdoor amenity, and the T2 Level 7 terrace. Additionally, the south elevation of T4 will experience windier conditions, requiring mitigation at the primary lobby entrance. Many of these areas are improved with the inclusion of mitigation in the *future with mitigation* scenario, however, the south elevation of T4 remains unsuitable for the lobby entrance, and mitigation remains recommended to improve conditions.

Within the context of typical weather patterns, which exclude anomalous localized storm events such as tornadoes and downbursts, no areas over the study site were found to experience conditions that could be considered unsafe.

This concludes our pedestrian level wind study and report. Please advise the undersigned of any questions or comments.

Sincerely,

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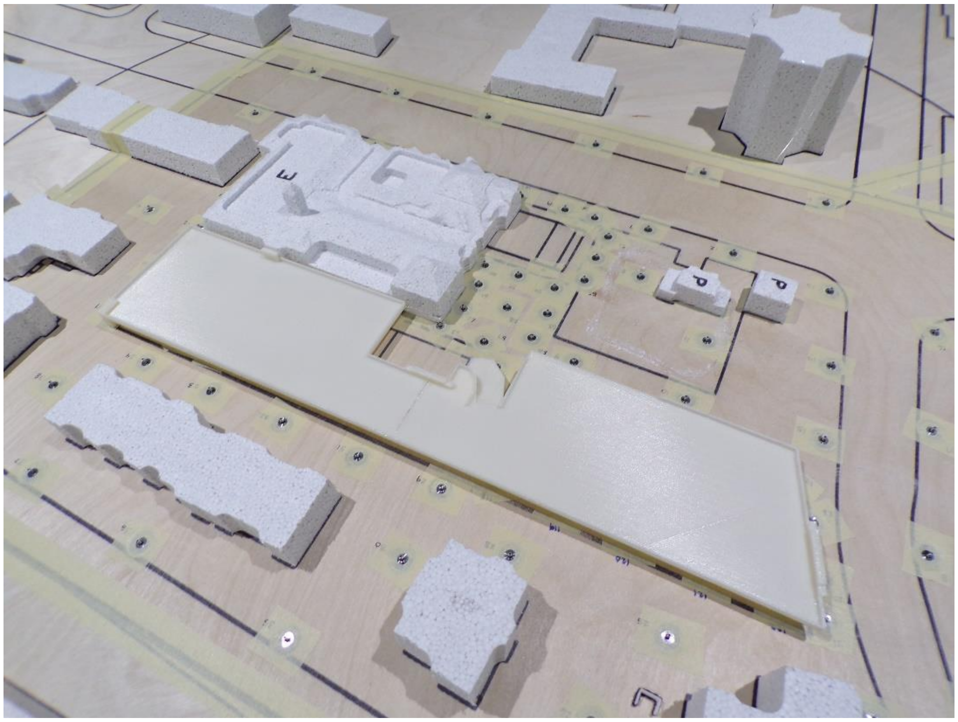
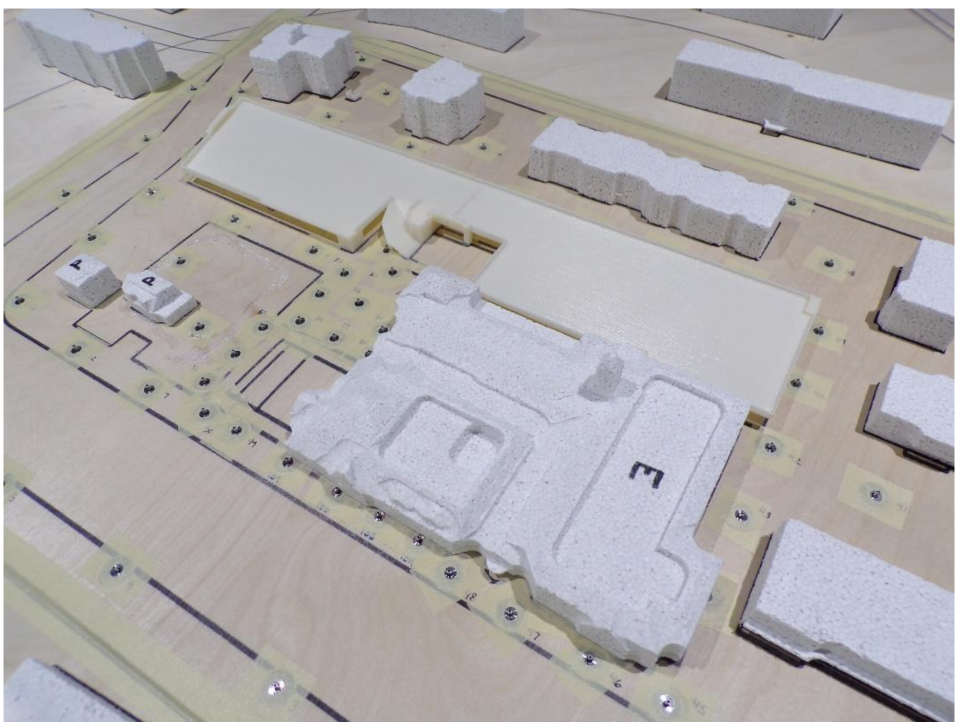
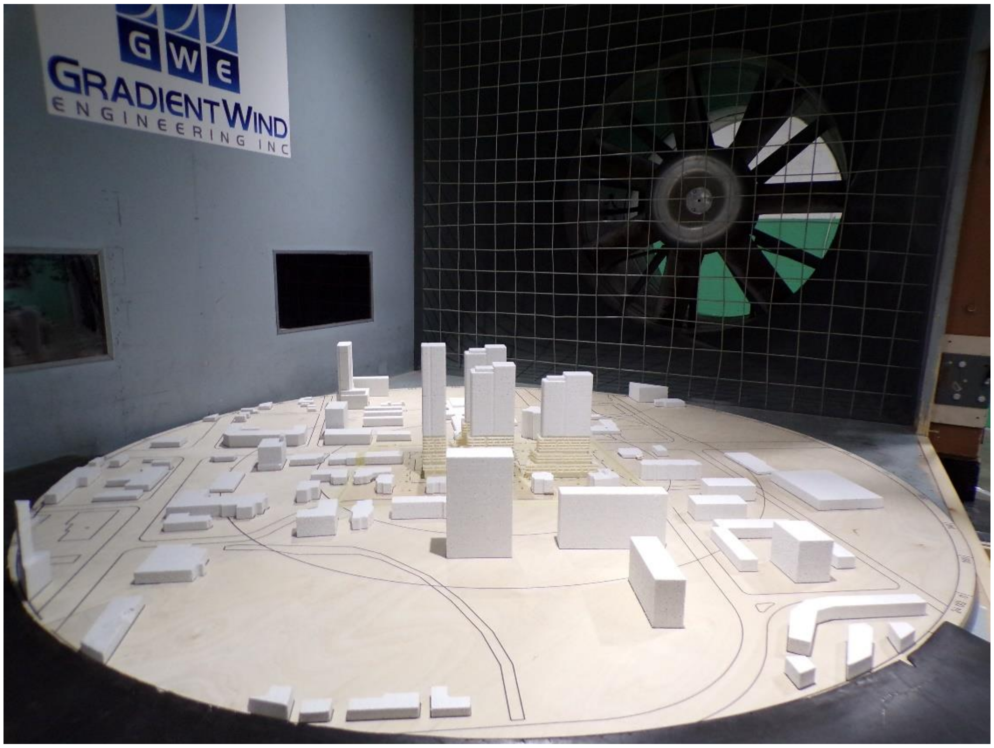
GW24-012-WTPLW



PHOTOGRAPH 1: CLOSE-UP VIEW OF EXISTING CONTEXT MODEL LOOKING SOUTHWEST

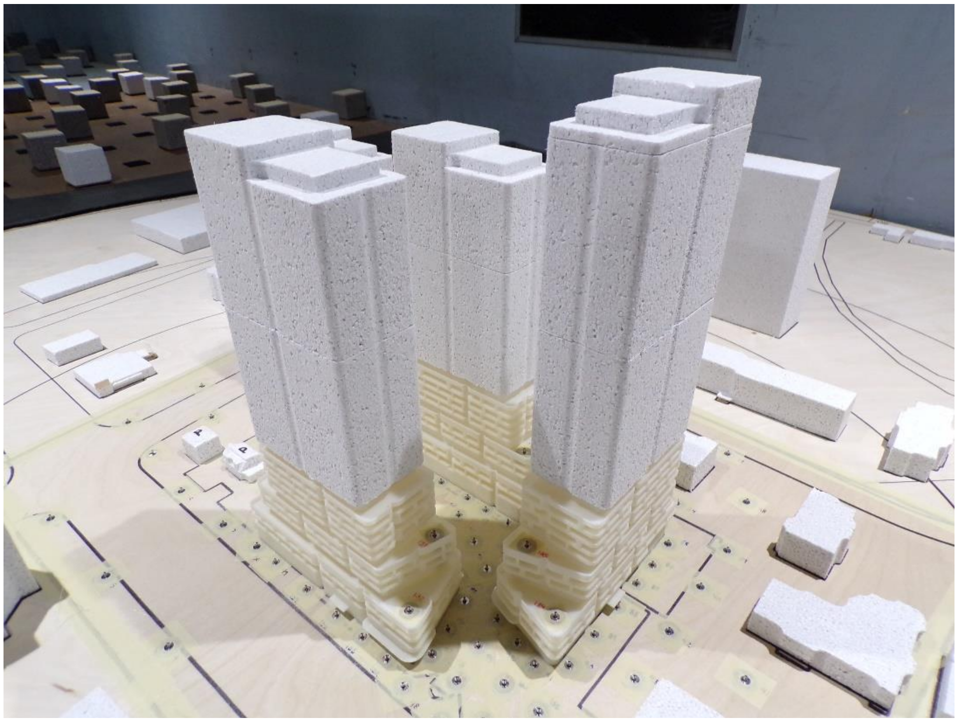


PHOTOGRAPH 2: CLOSE-UP VIEW OF EXISTING CONTEXT MODEL LOOKING NORTHEAST



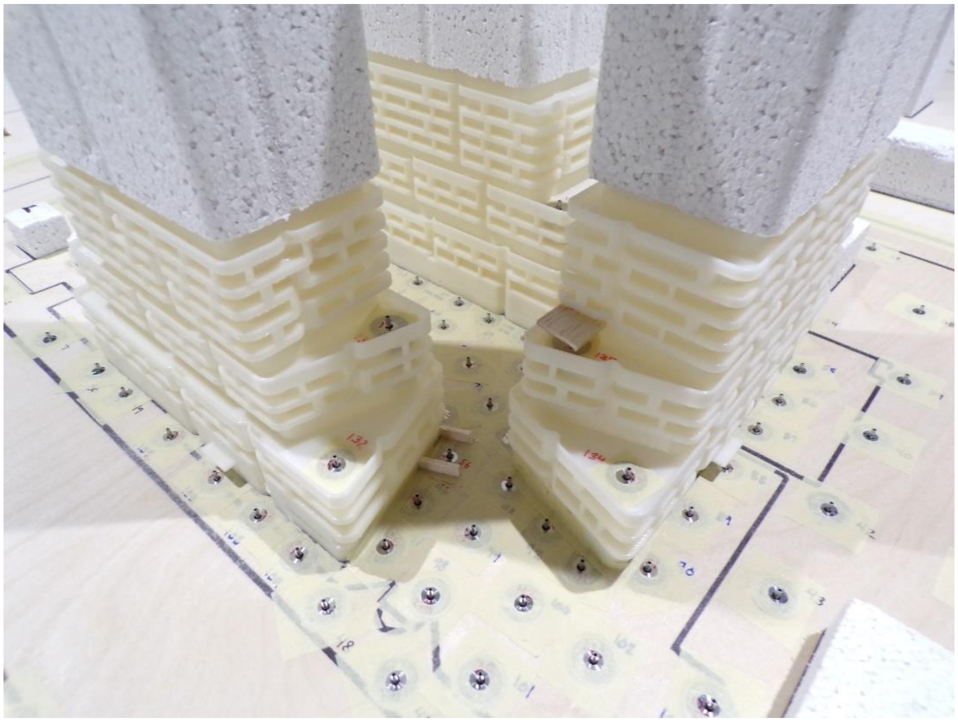
PHOTOGRAPH 3: PROPOSED STUDY MODEL INSIDE THE GWE WIND TUNNEL LOOKING DOWNWIND

PHOTOGRAPH 4: PROPOSED STUDY MODEL INSIDE THE GWE WIND TUNNEL LOOKING UPWIND



PHOTOGRAPH 5: CLOSE-UP VIEW OF PROPOSED STUDY MODEL LOOKING NORTHEAST

PHOTOGRAPH 6: CLOSE-UP VIEW OF PROPOSED STUDY MODEL LOOKING SOUTHWEST



PHOTOGRAPH 7: CLOSE-UP VIEW OF PROPOSED STUDY MODEL WITH MITIGATION LOOKING NORTHEAST

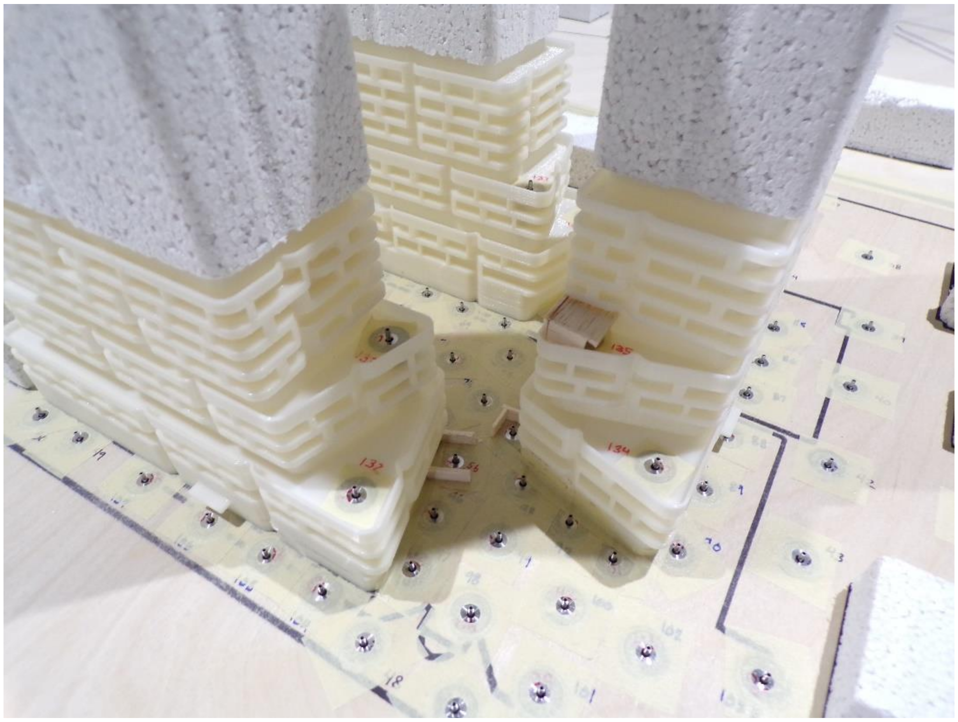
PHOTOGRAPH 8: CLOSE-UP VIEW OF PROPOSED STUDY MODEL WITH MITIGATION LOOKING SOUTHWEST

PHOTOGRAPH 9: <u>FUTURE</u> STUDY MODEL INSIDE THE GWE WIND TUNNEL LOOKING DOWNWIND

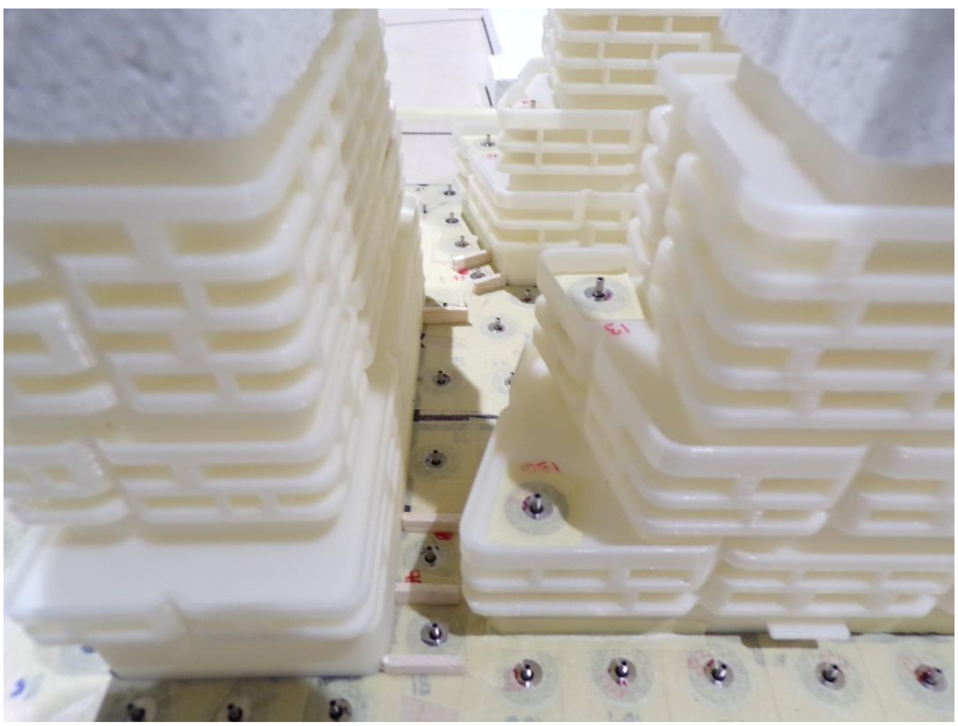
PHOTOGRAPH 10: <u>FUTURE</u> STUDY MODEL INSIDE THE GWE WIND TUNNEL LOOKING UPWIND

PHOTOGRAPH 11: CLOSE-UP VIEW OF FUTURE STUDY MODEL LOOKING NORTHEAST

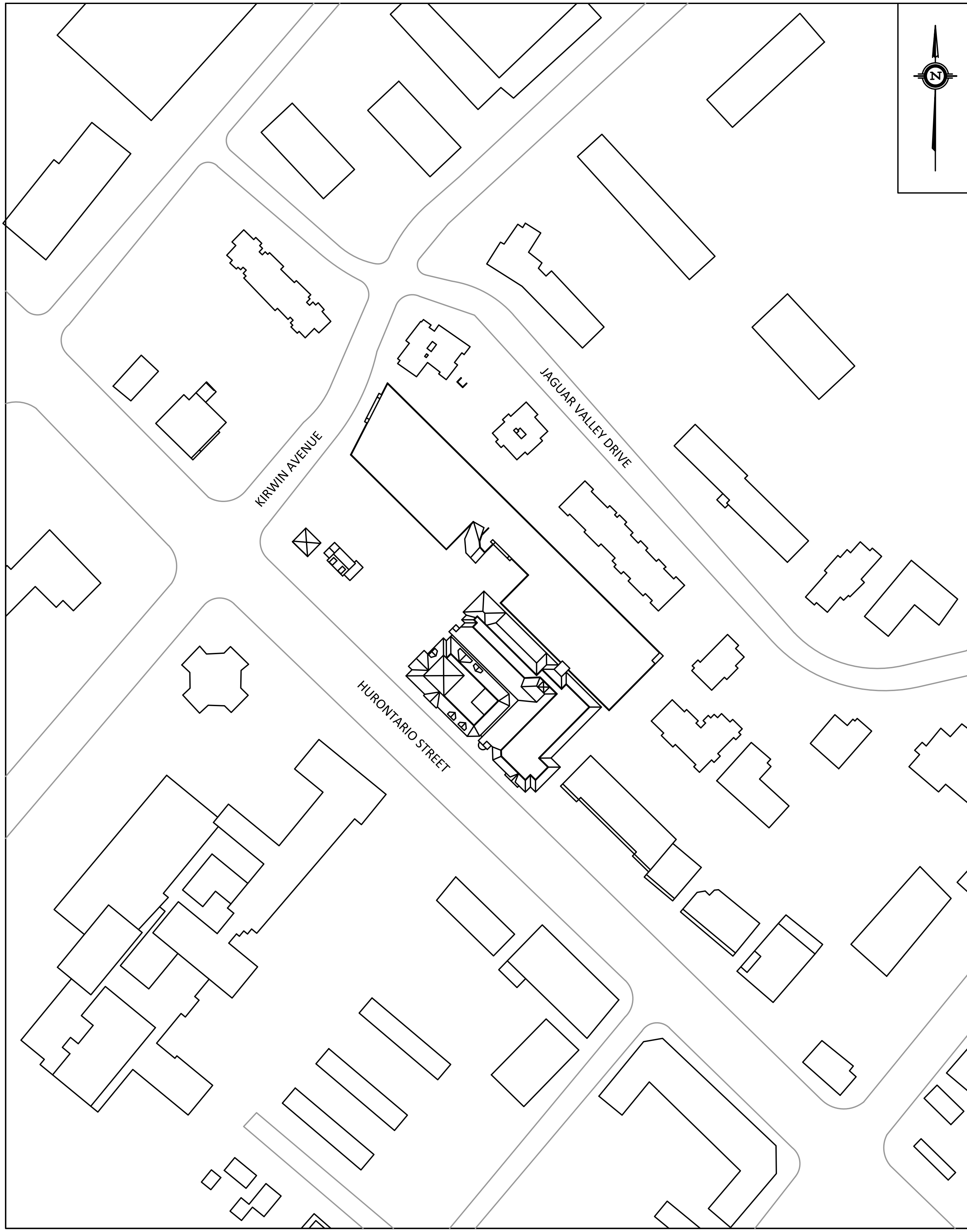
PHOTOGRAPH 12: CLOSE-UP VIEW OF FUTURE STUDY MODEL LOOKING SOUTHWEST



PHOTOGRAPH 13: CLOSE-UP VIEW OF <u>FUTURE</u> STUDY MODEL WITH MITIGATION LOOKING NORTHEAST



PHOTOGRAPH 14: CLOSE-UP VIEW OF <u>FUTURE</u> STUDY MODEL WITH MITIGATION LOOKING SOUTHWEST



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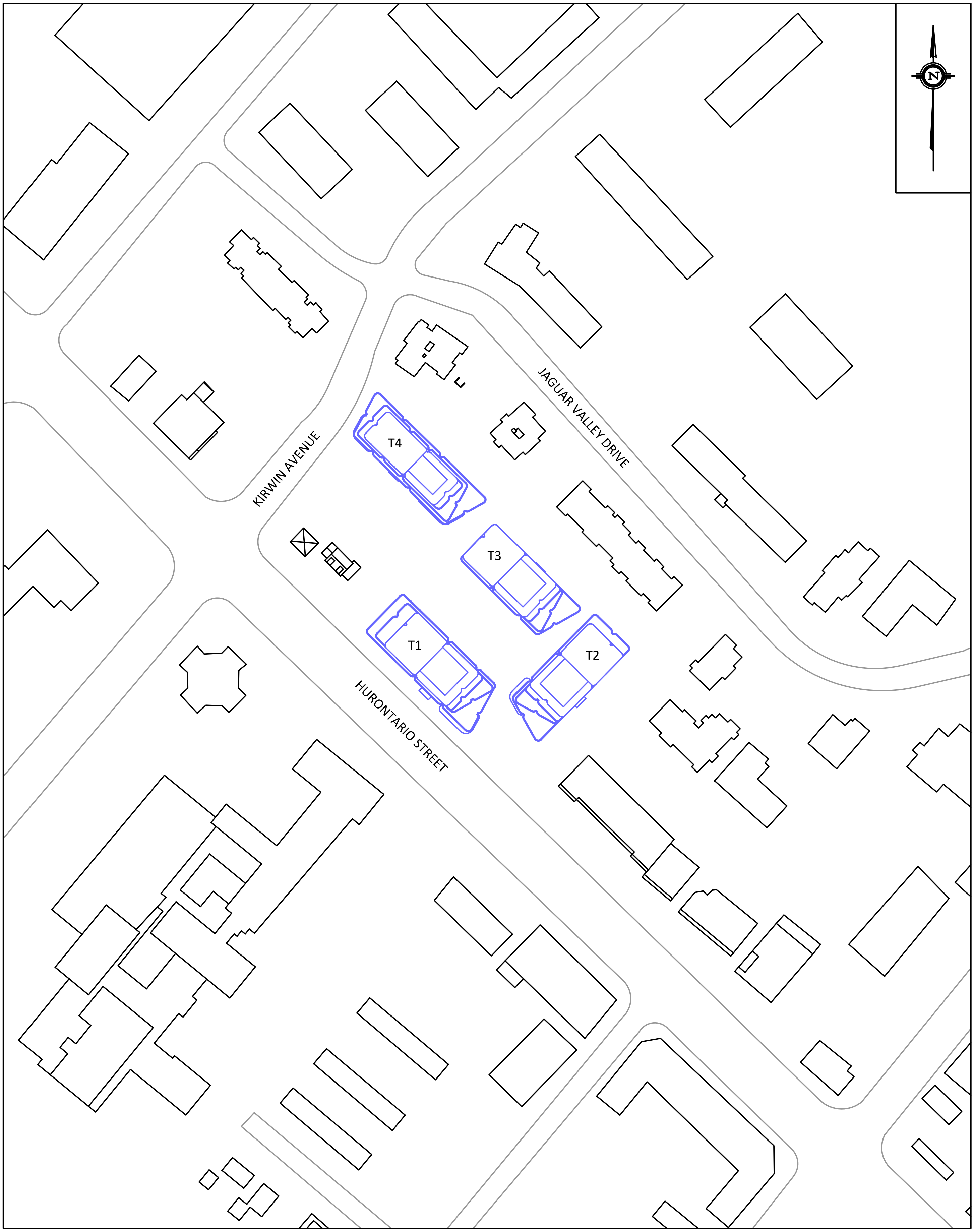
PROJECT: 3085 HURONTARIO STREET, MISSISSAUGA PEDESTRIAN LEVEL WIND STUDY		DESCRIPTION: FIGURE 1A: EXISTING SITE PLAN AND SURROUNDING CONTEXT
SCALE: 1:2500 (APPROX.)	DRAWING NO.: GW24-012-PLW-1A	
DATE: SEPTEMBER 10, 2024	DRAWN BY: C.E.	



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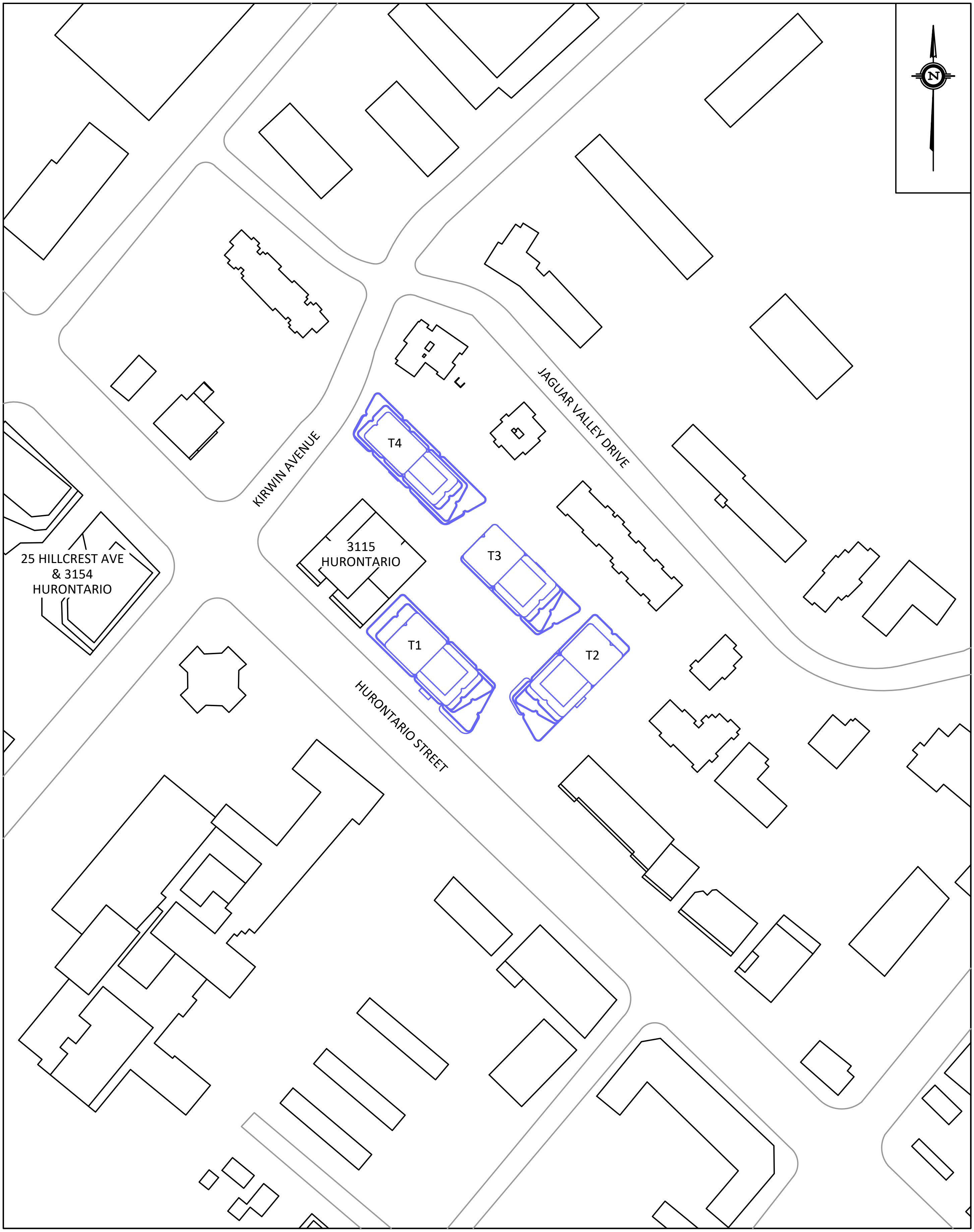
SCALE: 1:2500 (APPROX.)	DRAWING NO.: GW24-012-PLW-1B	
DATE: SEPTEMBER 10, 2024	DRAWN BY: C.E.	



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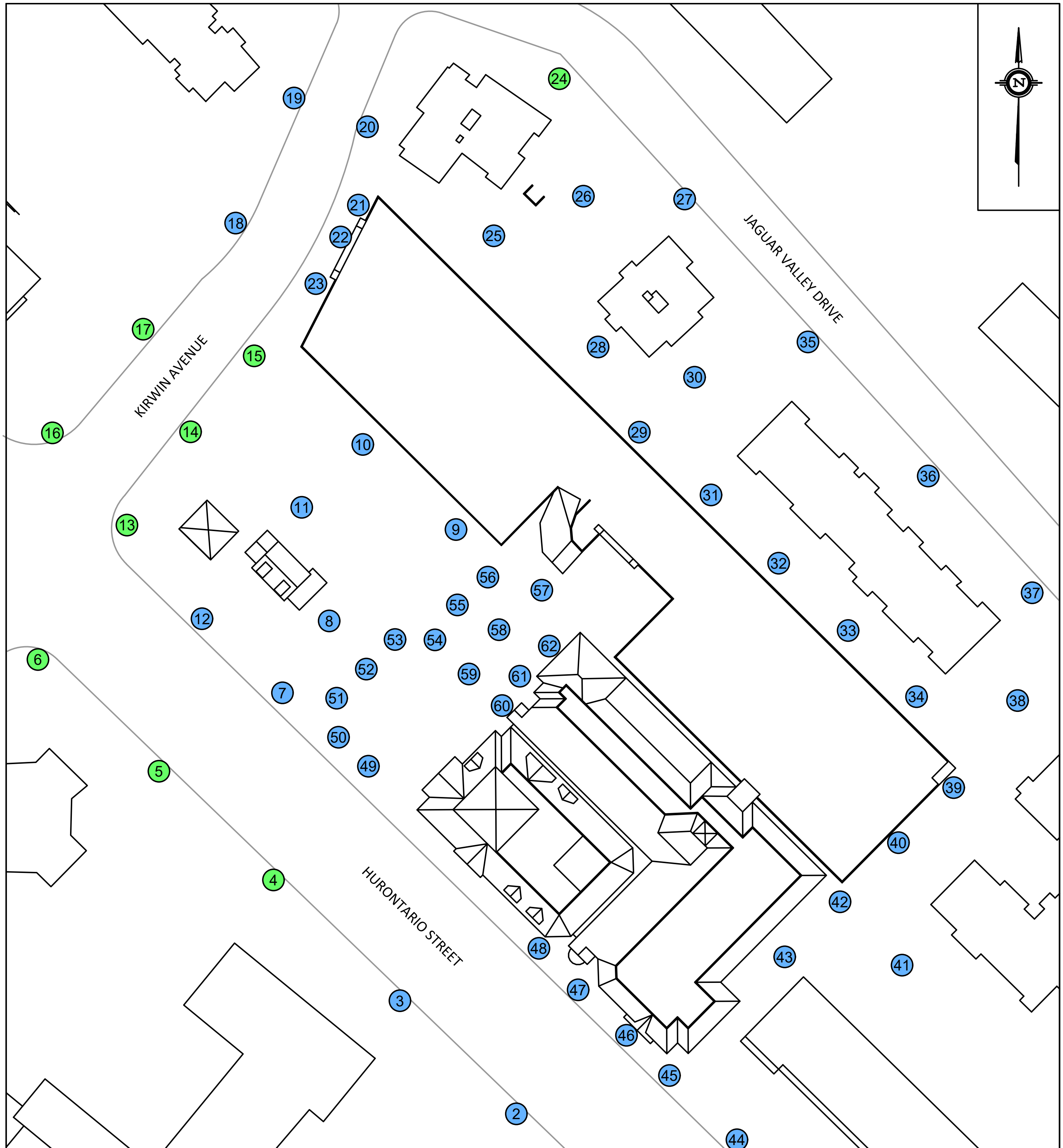
PROJECT	3085 HURONTARIO STREET, MISSISSAUGA PEDESTRIAN LEVEL WIND STUDY
SCALE	1:2500 (APPROX.)
DRAWING NO.	GW24-012-PLW-1C
DATE	SEPTEMBER 10, 2024
DRAWN BY	C.E.
DESCRIPTION	FIGURE 1C: FUTURE SITE PLAN AND SURROUNDING CONTEXT



PREDICTED COMFORT CLASSES

- SITTING
- STANDING
- WALKING
- UNCOMFORTABLE

WIND SAFETY CRITERION

- ACCEPTABLE
- EXCEEDED

NOTES:

1. SCALE IS APPROXIMATE.
2. # PEDESTRIAN LEVEL WIND SENSOR LOCATION.

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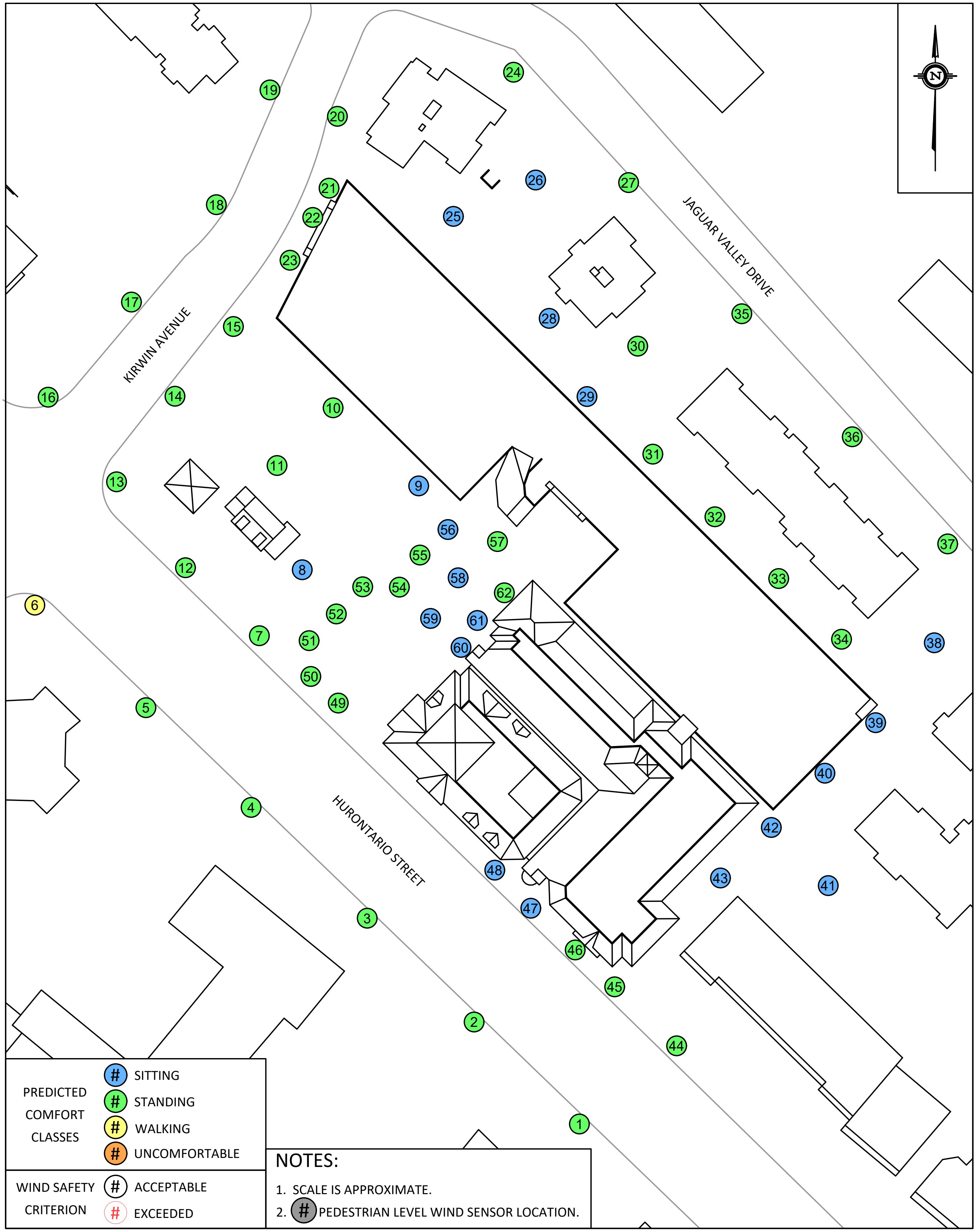
SCALE	1:1300 (APPROX.)
DRAWING NO.	GW24-012-PLW-2A
DATE	SEPTEMBER 10, 2024
DRAWN BY	C.E.
DESCRIPTION	FIGURE 2A: SUMMER EXISTING GROUND FLOOR PLAN PEDESTRIAN COMFORT PREDICTIONS



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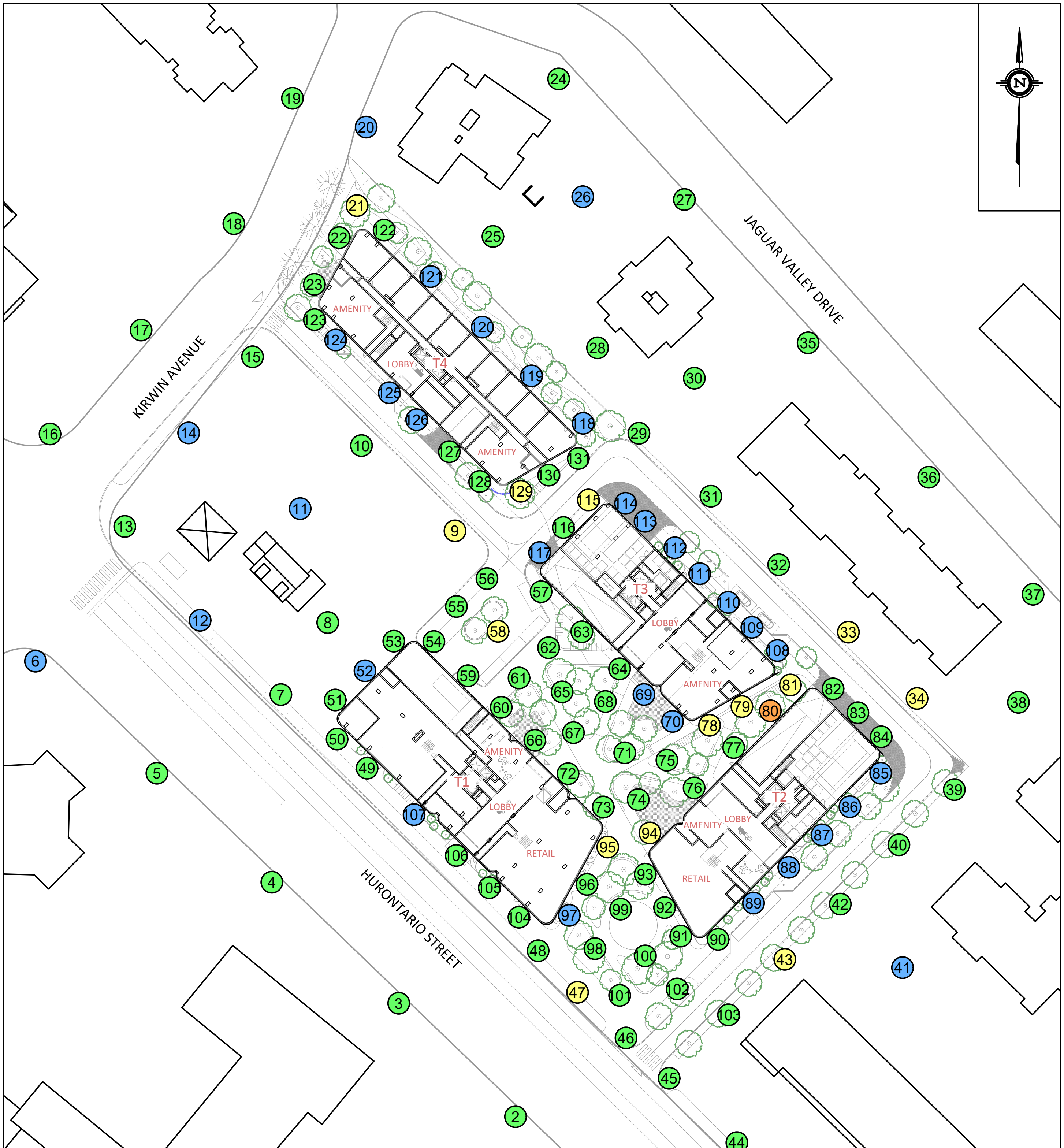
PROJECT	3085 HURONTARIO STREET, MISSISSAUGA PEDESTRIAN LEVEL WIND STUDY
SCALE	1:1300 (APPROX.)
DRAWING NO.	GW24-012-PLW-2B
DATE	SEPTEMBER 10, 2024
DRAWN BY	C.E.
DESCRIPTION	FIGURE 2B: WINTER EXISTING GROUND FLOOR PLAN PEDESTRIAN COMFORT PREDICTIONS



PREDICTED COMFORT CLASSES
- SITTING
- STANDING
- WALKING
- UNCOMFORTABLE

WIND SAFETY CRITERION
- ACCEPTABLE
- EXCEEDED

NOTES:
1. SCALE IS APPROXIMATE.
2. (#) PEDESTRIAN LEVEL WIND SENSOR LOCATION.

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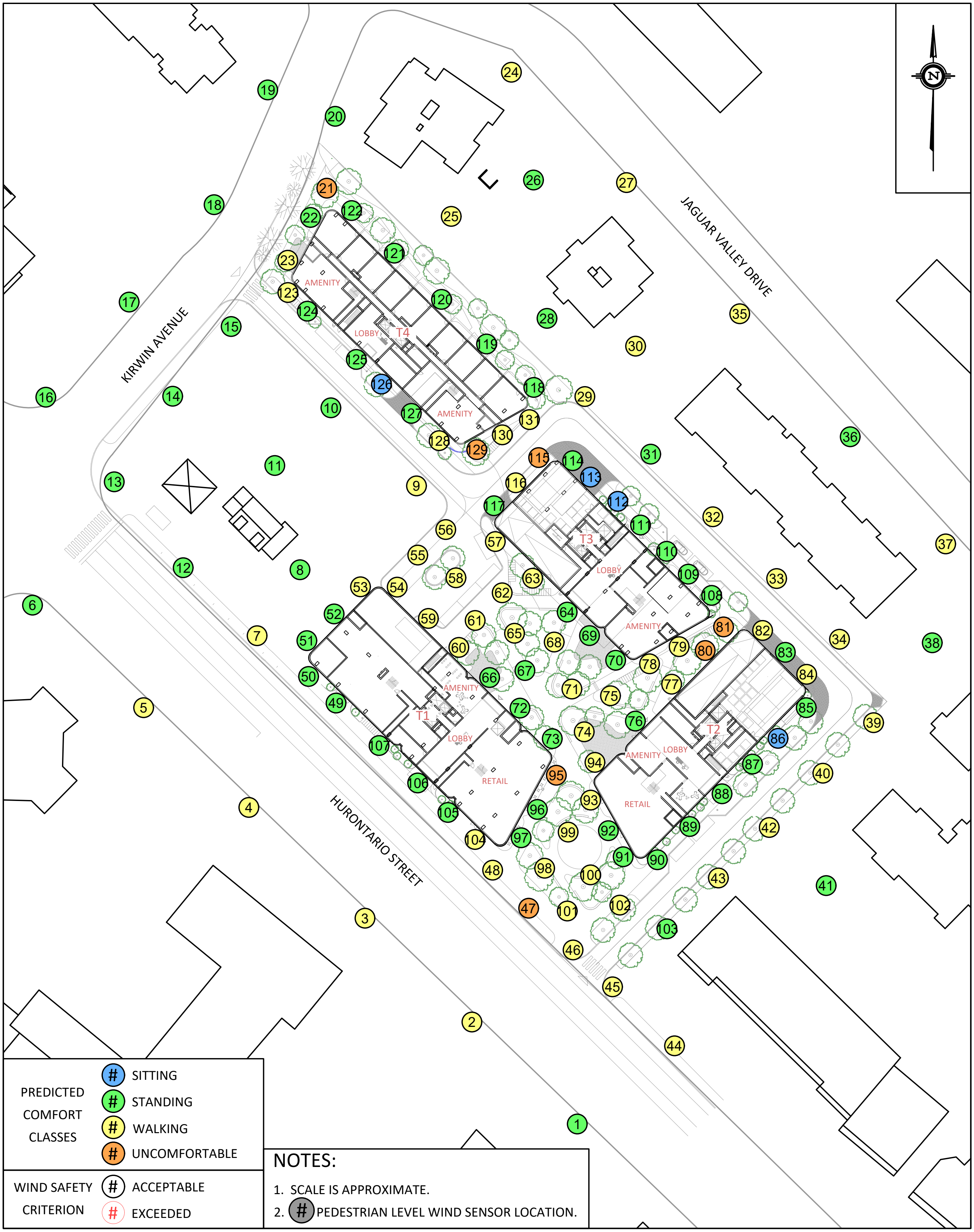
PROJECT	3085 HURONTARIO STREET, MISSISSAUGA PEDESTRIAN LEVEL WIND STUDY
SCALE	1:1300 (APPROX.)
DRAWING NO.	GW24-012-PLW-3A
DATE	SEPTEMBER 10, 2024
DRAWN BY	C.E.
DESCRIPTION	FIGURE 3A: SUMMER PROPOSED GROUND FLOOR PLAN PEDESTRIAN COMFORT PREDICTIONS



PREDICTED COMFORT CLASSES

- # SITTING
- # STANDING
- # WALKING
- # UNCOMFORTABLE

WIND SAFETY CRITERION

- # ACCEPTABLE
- # EXCEEDED

NOTES:

1. SCALE IS APPROXIMATE.
2. # PEDESTRIAN LEVEL WIND SENSOR LOCATION.

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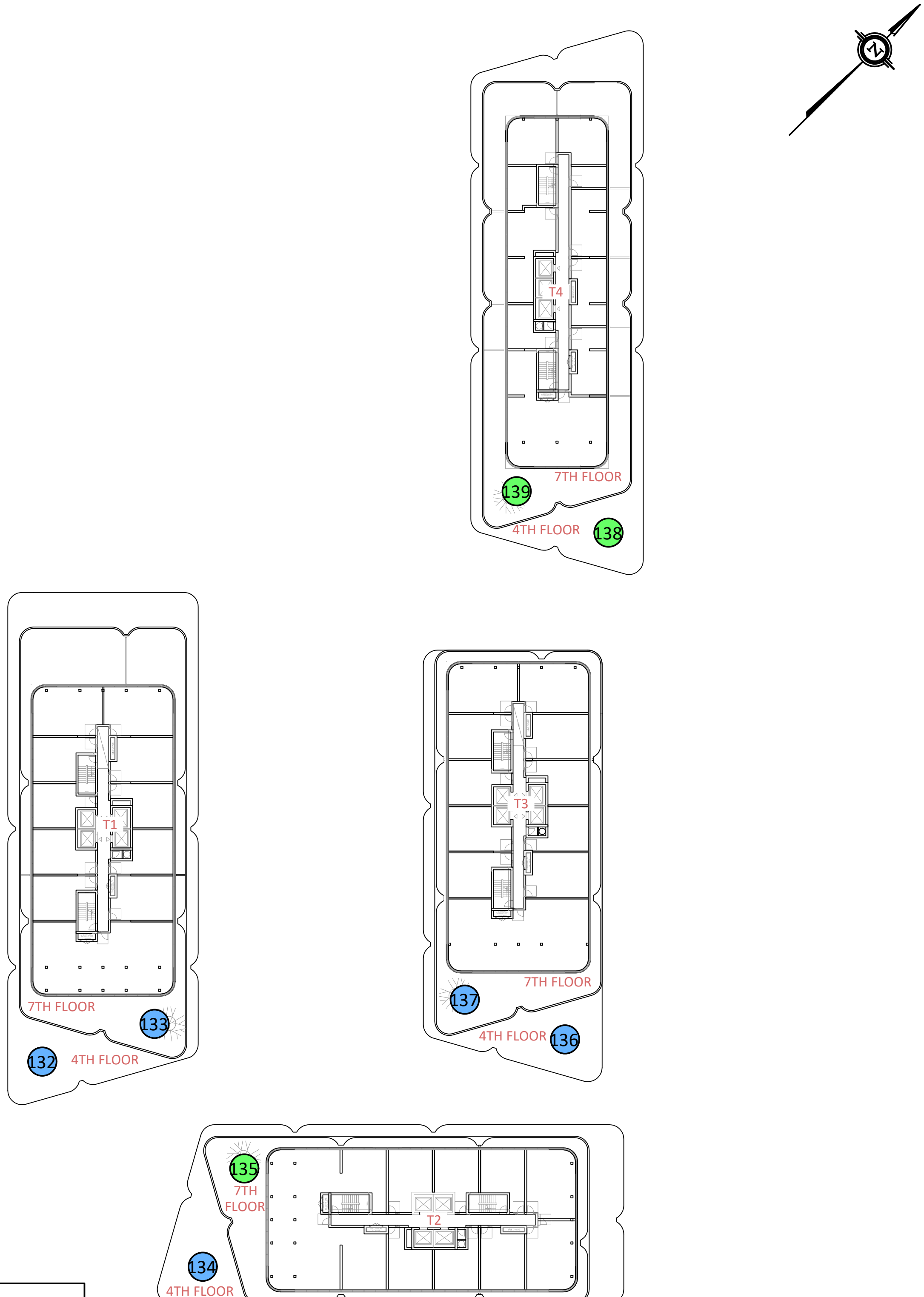
SCALE	1:1300 (APPROX.)
DRAWING NO.	GW24-012-PLW-3B
DATE	SEPTEMBER 10, 2024
DRAWN BY	C.E.
DESCRIPTION	FIGURE 3B: WINTER PROPOSED GROUND FLOOR PLAN PEDESTRIAN COMFORT PREDICTIONS



PREDICTED COMFORT CLASSES	
#	SITTING
#	STANDING
#	WALKING
#	UNCOMFORTABLE

WIND SAFETY CRITERION	
#	ACCEPTABLE
#	EXCEEDED

NOTES:

1. SCALE IS APPROXIMATE.
2. # PEDESTRIAN LEVEL WIND SENSOR LOCATION.

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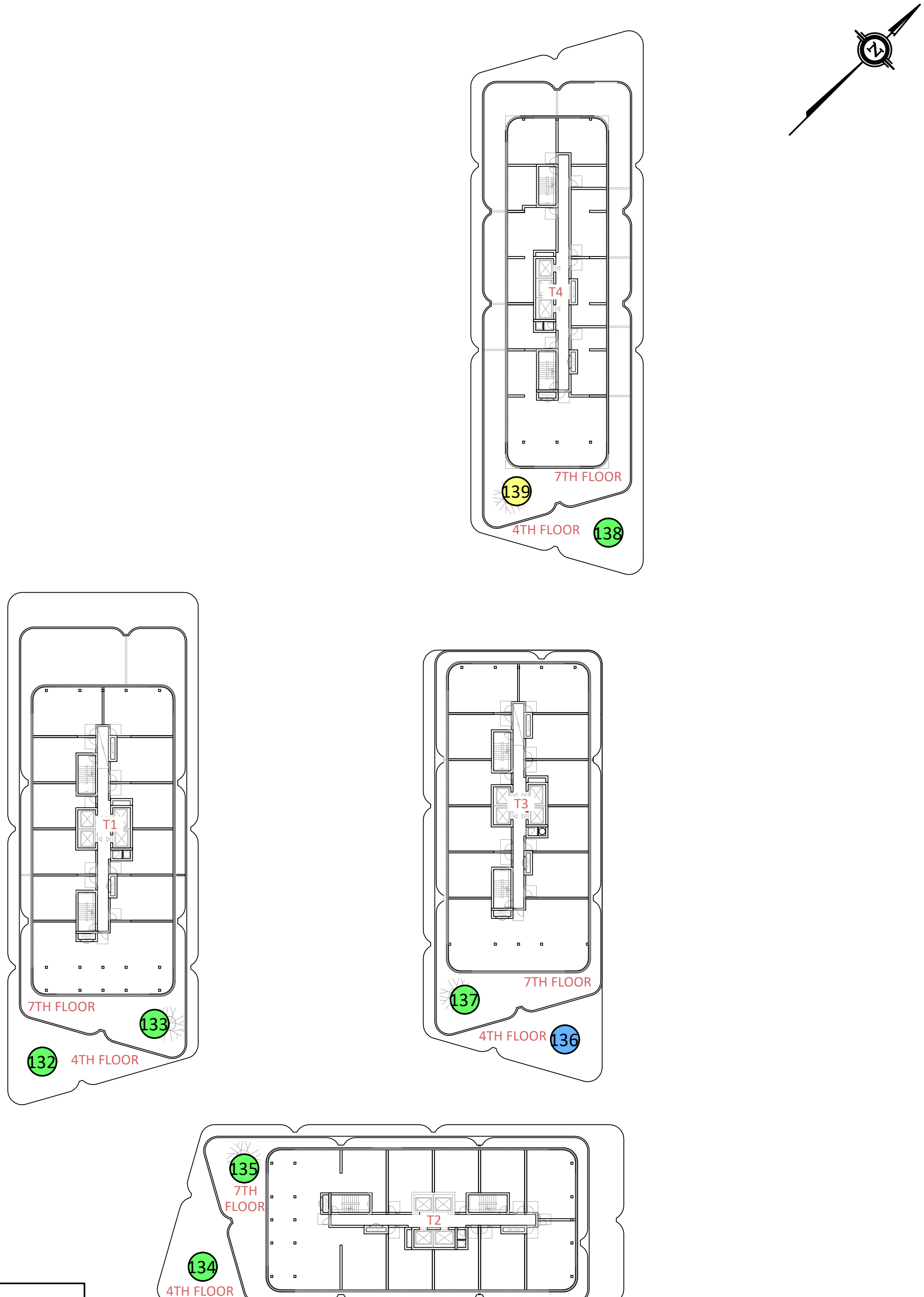
PROJECT	3085 HURONTARIO STREET, MISSISSAUGA PEDESTRIAN LEVEL WIND STUDY
SCALE	1:900 (APPROX.)
DRAWING NO.	GW24-012-PLW-4A
DATE	SEPTEMBER 10, 2024
DRAWN BY	C.E.
DESCRIPTION	FIGURE 4A: SUMMER PROPOSED OUTDOOR AMENITY FLOOR PLAN PEDESTRIAN COMFORT PREDICTIONS



PREDICTED COMFORT CLASSES	#	SITTING
	#	STANDING
	#	WALKING
	#	UNCOMFORTABLE
WIND SAFETY CRITERION	#	ACCEPTABLE
	#	EXCEEDED

NOTES:

1. SCALE IS APPROXIMATE.
2. (#) PEDESTRIAN LEVEL WIND SENSOR LOCATION.

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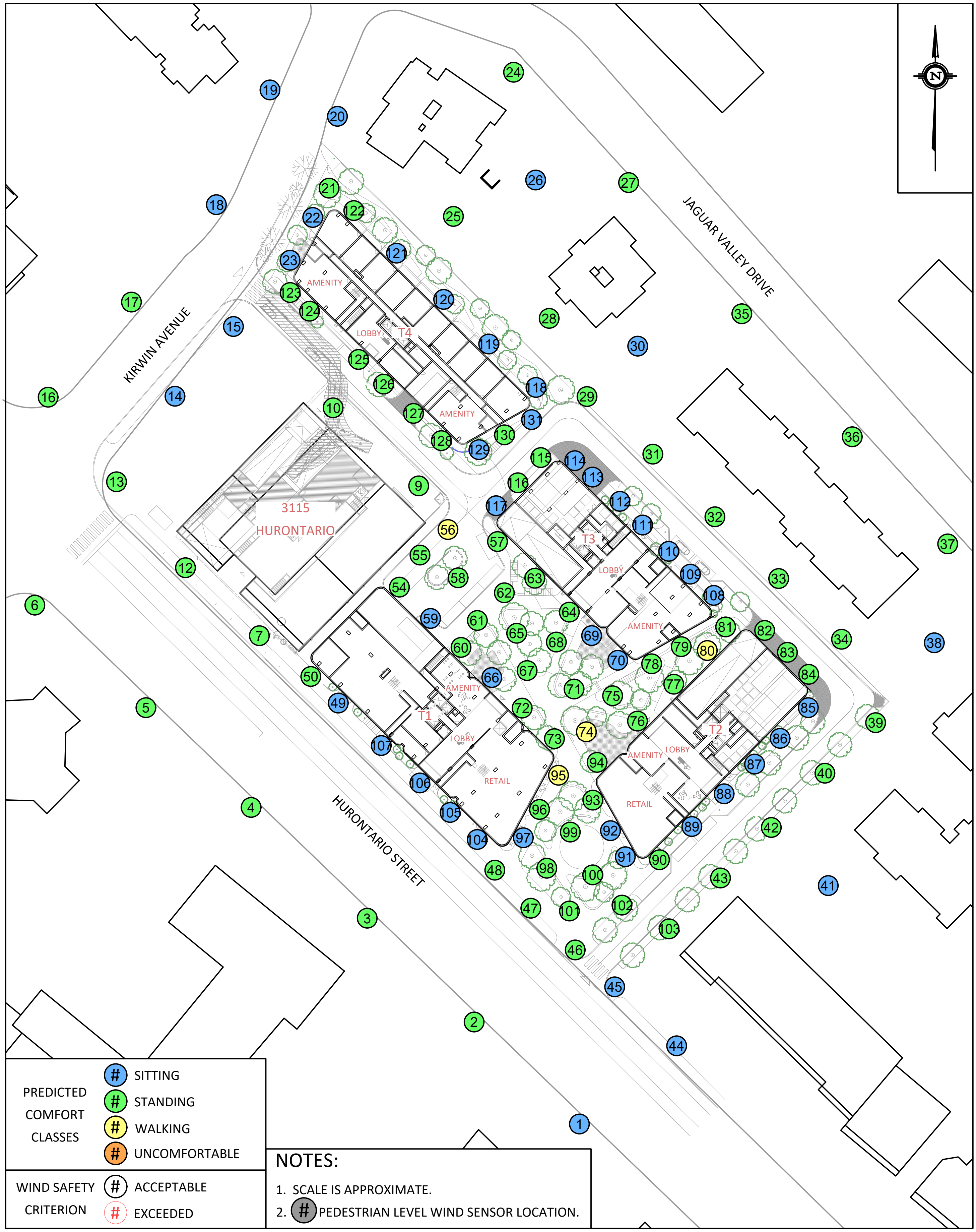
PROJECT: 3085 HURONTARIO STREET, MISSISSAUGA PEDESTRIAN LEVEL WIND STUDY		DESCRIPTION: FIGURE 4B: WINTER PROPOSED OUTDOOR AMENITY FLOOR PLAN PEDESTRIAN COMFORT PREDICTIONS
SCALE: 1:900 (APPROX.)	DRAWING NO. GW24-012-PLW-4B	
DATE: SEPTEMBER 10, 2024	DRAWN BY: C.E.	



PREDICTED COMFORT CLASSES
- # SITTING
- # STANDING
- # WALKING
- # UNCOMFORTABLE

WIND SAFETY CRITERION
- # ACCEPTABLE
- # EXCEEDED

NOTES:
1. SCALE IS APPROXIMATE.
2. # PEDESTRIAN LEVEL WIND SENSOR LOCATION.

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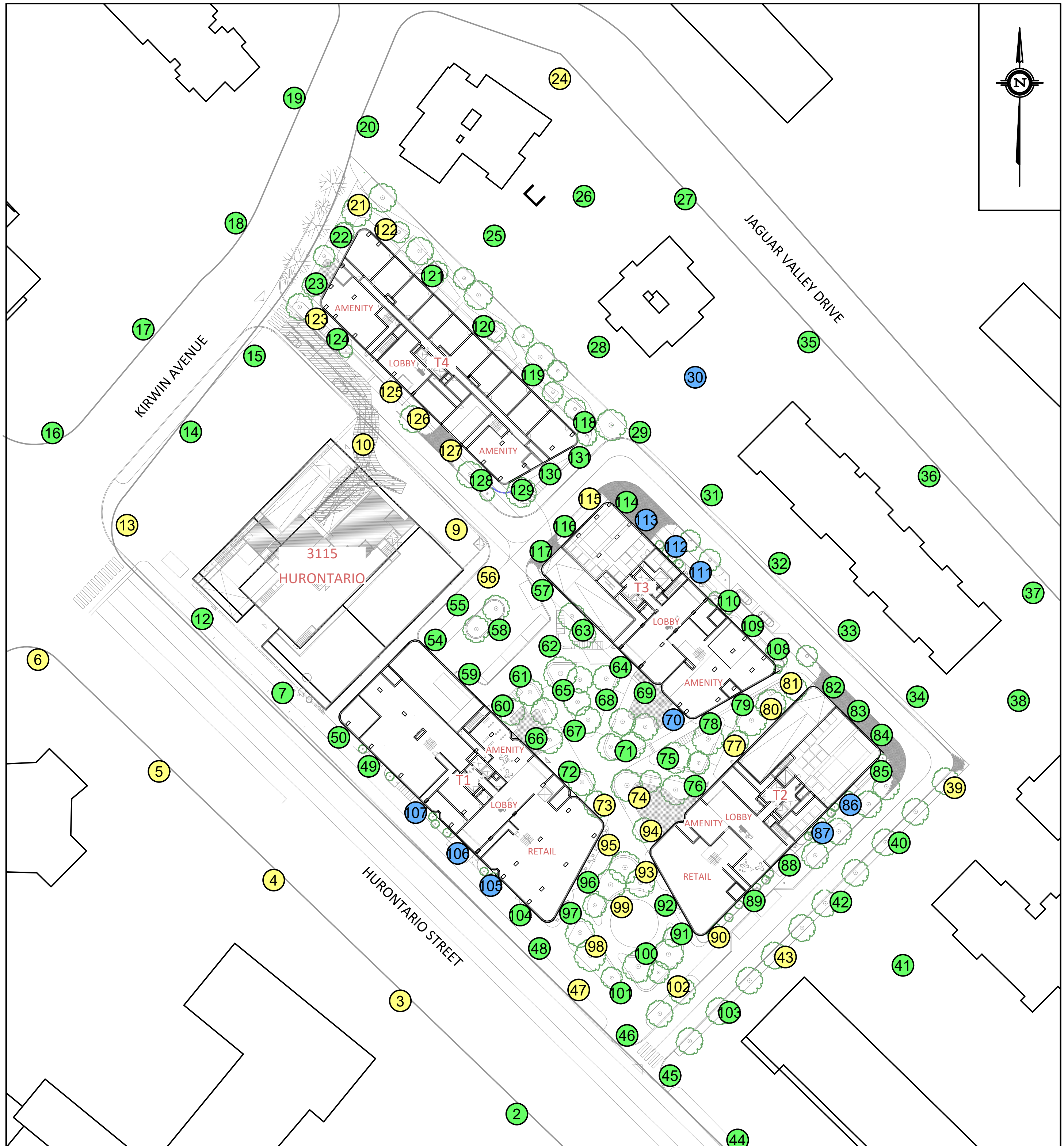
PROJECT: 3085 HURONTARIO STREET, MISSISSAUGA PEDESTRIAN LEVEL WIND STUDY		DESCRIPTION: FIGURE 5A: SUMMER FUTURE GROUND FLOOR PLAN PEDESTRIAN COMFORT PREDICTIONS
SCALE: 1:1300 (APPROX.)	DRAWING NO.: GW24-012-PLW-5A	
DATE: SEPTEMBER 10, 2024	DRAWN BY: C.E.	



PREDICTED COMFORT CLASSES	
# (blue)	SITTING
# (green)	STANDING
# (yellow)	WALKING
# (orange)	UNCOMFORTABLE

WIND SAFETY CRITERION	
# (black)	ACCEPTABLE
# (red)	EXCEEDED

NOTES:

1. SCALE IS APPROXIMATE.
2. # PEDESTRIAN LEVEL WIND SENSOR LOCATION.

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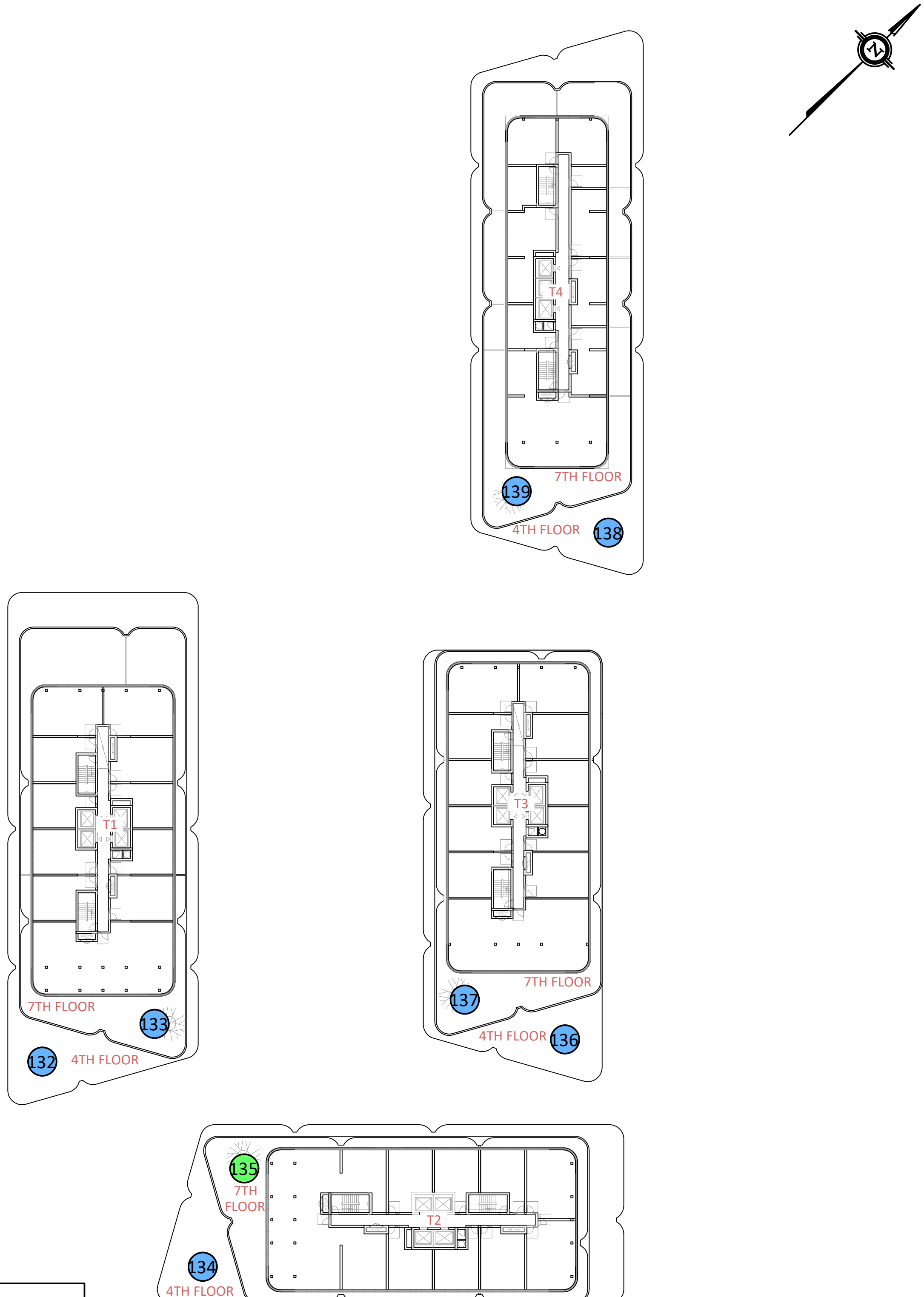
SCALE	1:1300 (APPROX.)
DRAWING NO.	GW24-012-PLW-5B
DATE	SEPTEMBER 10, 2024
DRAWN BY	C.E.
DESCRIPTION	FIGURE 5B: WINTER FUTURE GROUND FLOOR PLAN PEDESTRIAN COMFORT PREDICTIONS



PREDICTED COMFORT CLASSES	# (blue)	SITTING
	# (green)	STANDING
	# (yellow)	WALKING
	# (orange)	UNCOMFORTABLE
WIND SAFETY CRITERION	# (black)	ACCEPTABLE
	# (red)	EXCEEDED

NOTES:

1. SCALE IS APPROXIMATE.
2. # PEDESTRIAN LEVEL WIND SENSOR LOCATION.

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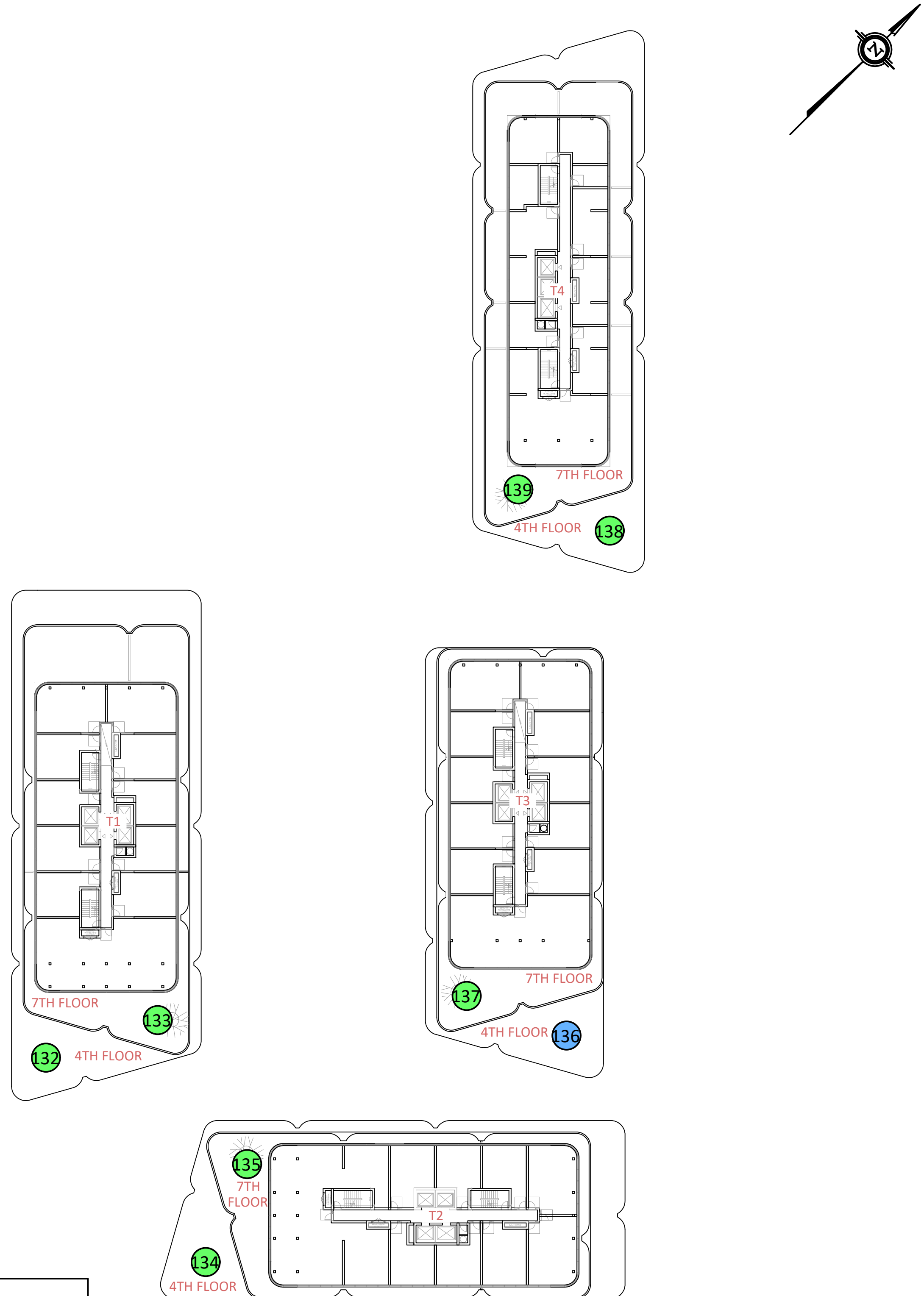
SCALE	1:900 (APPROX.)	DRAWING NO.	GW24-012-PLW-6A
DATE	SEPTEMBER 10, 2024	DRAWN BY	C.E.

DESCRIPTION

FIGURE 6A: SUMMER
FUTURE OUTDOOR AMENITY FLOOR PLAN
PEDESTRIAN COMFORT PREDICTIONS



PREDICTED COMFORT CLASSES	
(#) blue	SITTING
(#) green	STANDING
(#) yellow	WALKING
(#) orange	UNCOMFORTABLE

WIND SAFETY CRITERION	
(#) black	ACCEPTABLE
(#) red	EXCEEDED

NOTES:

1. SCALE IS APPROXIMATE.
2. (#) PEDESTRIAN LEVEL WIND SENSOR LOCATION.

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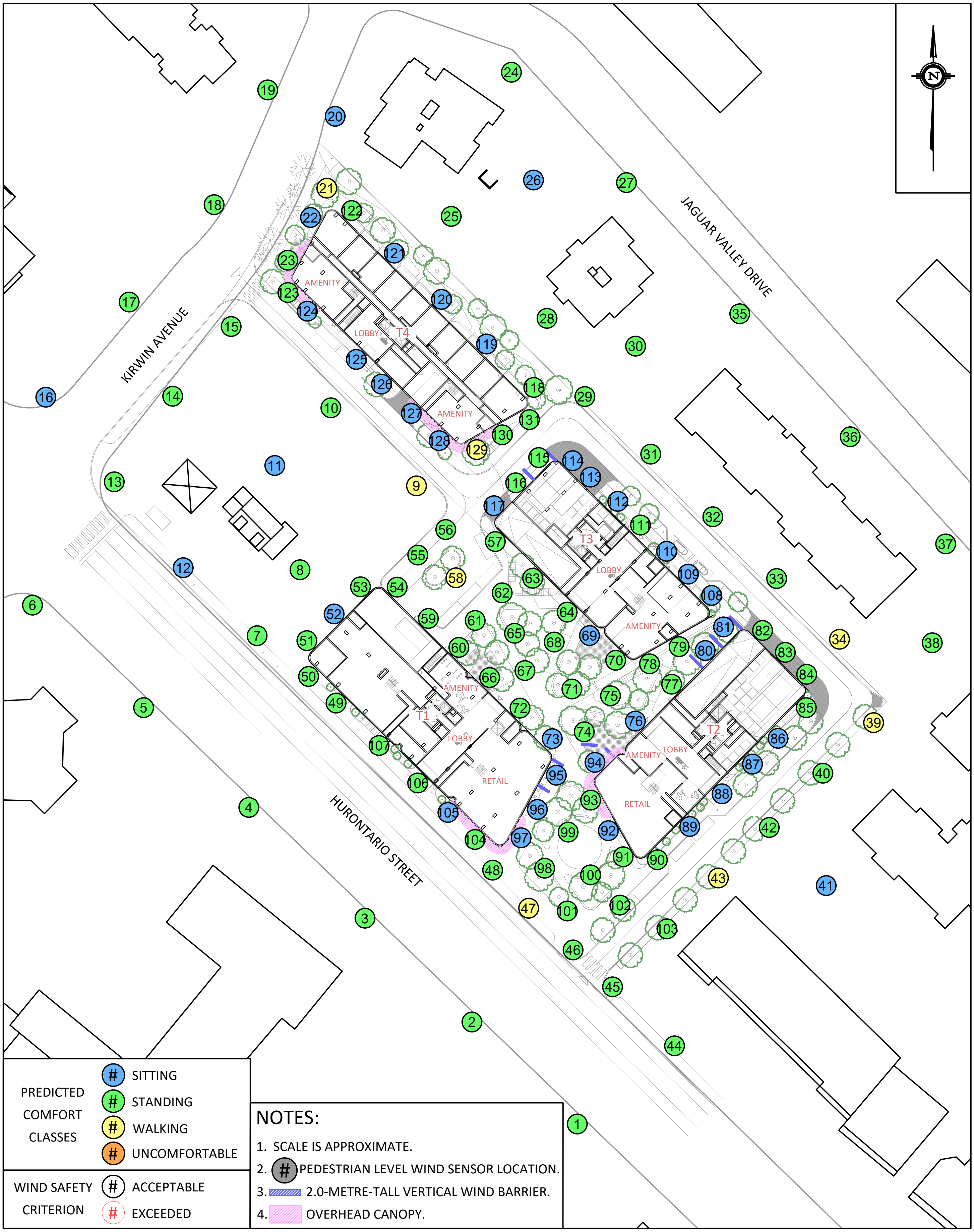
SCALE	1:900 (APPROX.)
DRAWING NO.	GW24-012-PLW-6B
DATE	SEPTEMBER 10, 2024
DRAWN BY	C.E.
DESCRIPTION	FIGURE 6B: WINTER FUTURE OUTDOOR AMENITY FLOOR PLAN PEDESTRIAN COMFORT PREDICTIONS



PREDICTED COMFORT CLASSES
- # SITTING
- # STANDING
- # WALKING
- # UNCOMFORTABLE

WIND SAFETY CRITERION
- # ACCEPTABLE
- # EXCEEDED

NOTES:
1. SCALE IS APPROXIMATE.
2. # PEDESTRIAN LEVEL WIND SENSOR LOCATION.
3. 2.0-METRE-TALL VERTICAL WIND BARRIER.
4. OVERHEAD CANOPY.

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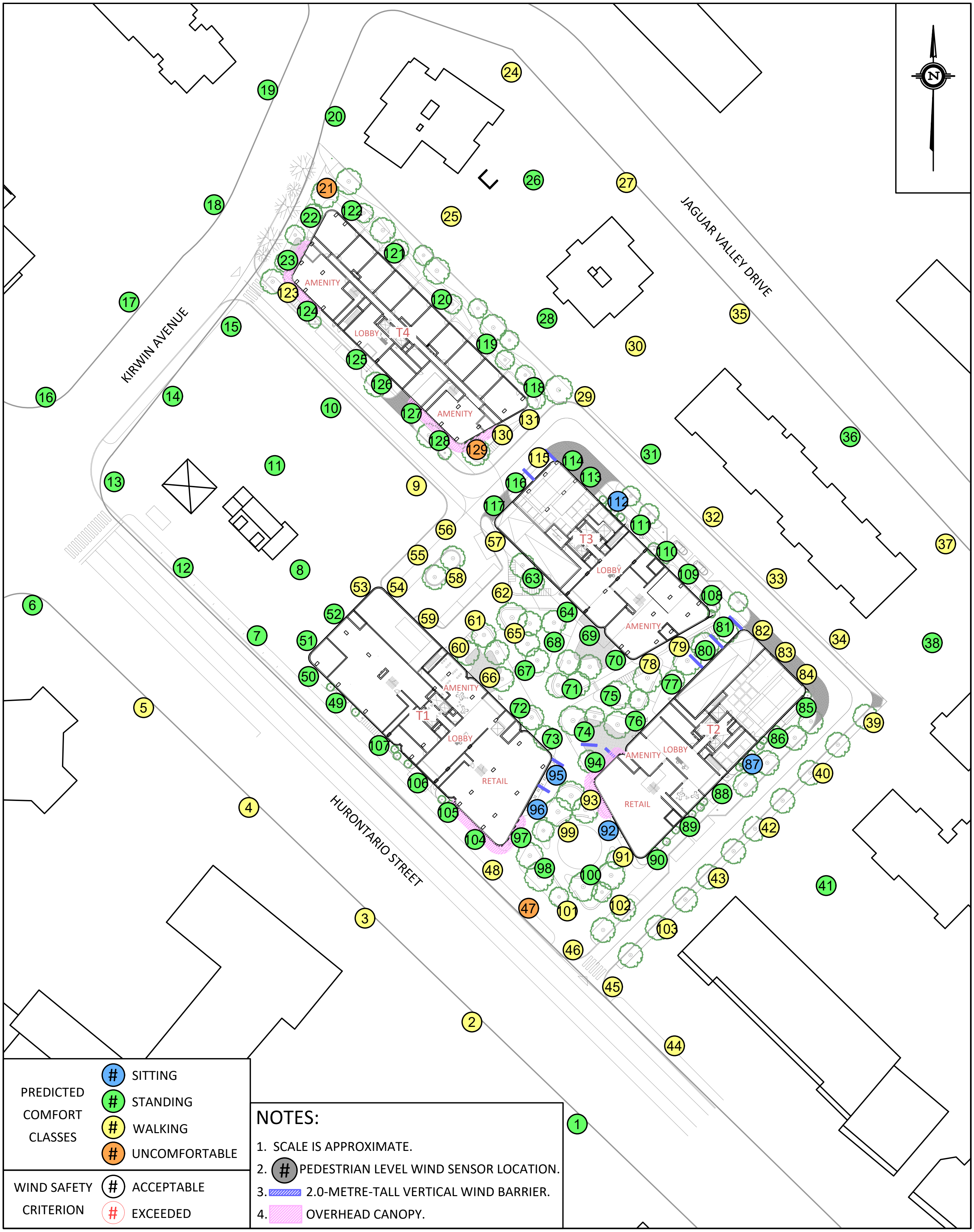
PROJECT: 3085 HURONTARIO STREET, MISSISSAUGA PEDESTRIAN LEVEL WIND STUDY		DESCRIPTION: FIGURE 7A: SUMMER PROPOSED WITH MITIGATION GROUND FLOOR PLAN PEDESTRIAN COMFORT PREDICTIONS
SCALE: 1:1300 (APPROX.)	DRAWING NO.: GW24-012-PLW-7A	
DATE: SEPTEMBER 10, 2024	DRAWN BY: C.E.	



PREDICTED COMFORT CLASSES
- # SITTING
- # STANDING
- # WALKING
- # UNCOMFORTABLE

WIND SAFETY CRITERION
- # ACCEPTABLE
- # EXCEEDED

NOTES:
1. SCALE IS APPROXIMATE.
2. # PEDESTRIAN LEVEL WIND SENSOR LOCATION.
3. 2.0-METRE-TALL VERTICAL WIND BARRIER.
4. OVERHEAD CANOPY.

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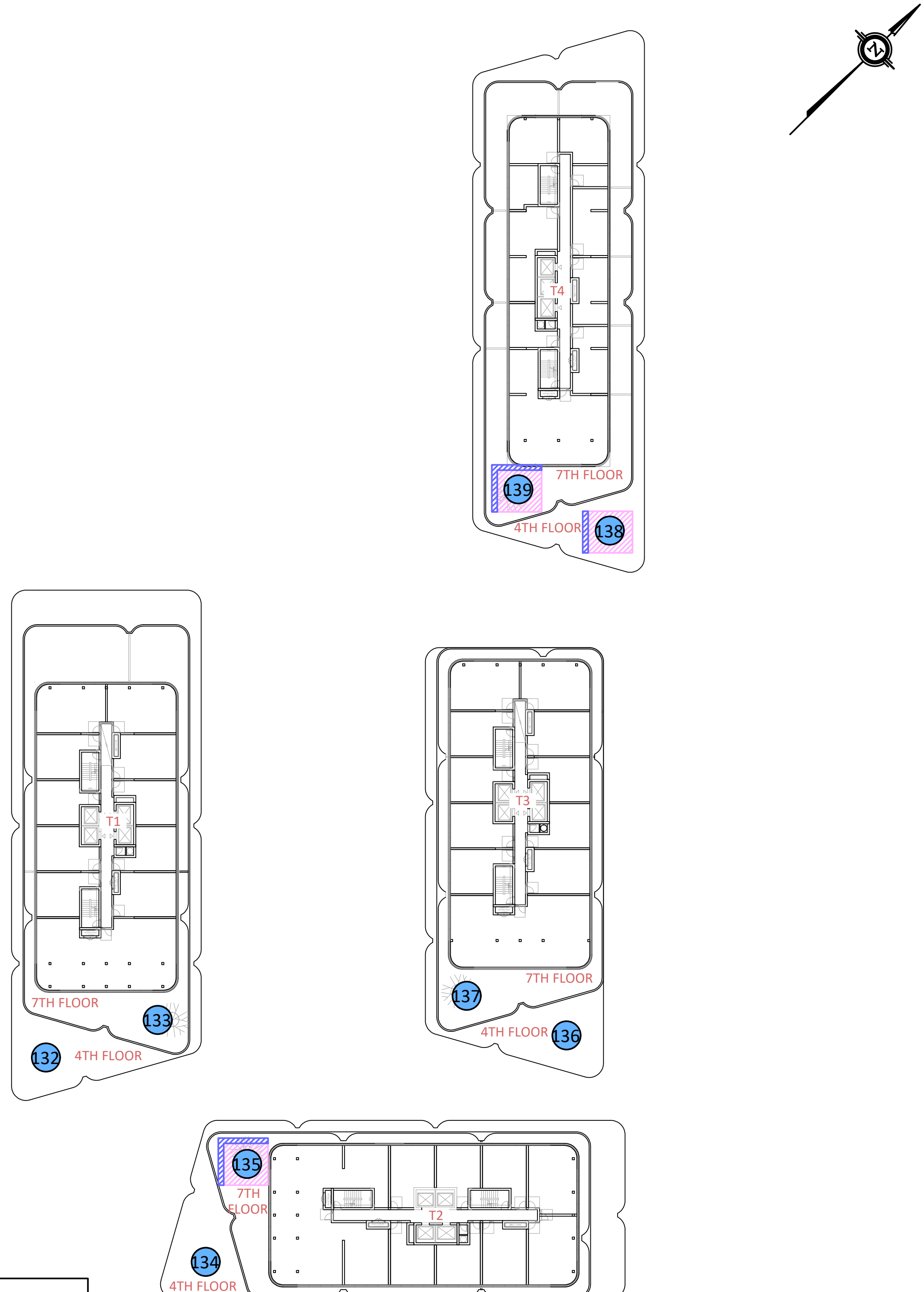
SCALE	1:1300 (APPROX.)
DRAWING NO.	GW24-012-PLW-7B
DATE	SEPTEMBER 10, 2024
DRAWN BY	C.E.
DESCRIPTION	FIGURE 7B: WINTER PROPOSED WITH MITIGATION GROUND FLOOR PLAN PEDESTRIAN COMFORT PREDICTIONS



PREDICTED COMFORT CLASSES

- # SITTING
- # STANDING
- # WALKING
- # UNCOMFORTABLE

WIND SAFETY CRITERION

- # ACCEPTABLE
- # EXCEEDED

NOTES:

1. SCALE IS APPROXIMATE.
2. # PEDESTRIAN LEVEL WIND SENSOR LOCATION.
3. 3.0-METRE-TALL VERTICAL WIND BARRIER.
4. OVERHEAD PERGOLA/CANOPY.

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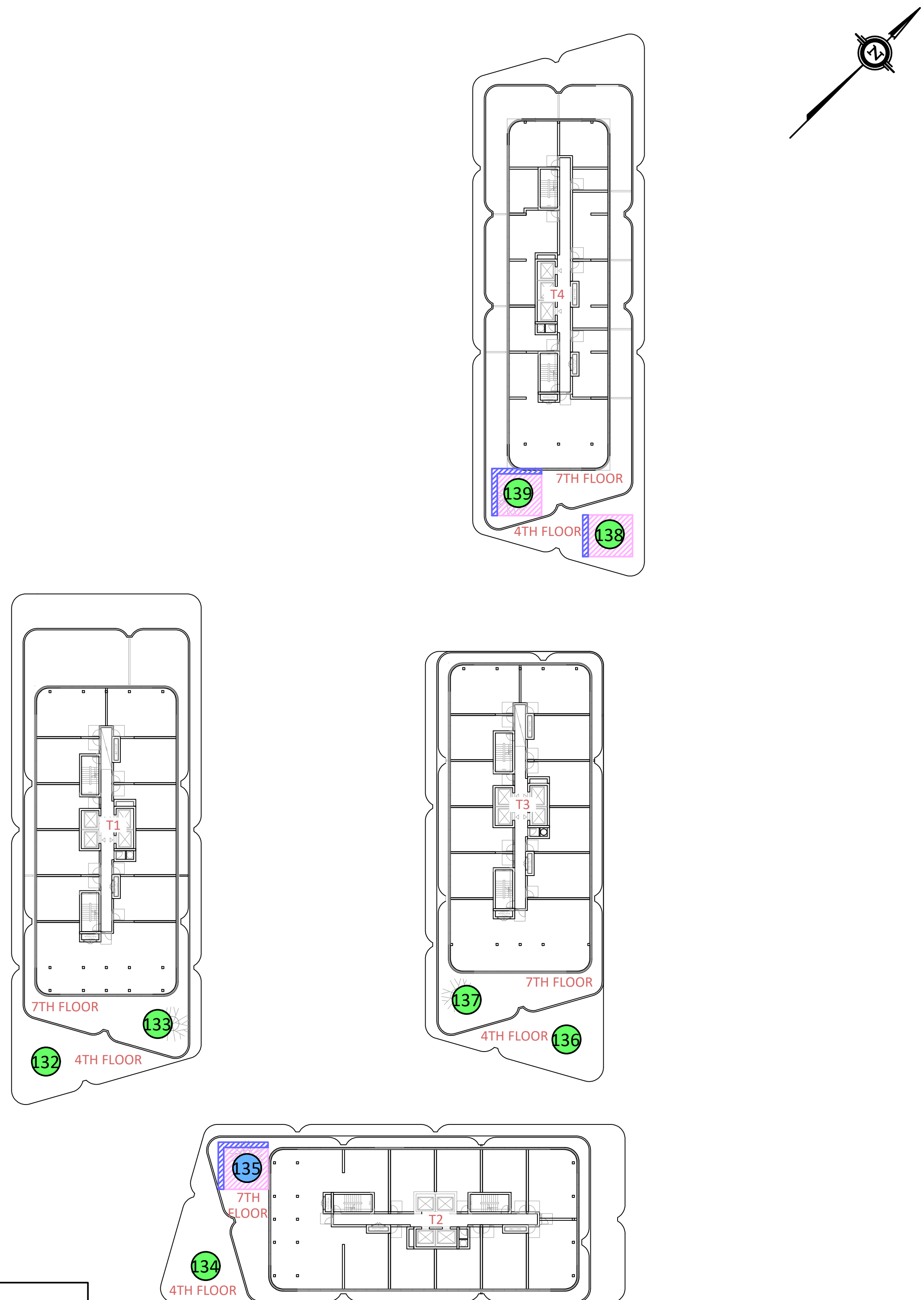
PROJECT	3085 HURONTARIO STREET, MISSISSAUGA PEDESTRIAN LEVEL WIND STUDY
SCALE	1:900 (APPROX.)
DRAWING NO.	GW24-012-PLW-8A
DATE	SEPTEMBER 10, 2024
DRAWN BY	C.E.
DESCRIPTION	FIGURE 8A: SUMMER PROPOSED WITH MITIGATION OUTDOOR AMENITY FLOOR PLAN PEDESTRIAN COMFORT PREDICTIONS



PREDICTED COMFORT CLASSES	
#	SITTING
#	STANDING
#	WALKING
#	UNCOMFORTABLE
WIND SAFETY CRITERION	
#	ACCEPTABLE
#	EXCEEDED

NOTES:

1. SCALE IS APPROXIMATE.
2. (#) PEDESTRIAN LEVEL WIND SENSOR LOCATION.
3. 3.0-METRE-TALL VERTICAL WIND BARRIER.
4. OVERHEAD PERGOLA/CANOPY.

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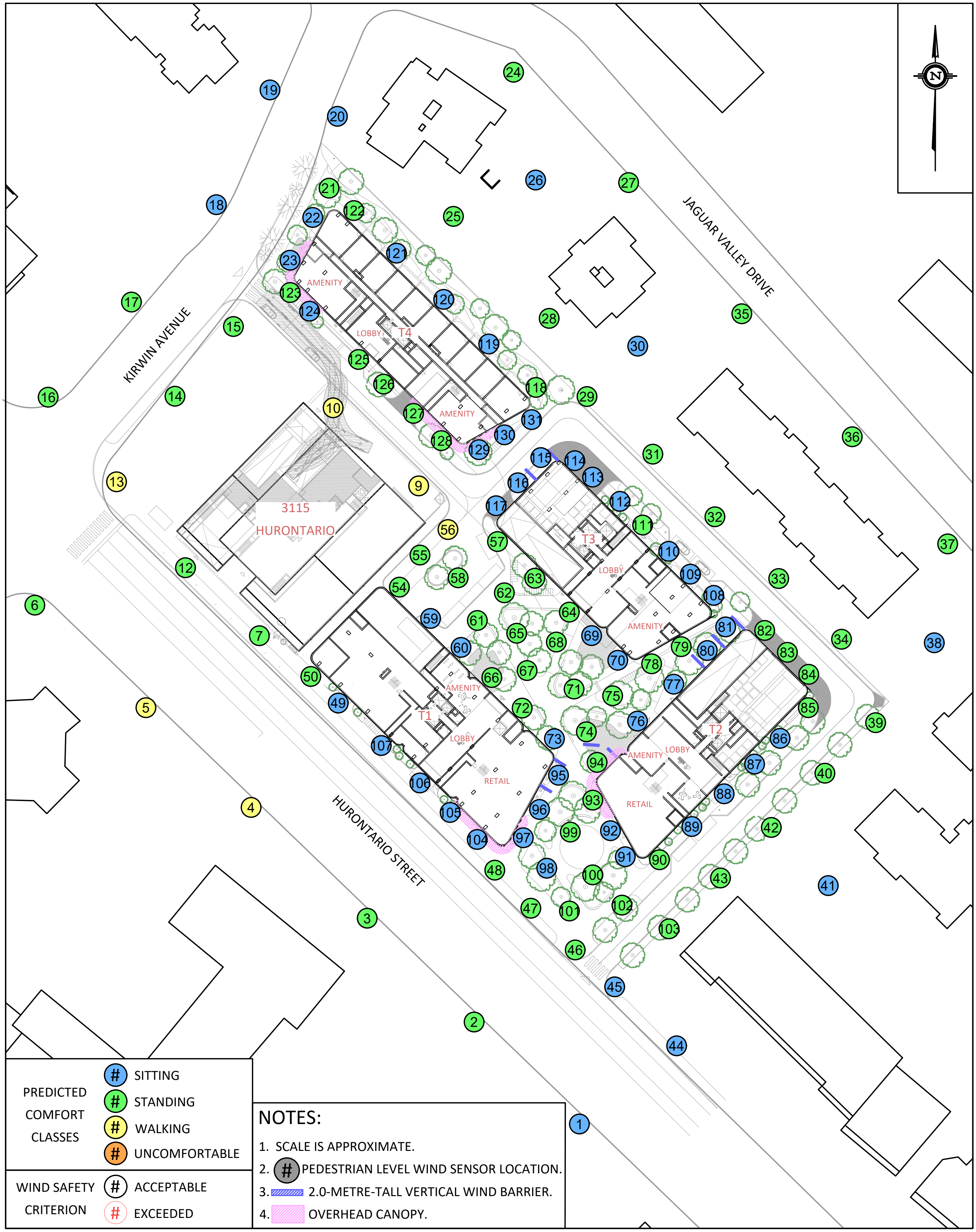
PROJECT	3085 HURONTARIO STREET, MISSISSAUGA PEDESTRIAN LEVEL WIND STUDY		
SCALE	1:900 (APPROX.)	DRAWING NO.	GW24-012-PLW-8B
DATE	SEPTEMBER 10, 2024	DRAWN BY	C.E.

DESCRIPTION

FIGURE 8B: WINTER
PROPOSED WITH MITIGATION
OUTDOOR AMENITY FLOOR PLAN
PEDESTRIAN COMFORT PREDICTIONS



PREDICTED COMFORT CLASSES
- # SITTING
- # STANDING
- # WALKING
- # UNCOMFORTABLE

WIND SAFETY CRITERION
- # ACCEPTABLE
- # EXCEEDED

NOTES:

1. SCALE IS APPROXIMATE.
2. # PEDESTRIAN LEVEL WIND SENSOR LOCATION.
3. 2.0-METRE-TALL VERTICAL WIND BARRIER.
4. OVERHEAD CANOPY.

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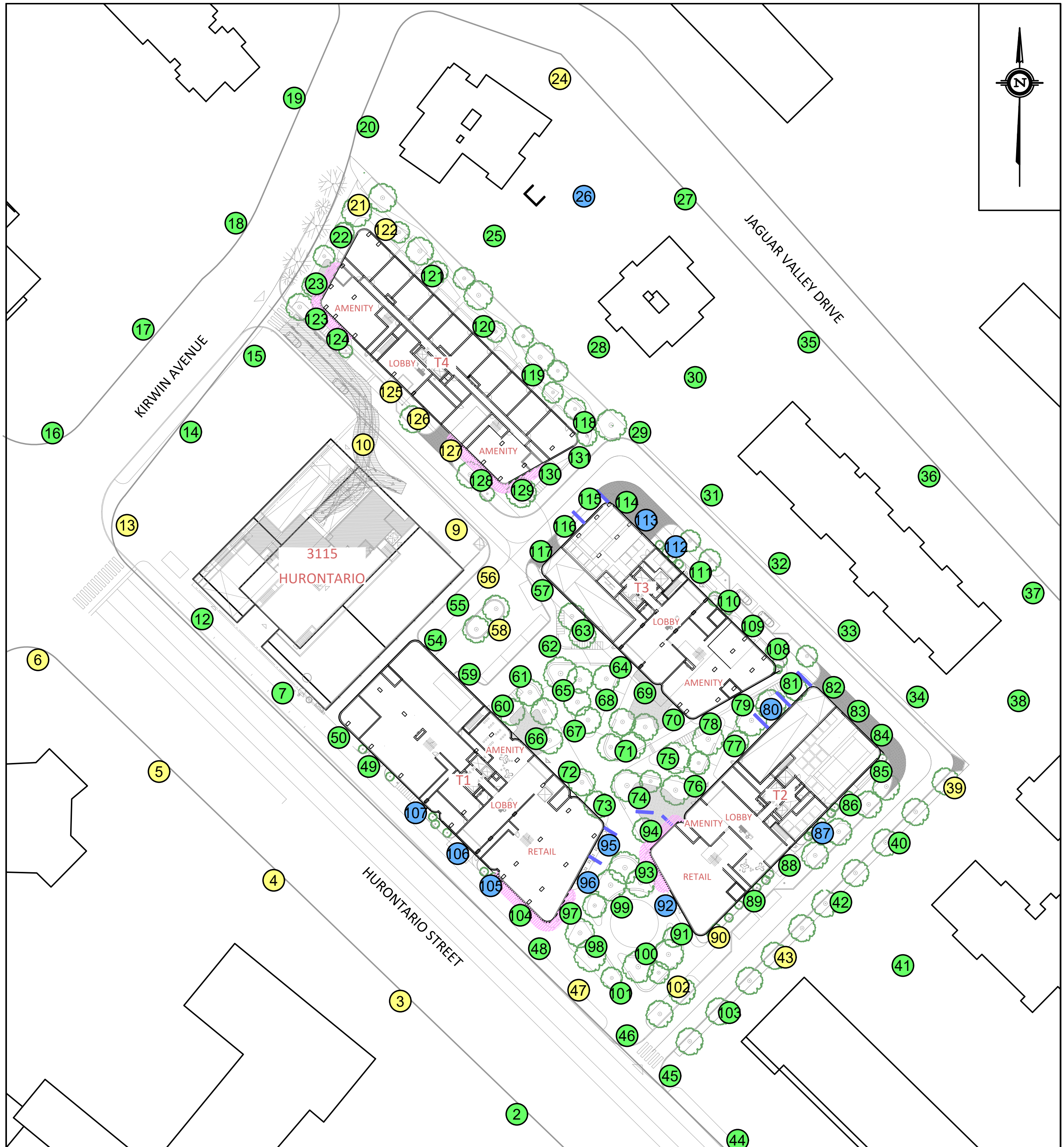
PROJECT: 3085 HURONTARIO STREET, MISSISSAUGA PEDESTRIAN LEVEL WIND STUDY		DESCRIPTION: FIGURE 9A: SUMMER FUTURE WITH MITIGATION GROUND FLOOR PLAN PEDESTRIAN COMFORT PREDICTIONS
SCALE: 1:1300 (APPROX.)	DRAWING NO.: GW24-012-PLW-9A	
DATE: SEPTEMBER 10, 2024	DRAWN BY: C.E.	



PREDICTED COMFORT CLASSES	#	SITTING
	#	STANDING
	#	WALKING
	#	UNCOMFORTABLE
WIND SAFETY CRITERION	#	ACCEPTABLE
	#	EXCEEDED

NOTES:

1. SCALE IS APPROXIMATE.
2. # PEDESTRIAN LEVEL WIND SENSOR LOCATION.
3. 2.0-METRE-TALL VERTICAL WIND BARRIER.
4. OVERHEAD CANOPY.

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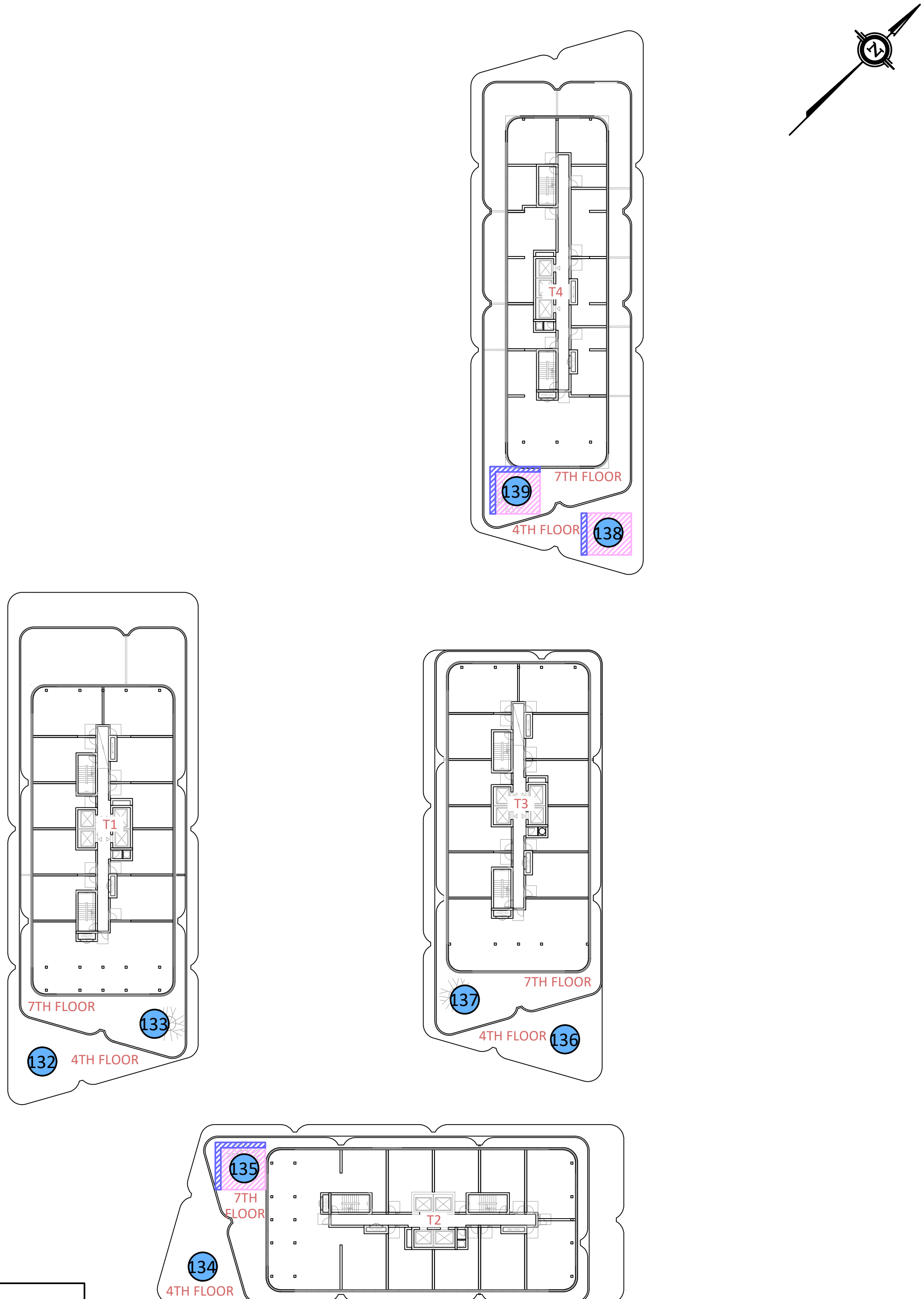
PROJECT	3085 HURONTARIO STREET, MISSISSAUGA PEDESTRIAN LEVEL WIND STUDY
SCALE	1:1300 (APPROX.)
DRAWING NO.	GW24-012-PLW-9B
DATE	SEPTEMBER 10, 2024
DRAWN BY	C.E.
DESCRIPTION	FIGURE 9B: WINTER FUTURE WITH MITIGATION GROUND FLOOR PLAN PEDESTRIAN COMFORT PREDICTIONS



PREDICTED COMFORT CLASSES	
#	SITTING
#	STANDING
#	WALKING
#	UNCOMFORTABLE
WIND SAFETY CRITERION	
#	ACCEPTABLE
#	EXCEEDED

NOTES:

1. SCALE IS APPROXIMATE.
2. # PEDESTRIAN LEVEL WIND SENSOR LOCATION.
3. 3.0-METRE-TALL VERTICAL WIND BARRIER.
4. OVERHEAD PERGOLA/CANOPY.

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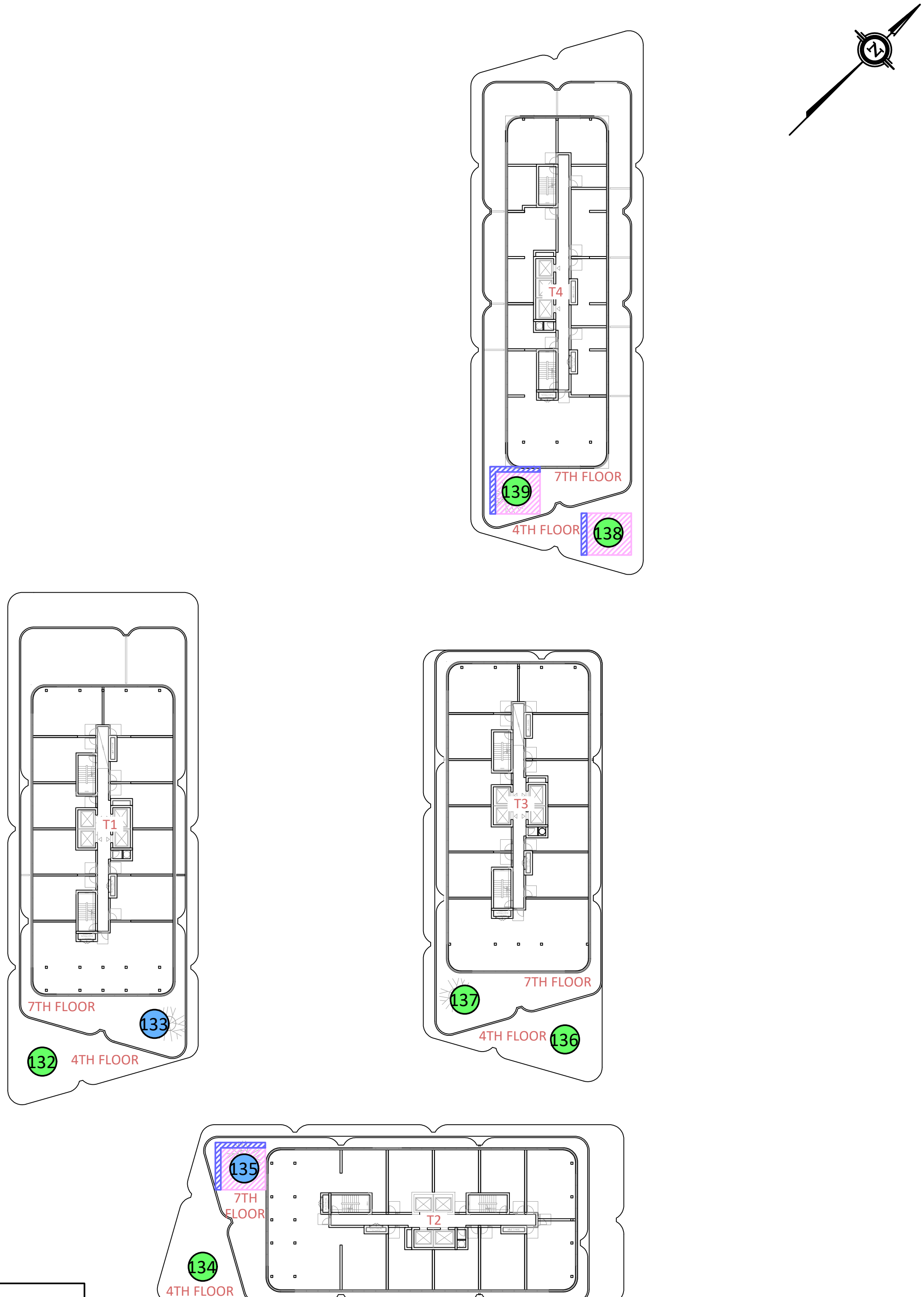
PROJECT	3085 HURONTARIO STREET, MISSISSAUGA PEDESTRIAN LEVEL WIND STUDY		
SCALE	1:900 (APPROX.)	DRAWING NO.	GW24-012-PLW-10A
DATE	SEPTEMBER 10, 2024	DRAWN BY	C.E.

DESCRIPTION

FIGURE 10A: SUMMER
FUTURE WITH MITIGATION
OUTDOOR AMENITY FLOOR PLAN
PEDESTRIAN COMFORT PREDICTIONS



PREDICTED COMFORT CLASSES	
#	SITTING
#	STANDING
#	WALKING
#	UNCOMFORTABLE
WIND SAFETY CRITERION	
#	ACCEPTABLE
#	EXCEEDED

NOTES:

1. SCALE IS APPROXIMATE.
2. (#) PEDESTRIAN LEVEL WIND SENSOR LOCATION.
3. 3.0-METRE-TALL VERTICAL WIND BARRIER.
4. OVERHEAD PERGOLA/CANOPY.

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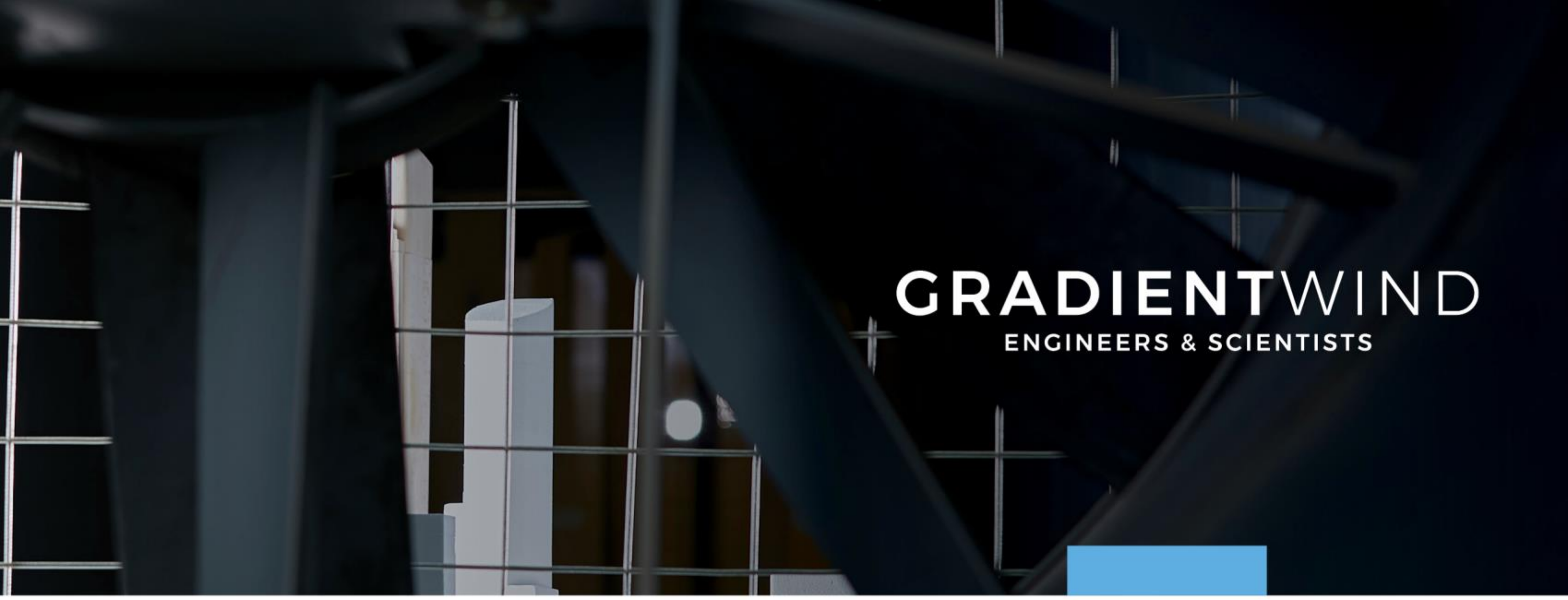
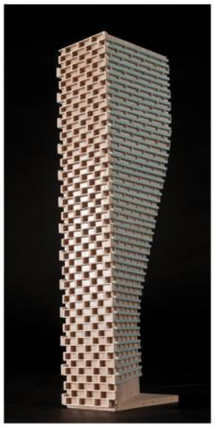
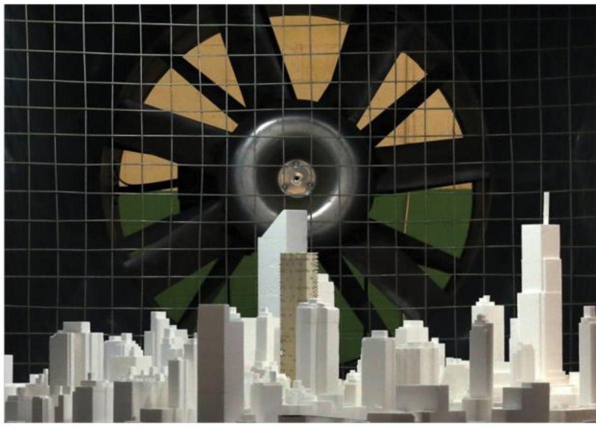
PROJECT	3085 HURONTARIO STREET, MISSISSAUGA PEDESTRIAN LEVEL WIND STUDY
SCALE	1:900 (APPROX.)
DRAWING NO.	GW24-012-PLW-10B
DATE	SEPTEMBER 10, 2024
DRAWN BY	C.E.
DESCRIPTION	FIGURE 10B: WINTER FUTURE WITH MITIGATION OUTDOOR AMENITY FLOOR PLAN PEDESTRIAN COMFORT PREDICTIONS







APPENDIX A

PEDESTRIAN COMFORT SUITABILITY, TABLES A1-A2
(EXISTING SCENARIO)

127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
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Guidelines	
Pedestrian Comfort	**20% exceedance wind speed** 0-10 km/h = Sitting, 10-15 km/h = Standing, 15-20 km/h = Walking, >20 km/h = Uncomfortable
Pedestrian Safety	**0.1% exceedance wind speed** 0-90 km/h = Safe

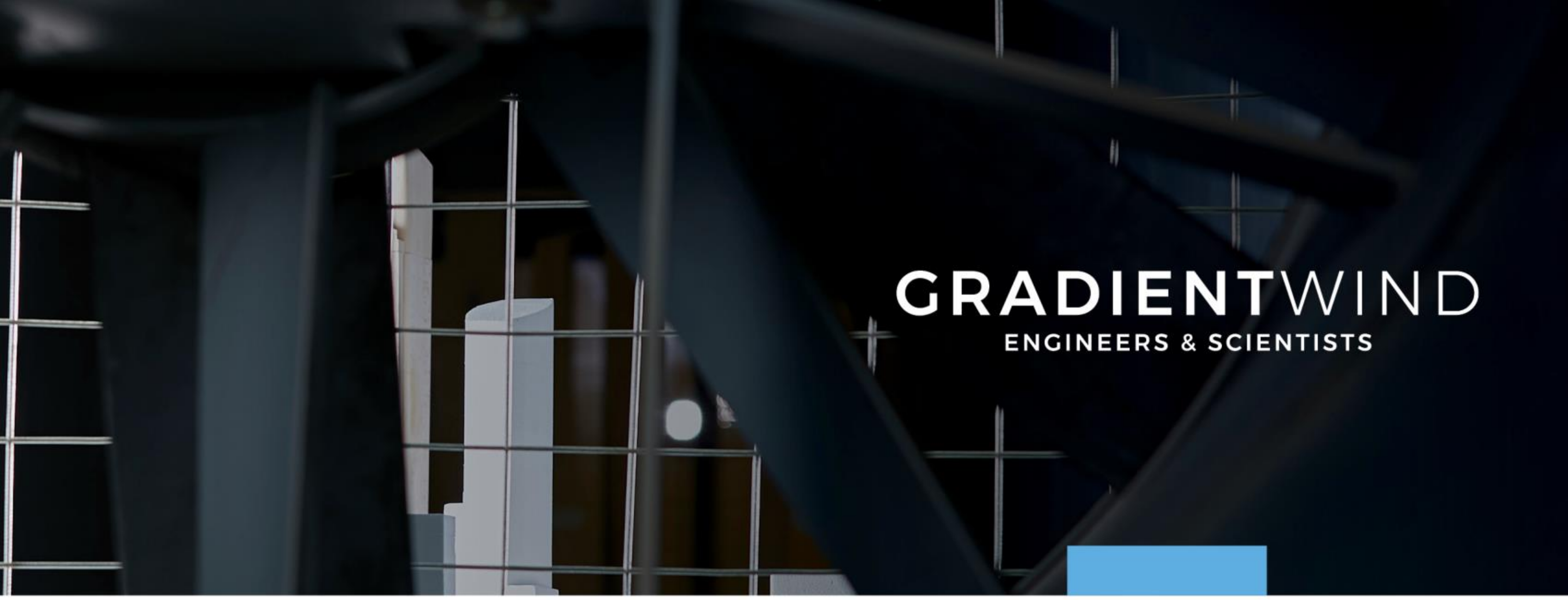
TABLE A1: SUMMARY OF PEDESTRIAN COMFORT (EXISTING SCENARIO)

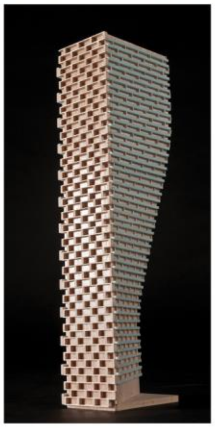
Sensor	Pedestrian Comfort				Pedestrian Safety	
	Summer		Winter		Annual	
	Wind Speed	Comfort Class	Wind Speed	Comfort Class	Wind Speed	Safety Class
1	9.0	Sitting	11.7	Standing	44.8	Safe
2	9.7	Sitting	12.4	Standing	44.9	Safe
3	9.7	Sitting	12.1	Standing	50.0	Safe
4	10.4	Standing	13.3	Standing	51.2	Safe
5	12.3	Standing	14.9	Standing	61.5	Safe
6	11.6	Standing	15.5	Walking	56.3	Safe
7	9.2	Sitting	11.6	Standing	45.9	Safe
8	6.7	Sitting	8.5	Sitting	34.9	Safe
9	7.4	Sitting	9.4	Sitting	36.6	Safe
10	8.6	Sitting	11.2	Standing	45.1	Safe
11	9.0	Sitting	11.5	Standing	48.7	Safe
12	9.9	Sitting	12.9	Standing	47.9	Safe
13	10.2	Standing	12.7	Standing	44.7	Safe
14	10.2	Standing	13.2	Standing	47.2	Safe
15	10.1	Standing	12.9	Standing	49.8	Safe
16	10.3	Standing	13.2	Standing	46.5	Safe
17	10.5	Standing	13.3	Standing	48.2	Safe
18	9.6	Sitting	12.5	Standing	48.4	Safe
19	9.4	Sitting	11.3	Standing	48.1	Safe
20	9.1	Sitting	11.0	Standing	40.0	Safe
21	9.4	Sitting	12.0	Standing	43.4	Safe
22	9.2	Sitting	11.5	Standing	43.9	Safe
23	8.7	Sitting	11.0	Standing	39.6	Safe
24	11.4	Standing	13.9	Standing	52.3	Safe
25	7.3	Sitting	9.4	Sitting	36.2	Safe
26	7.6	Sitting	9.4	Sitting	34.3	Safe
27	9.6	Sitting	12.3	Standing	45.4	Safe
28	8.0	Sitting	10.0	Sitting	37.7	Safe
29	7.2	Sitting	9.2	Sitting	33.0	Safe
30	7.9	Sitting	10.5	Standing	42.9	Safe
31	8.9	Sitting	10.9	Standing	40.9	Safe
32	8.2	Sitting	10.1	Standing	37.4	Safe
33	9.0	Sitting	11.2	Standing	40.0	Safe
34	8.6	Sitting	11.1	Standing	40.8	Safe
35	8.9	Sitting	10.9	Standing	45.3	Safe

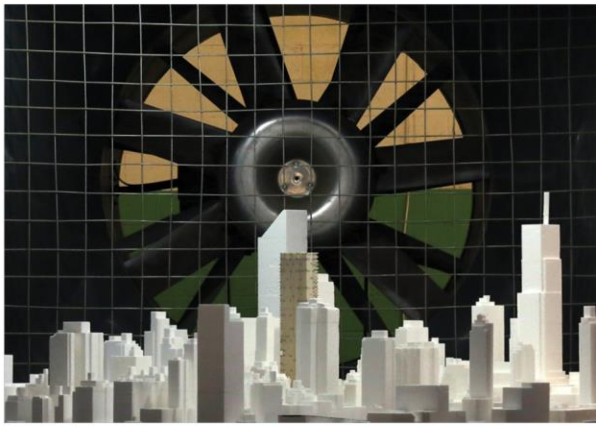
Guidelines	
Pedestrian Comfort	**20% exceedance wind speed** 0-10 km/h = Sitting, 10-15 km/h = Standing, 15-20 km/h = Walking, >20 km/h = Uncomfortable
Pedestrian Safety	**0.1% exceedance wind speed** 0-90 km/h = Safe

TABLE A2: SUMMARY OF PEDESTRIAN COMFORT (EXISTING SCENARIO)

Sensor	Pedestrian Comfort				Pedestrian Safety	
	Summer		Winter		Annual	
	Wind Speed	Comfort Class	Wind Speed	Comfort Class	Wind Speed	Safety Class
36	9.1	Sitting	11.5	Standing	43.3	Safe
37	9.2	Sitting	11.2	Standing	41.0	Safe
38	6.6	Sitting	8.3	Sitting	31.5	Safe
39	5.6	Sitting	6.9	Sitting	24.7	Safe
40	6.4	Sitting	7.8	Sitting	27.2	Safe
41	7.1	Sitting	8.6	Sitting	30.8	Safe
42	6.4	Sitting	7.9	Sitting	28.1	Safe
43	6.9	Sitting	8.9	Sitting	32.5	Safe
44	8.6	Sitting	11.5	Standing	44.4	Safe
45	9.7	Sitting	13.0	Standing	48.9	Safe
46	8.5	Sitting	11.4	Standing	46.9	Safe
47	7.4	Sitting	9.3	Sitting	37.4	Safe
48	7.3	Sitting	9.5	Sitting	39.3	Safe
49	9.4	Sitting	11.2	Standing	41.6	Safe
50	9.6	Sitting	11.8	Standing	44.4	Safe
51	8.8	Sitting	11.0	Standing	41.0	Safe
52	8.0	Sitting	10.1	Standing	38.1	Safe
53	8.3	Sitting	10.6	Standing	41.5	Safe
54	8.0	Sitting	10.4	Standing	40.8	Safe
55	8.1	Sitting	10.6	Standing	40.4	Safe
56	6.9	Sitting	9.3	Sitting	38.4	Safe
57	7.5	Sitting	10.2	Standing	41.6	Safe
58	7.2	Sitting	9.5	Sitting	36.5	Safe
59	7.3	Sitting	9.3	Sitting	35.1	Safe
60	6.4	Sitting	8.4	Sitting	35.4	Safe
61	6.2	Sitting	7.8	Sitting	31.2	Safe
62	7.1	Sitting	9.3	Sitting	39.2	Safe







APPENDIX B

PEDESTRIAN COMFORT SUITABILITY, TABLES B1-B4 (PROPOSED SCENARIO)

127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
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Guidelines	
Pedestrian Comfort	**20% exceedance wind speed** 0-10 km/h = Sitting, 10-15 km/h = Standing, 15-20 km/h = Walking, >20 km/h = Uncomfortable
Pedestrian Safety	**0.1% exceedance wind speed** 0-90 km/h = Safe

TABLE B1: SUMMARY OF PEDESTRIAN COMFORT (PROPOSED SCENARIO)

Sensor	Pedestrian Comfort				Pedestrian Safety	
	Summer		Winter		Annual	
	Wind Speed	Comfort Class	Wind Speed	Comfort Class	Wind Speed	Safety Class
1	10.9	Standing	14.6	Standing	53.4	Safe
2	11.7	Standing	15.2	Walking	54.1	Safe
3	13.6	Standing	17.6	Walking	63.1	Safe
4	12.9	Standing	15.9	Walking	60.2	Safe
5	13.3	Standing	16.2	Walking	60.0	Safe
6	9.9	Sitting	12.7	Standing	48.7	Safe
7	13.5	Standing	15.7	Walking	57.0	Safe
8	10.6	Standing	13.2	Standing	56.9	Safe
9	16.0	Walking	20.0	Walking	67.3	Safe
10	11.3	Standing	13.2	Standing	52.4	Safe
11	9.6	Sitting	11.6	Standing	46.8	Safe
12	9.4	Sitting	10.7	Standing	41.7	Safe
13	10.5	Standing	11.8	Standing	44.9	Safe
14	9.2	Sitting	11.0	Standing	44.5	Safe
15	11.9	Standing	13.9	Standing	54.7	Safe
16	10.1	Standing	12.2	Standing	42.7	Safe
17	10.4	Standing	12.5	Standing	45.7	Safe
18	10.4	Standing	13.0	Standing	55.5	Safe
19	10.8	Standing	13.8	Standing	54.8	Safe
20	9.8	Sitting	13.3	Standing	61.1	Safe
21	15.6	Walking	21.0	Uncomfortable	70.9	Safe
22	10.3	Standing	14.3	Standing	65.3	Safe
23	12.0	Standing	16.2	Walking	75.7	Safe
24	12.6	Standing	16.9	Walking	62.2	Safe
25	12.8	Standing	17.4	Walking	78.6	Safe
26	8.7	Sitting	11.2	Standing	43.8	Safe
27	12.5	Standing	15.5	Walking	58.7	Safe
28	11.5	Standing	14.6	Standing	53.1	Safe
29	14.3	Standing	19.7	Walking	82.7	Safe
30	11.1	Standing	15.1	Walking	71.0	Safe
31	12.5	Standing	14.4	Standing	53.5	Safe
32	13.7	Standing	15.5	Walking	54.9	Safe
33	15.6	Walking	18.6	Walking	68.1	Safe
34	15.4	Walking	18.1	Walking	59.4	Safe
35	12.8	Standing	15.4	Walking	59.3	Safe

Guidelines	
Pedestrian Comfort	**20% exceedance wind speed** 0-10 km/h = Sitting, 10-15 km/h = Standing, 15-20 km/h = Walking, >20 km/h = Uncomfortable
Pedestrian Safety	**0.1% exceedance wind speed** 0-90 km/h = Safe

TABLE B2: SUMMARY OF PEDESTRIAN COMFORT (PROPOSED SCENARIO)

Sensor	Pedestrian Comfort				Pedestrian Safety	
	Summer		Winter		Annual	
	Wind Speed	Comfort Class	Wind Speed	Comfort Class	Wind Speed	Safety Class
36	11.7	Standing	13.6	Standing	49.1	Safe
37	13.8	Standing	16.1	Walking	58.2	Safe
38	10.3	Standing	11.8	Standing	47.7	Safe
39	15.0	Standing	17.7	Walking	64.2	Safe
40	12.9	Standing	15.6	Walking	65.5	Safe
41	9.3	Sitting	11.5	Standing	45.2	Safe
42	12.0	Standing	16.0	Walking	68.3	Safe
43	15.6	Walking	20.0	Walking	68.8	Safe
44	11.6	Standing	16.2	Walking	64.7	Safe
45	12.6	Standing	17.4	Walking	65.8	Safe
46	14.6	Standing	19.8	Walking	68.2	Safe
47	15.9	Walking	20.2	Uncomfortable	67.1	Safe
48	14.4	Standing	18.8	Walking	65.4	Safe
49	10.3	Standing	11.9	Standing	50.2	Safe
50	12.4	Standing	14.7	Standing	68.4	Safe
51	11.3	Standing	14.0	Standing	59.2	Safe
52	9.0	Sitting	11.3	Standing	44.3	Safe
53	12.9	Standing	16.4	Walking	64.7	Safe
54	13.7	Standing	18.5	Walking	74.5	Safe
55	14.6	Standing	17.4	Walking	59.2	Safe
56	14.8	Standing	17.5	Walking	62.5	Safe
57	13.0	Standing	16.1	Walking	66.5	Safe
58	15.4	Walking	18.7	Walking	65.8	Safe
59	13.0	Standing	16.6	Walking	56.7	Safe
60	13.7	Standing	17.4	Walking	62.1	Safe
61	14.4	Standing	17.4	Walking	61.0	Safe
62	13.7	Standing	17.4	Walking	66.4	Safe
63	12.8	Standing	15.6	Walking	58.4	Safe
64	11.4	Standing	14.3	Standing	55.9	Safe
65	13.1	Standing	15.9	Walking	61.1	Safe
66	11.4	Standing	14.4	Standing	57.3	Safe
67	12.1	Standing	14.6	Standing	52.4	Safe
68	13.3	Standing	16.3	Walking	62.1	Safe
69	9.7	Sitting	12.5	Standing	51.9	Safe
70	9.9	Sitting	13.0	Standing	56.7	Safe

Guidelines	
Pedestrian Comfort	**20% exceedance wind speed** 0-10 km/h = Sitting, 10-15 km/h = Standing, 15-20 km/h = Walking, >20 km/h = Uncomfortable
Pedestrian Safety	**0.1% exceedance wind speed** 0-90 km/h = Safe

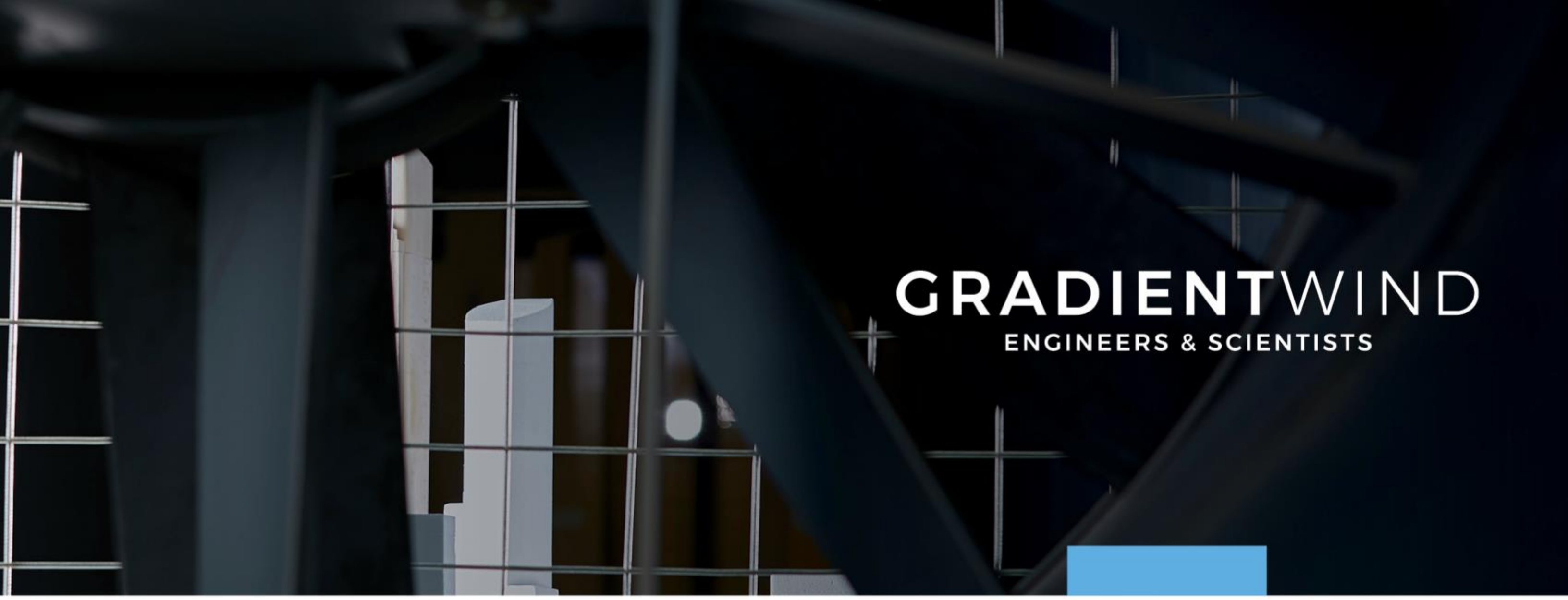
TABLE B3: SUMMARY OF PEDESTRIAN COMFORT (PROPOSED SCENARIO)

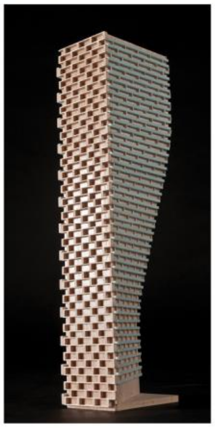
Sensor	Pedestrian Comfort				Pedestrian Safety	
	Summer		Winter		Annual	
	Wind Speed	Comfort Class	Wind Speed	Comfort Class	Wind Speed	Safety Class
71	13.0	Standing	15.3	Walking	54.3	Safe
72	11.2	Standing	14.3	Standing	54.1	Safe
73	11.9	Standing	14.7	Standing	52.4	Safe
74	14.7	Standing	16.4	Walking	56.6	Safe
75	13.0	Standing	15.1	Walking	61.8	Safe
76	11.3	Standing	13.9	Standing	60.2	Safe
77	14.9	Standing	19.2	Walking	64.9	Safe
78	15.1	Walking	18.8	Walking	65.3	Safe
79	15.2	Walking	19.5	Walking	68.9	Safe
80	20.5	Uncomfortable	26.5	Uncomfortable	81.7	Safe
81	19.1	Walking	25.8	Uncomfortable	84.5	Safe
82	12.7	Standing	15.6	Walking	65.5	Safe
83	11.0	Standing	13.6	Standing	55.9	Safe
84	13.0	Standing	16.1	Walking	64.1	Safe
85	10.0	Sitting	11.0	Standing	48.4	Safe
86	8.2	Sitting	9.9	Sitting	47.0	Safe
87	7.9	Sitting	10.1	Standing	43.9	Safe
88	8.2	Sitting	10.4	Standing	44.2	Safe
89	8.2	Sitting	10.2	Standing	44.6	Safe
90	11.4	Standing	14.6	Standing	69.3	Safe
91	10.5	Standing	13.3	Standing	54.7	Safe
92	10.7	Standing	14.4	Standing	60.9	Safe
93	14.8	Standing	18.9	Walking	72.9	Safe
94	16.0	Walking	18.3	Walking	63.9	Safe
95	18.9	Walking	23.1	Uncomfortable	75.6	Safe
96	11.8	Standing	14.8	Standing	56.9	Safe
97	8.2	Sitting	10.1	Standing	48.3	Safe
98	12.9	Standing	16.2	Walking	62.1	Safe
99	15.0	Standing	19.1	Walking	69.3	Safe
100	12.0	Standing	15.7	Walking	62.7	Safe
101	13.5	Standing	18.0	Walking	64.8	Safe
102	14.8	Standing	19.7	Walking	67.0	Safe
103	11.7	Standing	14.9	Standing	53.5	Safe
104	12.2	Standing	16.4	Walking	59.4	Safe
105	10.9	Standing	15.0	Standing	57.3	Safe

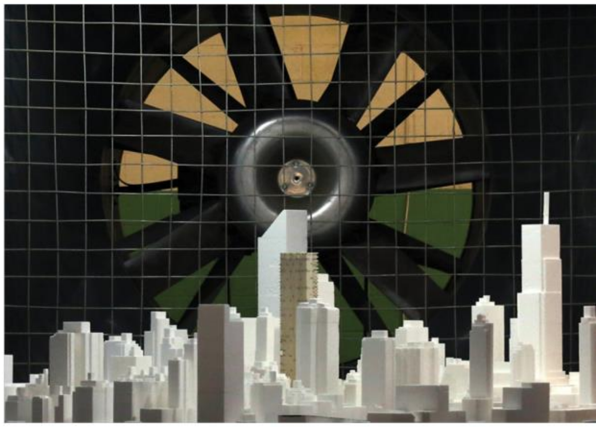
Guidelines	
Pedestrian Comfort	**20% exceedance wind speed** 0-10 km/h = Sitting, 10-15 km/h = Standing, 15-20 km/h = Walking, >20 km/h = Uncomfortable
Pedestrian Safety	**0.1% exceedance wind speed** 0-90 km/h = Safe

TABLE B4: SUMMARY OF PEDESTRIAN COMFORT (PROPOSED SCENARIO)

Sensor	Pedestrian Comfort				Pedestrian Safety	
	Summer		Winter		Annual	
	Wind Speed	Comfort Class	Wind Speed	Comfort Class	Wind Speed	Safety Class
106	10.3	Standing	13.9	Standing	57.8	Safe
107	9.8	Sitting	12.3	Standing	59.7	Safe
108	9.3	Sitting	11.5	Standing	53.0	Safe
109	9.4	Sitting	11.4	Standing	48.2	Safe
110	9.1	Sitting	11.3	Standing	48.6	Safe
111	8.6	Sitting	10.5	Standing	47.7	Safe
112	7.9	Sitting	9.5	Sitting	43.4	Safe
113	7.7	Sitting	9.4	Sitting	41.9	Safe
114	8.8	Sitting	10.7	Standing	47.2	Safe
115	19.8	Walking	26.3	Uncomfortable	84.3	Safe
116	14.7	Standing	18.9	Walking	61.5	Safe
117	9.8	Sitting	12.3	Standing	53.6	Safe
118	9.7	Sitting	12.0	Standing	53.5	Safe
119	9.7	Sitting	11.8	Standing	46.7	Safe
120	9.0	Sitting	11.4	Standing	43.7	Safe
121	8.6	Sitting	10.9	Standing	44.6	Safe
122	11.1	Standing	14.5	Standing	58.1	Safe
123	13.9	Standing	16.7	Walking	67.7	Safe
124	9.2	Sitting	11.3	Standing	49.7	Safe
125	9.0	Sitting	10.8	Standing	39.5	Safe
126	8.2	Sitting	9.9	Sitting	38.4	Safe
127	10.4	Standing	13.6	Standing	53.4	Safe
128	10.8	Standing	15.2	Walking	63.9	Safe
129	16.3	Walking	22.0	Uncomfortable	77.5	Safe
130	14.4	Standing	18.5	Walking	65.4	Safe
131	13.7	Standing	17.7	Walking	69.9	Safe
132	8.7	Sitting	12.1	Standing	59.8	Safe
133	9.1	Sitting	10.3	Standing	37.6	Safe
134	9.5	Sitting	12.7	Standing	52.8	Safe
135	11.5	Standing	13.6	Standing	61.6	Safe
136	8.1	Sitting	10.0	Sitting	39.9	Safe
137	9.3	Sitting	11.4	Standing	50.5	Safe
138	10.9	Standing	13.8	Standing	61.0	Safe
139	14.1	Standing	19.8	Walking	85.2	Safe







APPENDIX C

PEDESTRIAN COMFORT SUITABILITY, TABLES C1-C4
(FUTURE SCENARIO)

127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
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Guidelines	
Pedestrian Comfort	**20% exceedance wind speed** 0-10 km/h = Sitting, 10-15 km/h = Standing, 15-20 km/h = Walking, >20 km/h = Uncomfortable
Pedestrian Safety	**0.1% exceedance wind speed** 0-90 km/h = Safe

TABLE C1: SUMMARY OF PEDESTRIAN COMFORT (FUTURE SCENARIO)

Sensor	Pedestrian Comfort				Pedestrian Safety	
	Summer		Winter		Annual	
	Wind Speed	Comfort Class	Wind Speed	Comfort Class	Wind Speed	Safety Class
1	8.8	Sitting	11.3	Standing	42.9	Safe
2	10.2	Standing	13.0	Standing	52.1	Safe
3	12.8	Standing	15.8	Walking	71.6	Safe
4	15.0	Standing	18.4	Walking	77.7	Safe
5	15.2	Walking	18.8	Walking	71.0	Safe
6	12.7	Standing	15.7	Walking	54.0	Safe
7	10.6	Standing	13.3	Standing	64.8	Safe
9	14.6	Standing	16.8	Walking	67.6	Safe
10	15.0	Standing	17.5	Walking	67.2	Safe
12	10.7	Standing	12.5	Standing	53.0	Safe
13	14.8	Standing	17.5	Walking	61.1	Safe
14	9.4	Sitting	11.2	Standing	50.2	Safe
15	9.9	Sitting	12.3	Standing	52.4	Safe
16	12.7	Standing	14.7	Standing	54.6	Safe
17	10.5	Standing	12.2	Standing	54.6	Safe
18	9.8	Sitting	12.0	Standing	55.4	Safe
19	8.9	Sitting	10.9	Standing	45.5	Safe
20	8.1	Sitting	10.6	Standing	45.7	Safe
21	13.5	Standing	18.1	Walking	65.1	Safe
22	8.7	Sitting	11.4	Standing	53.4	Safe
23	8.9	Sitting	11.3	Standing	52.4	Safe
24	12.8	Standing	16.4	Walking	59.9	Safe
25	10.9	Standing	14.2	Standing	62.0	Safe
26	8.0	Sitting	10.1	Standing	38.9	Safe
27	12.3	Standing	14.0	Standing	50.3	Safe
28	11.1	Standing	13.7	Standing	52.2	Safe
29	10.8	Standing	13.1	Standing	51.6	Safe
30	8.3	Sitting	10.0	Sitting	41.8	Safe
31	12.0	Standing	13.4	Standing	47.0	Safe
32	12.5	Standing	13.4	Standing	51.3	Safe
33	13.4	Standing	14.6	Standing	52.4	Safe
34	13.6	Standing	14.8	Standing	56.3	Safe
35	11.7	Standing	13.2	Standing	47.5	Safe

Guidelines	
Pedestrian Comfort	**20% exceedance wind speed** 0-10 km/h = Sitting, 10-15 km/h = Standing, 15-20 km/h = Walking, >20 km/h = Uncomfortable
Pedestrian Safety	**0.1% exceedance wind speed** 0-90 km/h = Safe

TABLE C2: SUMMARY OF PEDESTRIAN COMFORT (FUTURE SCENARIO)

Sensor	Pedestrian Comfort				Pedestrian Safety	
	Summer		Winter		Annual	
	Wind Speed	Comfort Class	Wind Speed	Comfort Class	Wind Speed	Safety Class
36	11.4	Standing	12.6	Standing	46.6	Safe
37	12.7	Standing	14.0	Standing	51.2	Safe
38	9.6	Sitting	10.7	Standing	44.9	Safe
39	13.9	Standing	15.9	Walking	62.3	Safe
40	12.6	Standing	15.0	Standing	62.1	Safe
41	8.3	Sitting	10.2	Standing	42.3	Safe
42	11.2	Standing	14.6	Standing	62.6	Safe
43	13.7	Standing	17.1	Walking	60.1	Safe
44	8.9	Sitting	11.6	Standing	43.4	Safe
45	9.5	Sitting	12.4	Standing	47.8	Safe
46	11.1	Standing	14.6	Standing	55.2	Safe
47	12.2	Standing	15.4	Walking	60.5	Safe
48	10.7	Standing	14.3	Standing	58.4	Safe
49	9.1	Sitting	10.9	Standing	50.0	Safe
50	11.8	Standing	14.4	Standing	59.5	Safe
54	10.1	Standing	12.5	Standing	68.6	Safe
55	10.9	Standing	13.2	Standing	57.5	Safe
56	15.3	Walking	18.5	Walking	68.5	Safe
57	12.4	Standing	13.7	Standing	77.8	Safe
58	12.7	Standing	14.7	Standing	57.4	Safe
59	9.3	Sitting	11.7	Standing	49.8	Safe
60	10.4	Standing	12.8	Standing	54.3	Safe
61	11.1	Standing	12.6	Standing	52.1	Safe
62	11.1	Standing	12.6	Standing	60.7	Safe
63	11.7	Standing	13.2	Standing	56.0	Safe
64	11.0	Standing	12.5	Standing	53.4	Safe
65	11.1	Standing	12.4	Standing	49.1	Safe
66	9.1	Sitting	11.4	Standing	50.4	Safe
67	10.4	Standing	12.8	Standing	52.8	Safe
68	12.6	Standing	14.5	Standing	55.8	Safe
69	9.3	Sitting	11.1	Standing	45.8	Safe
70	8.4	Sitting	9.9	Sitting	39.2	Safe

Guidelines	
Pedestrian Comfort	**20% exceedance wind speed** 0-10 km/h = Sitting, 10-15 km/h = Standing, 15-20 km/h = Walking, >20 km/h = Uncomfortable
Pedestrian Safety	**0.1% exceedance wind speed** 0-90 km/h = Safe

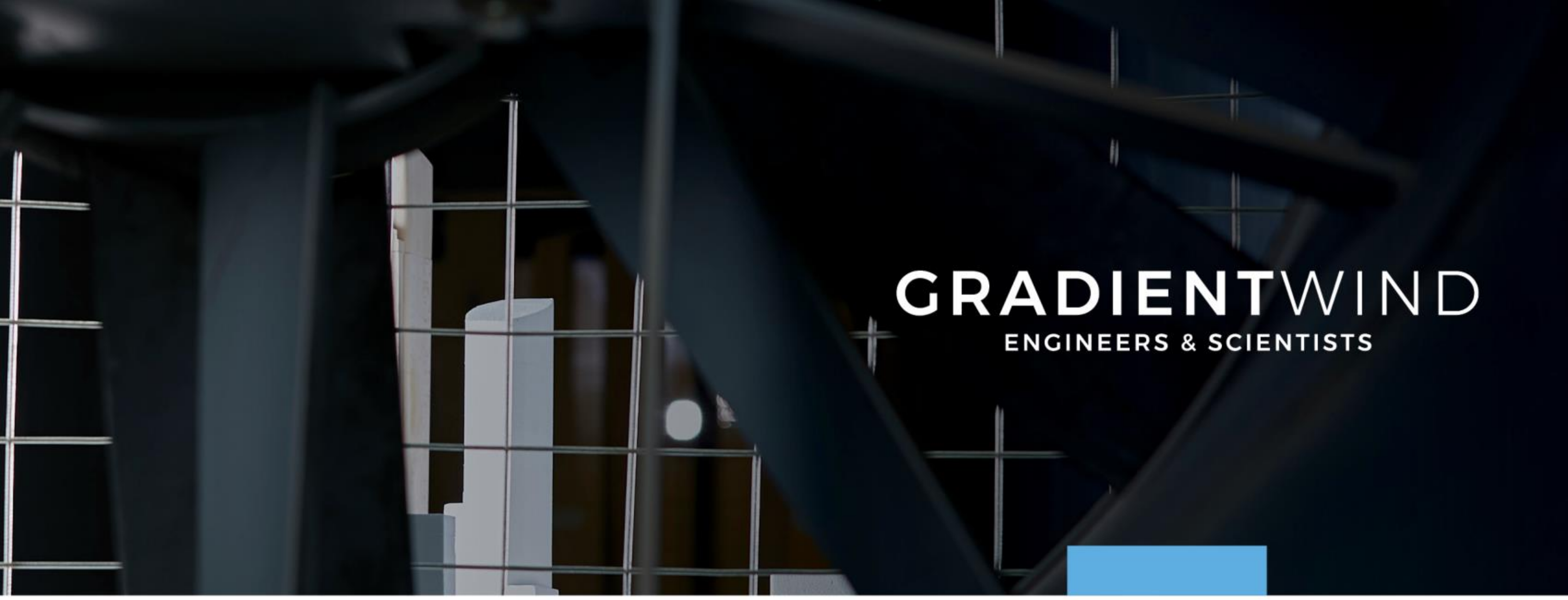
TABLE C3: SUMMARY OF PEDESTRIAN COMFORT (FUTURE SCENARIO)

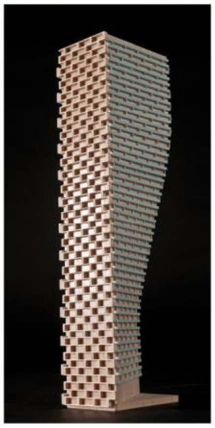
Sensor	Pedestrian Comfort				Pedestrian Safety	
	Summer		Winter		Annual	
	Wind Speed	Comfort Class	Wind Speed	Comfort Class	Wind Speed	Safety Class
71	12.0	Standing	14.1	Standing	60.2	Safe
72	10.3	Standing	13.0	Standing	56.7	Safe
73	12.2	Standing	15.6	Walking	63.9	Safe
74	16.0	Walking	17.9	Walking	64.0	Safe
75	12.0	Standing	14.1	Standing	57.1	Safe
76	10.7	Standing	13.1	Standing	55.3	Safe
77	12.9	Standing	15.9	Walking	60.1	Safe
78	11.5	Standing	13.1	Standing	51.1	Safe
79	12.1	Standing	13.8	Standing	58.8	Safe
80	16.5	Walking	19.9	Walking	67.4	Safe
81	14.2	Standing	17.1	Walking	61.6	Safe
82	11.8	Standing	14.4	Standing	62.0	Safe
83	10.1	Standing	12.3	Standing	56.1	Safe
84	11.4	Standing	13.9	Standing	64.9	Safe
85	9.7	Sitting	10.6	Standing	46.1	Safe
86	8.3	Sitting	9.9	Sitting	47.7	Safe
87	8.0	Sitting	10.0	Sitting	45.9	Safe
88	8.1	Sitting	10.3	Standing	43.8	Safe
89	8.1	Sitting	10.2	Standing	44.0	Safe
90	11.4	Standing	15.3	Walking	69.1	Safe
91	9.9	Sitting	12.4	Standing	51.2	Safe
92	10.0	Sitting	12.3	Standing	57.9	Safe
93	14.2	Standing	16.9	Walking	61.4	Safe
94	14.9	Standing	16.5	Walking	61.0	Safe
95	16.6	Walking	19.1	Walking	68.4	Safe
96	10.7	Standing	13.1	Standing	57.4	Safe
97	8.1	Sitting	10.2	Standing	45.1	Safe
98	12.6	Standing	15.9	Walking	65.3	Safe
99	13.8	Standing	16.9	Walking	65.9	Safe
100	10.5	Standing	13.1	Standing	57.6	Safe
101	10.8	Standing	13.9	Standing	56.9	Safe
102	12.6	Standing	16.4	Walking	62.6	Safe
103	10.6	Standing	13.5	Standing	49.1	Safe
104	8.4	Sitting	11.1	Standing	48.0	Safe
105	7.9	Sitting	10.0	Sitting	42.8	Safe

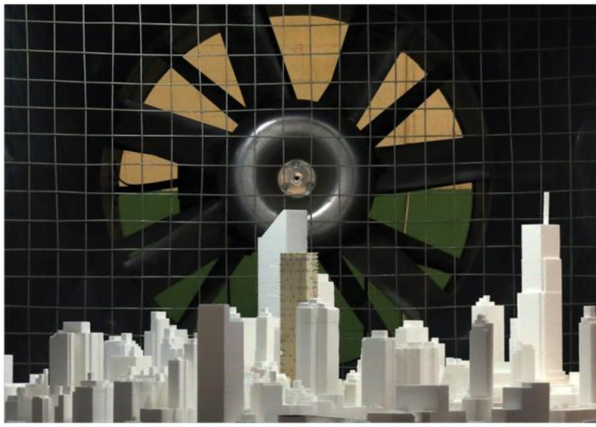
Guidelines	
Pedestrian Comfort	**20% exceedance wind speed** 0-10 km/h = Sitting, 10-15 km/h = Standing, 15-20 km/h = Walking, >20 km/h = Uncomfortable
Pedestrian Safety	**0.1% exceedance wind speed** 0-90 km/h = Safe

TABLE C4: SUMMARY OF PEDESTRIAN COMFORT (FUTURE SCENARIO)

Sensor	Pedestrian Comfort				Pedestrian Safety	
	Summer		Winter		Annual	
	Wind Speed	Comfort Class	Wind Speed	Comfort Class	Wind Speed	Safety Class
106	7.8	Sitting	9.6	Sitting	42.9	Safe
107	7.9	Sitting	9.6	Sitting	46.6	Safe
108	9.0	Sitting	10.9	Standing	52.7	Safe
109	8.8	Sitting	10.7	Standing	48.2	Safe
110	8.4	Sitting	10.2	Standing	46.6	Safe
111	8.2	Sitting	9.9	Sitting	45.7	Safe
112	8.0	Sitting	9.6	Sitting	41.4	Safe
113	7.5	Sitting	9.3	Sitting	38.7	Safe
114	8.8	Sitting	10.7	Standing	45.4	Safe
115	14.1	Standing	18.0	Walking	69.1	Safe
116	11.5	Standing	14.4	Standing	59.0	Safe
117	9.3	Sitting	11.6	Standing	49.8	Safe
118	9.4	Sitting	11.7	Standing	48.0	Safe
119	9.1	Sitting	11.1	Standing	44.3	Safe
120	9.0	Sitting	11.4	Standing	42.1	Safe
121	8.3	Sitting	10.5	Standing	41.6	Safe
122	12.5	Standing	16.5	Walking	63.3	Safe
123	12.6	Standing	15.6	Walking	64.8	Safe
124	10.9	Standing	13.2	Standing	52.9	Safe
125	13.2	Standing	15.1	Walking	57.5	Safe
126	13.6	Standing	15.6	Walking	60.0	Safe
127	14.7	Standing	17.6	Walking	68.8	Safe
128	11.8	Standing	13.6	Standing	60.6	Safe
129	9.6	Sitting	11.3	Standing	60.2	Safe
130	10.6	Standing	12.6	Standing	54.8	Safe
131	9.3	Sitting	10.8	Standing	53.7	Safe
132	7.9	Sitting	10.6	Standing	56.8	Safe
133	9.3	Sitting	10.6	Standing	37.5	Safe
134	9.1	Sitting	11.9	Standing	50.8	Safe
135	10.2	Standing	11.8	Standing	44.0	Safe
136	7.9	Sitting	9.5	Sitting	40.3	Safe
137	8.7	Sitting	10.2	Standing	45.6	Safe
138	9.6	Sitting	11.3	Standing	51.5	Safe
139	9.2	Sitting	11.6	Standing	48.5	Safe







APPENDIX D

PEDESTRIAN COMFORT SUITABILITY, TABLES D1-D4
(PROPOSED WITH MITIGATION SCENARIO)

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Guidelines	
Pedestrian Comfort	**20% exceedance wind speed** 0-10 km/h = Sitting, 10-15 km/h = Standing, 15-20 km/h = Walking, >20 km/h = Uncomfortable
Pedestrian Safety	**0.1% exceedance wind speed** 0-90 km/h = Safe

TABLE D1: SUMMARY OF PEDESTRIAN COMFORT (PROPOSED WITH MITIGATION SCENARIO)

Sensor	Pedestrian Comfort				Pedestrian Safety	
	Summer		Winter		Annual	
	Wind Speed	Comfort Class	Wind Speed	Comfort Class	Wind Speed	Safety Class
1	10.8	Standing	14.4	Standing	54.6	Safe
2	12.0	Standing	15.5	Walking	55.4	Safe
3	14.0	Standing	18.3	Walking	64.0	Safe
4	13.2	Standing	16.5	Walking	62.0	Safe
5	14.3	Standing	17.2	Walking	61.9	Safe
6	10.1	Standing	12.8	Standing	49.9	Safe
7	12.4	Standing	14.2	Standing	56.0	Safe
8	10.7	Standing	13.3	Standing	54.5	Safe
9	16.0	Walking	20.0	Walking	67.3	Safe
10	12.1	Standing	14.2	Standing	54.4	Safe
11	9.8	Sitting	12.1	Standing	48.0	Safe
12	9.8	Sitting	11.0	Standing	43.1	Safe
13	11.0	Standing	12.5	Standing	46.7	Safe
14	10.2	Standing	12.4	Standing	46.9	Safe
15	12.1	Standing	14.4	Standing	56.5	Safe
16	10.0	Sitting	12.0	Standing	42.5	Safe
17	10.4	Standing	12.6	Standing	46.7	Safe
18	10.5	Standing	13.2	Standing	56.3	Safe
19	10.7	Standing	14.1	Standing	59.7	Safe
20	9.6	Sitting	13.4	Standing	62.5	Safe
21	15.7	Walking	21.2	Uncomfortable	72.0	Safe
22	9.8	Sitting	13.4	Standing	62.1	Safe
23	11.3	Standing	15.0	Standing	70.0	Safe
24	12.7	Standing	16.9	Walking	63.1	Safe
25	13.0	Standing	17.6	Walking	78.9	Safe
26	8.9	Sitting	11.4	Standing	44.9	Safe
27	12.7	Standing	15.6	Walking	60.2	Safe
28	11.3	Standing	14.3	Standing	52.7	Safe
29	14.6	Standing	19.8	Walking	82.2	Safe
30	11.2	Standing	15.1	Walking	68.4	Safe
31	12.8	Standing	14.6	Standing	55.6	Safe
32	13.8	Standing	15.5	Walking	53.6	Safe
33	14.2	Standing	15.5	Walking	52.8	Safe
34	15.2	Walking	17.7	Walking	58.9	Safe
35	12.8	Standing	15.2	Walking	56.7	Safe

Guidelines	
Pedestrian Comfort	**20% exceedance wind speed** 0-10 km/h = Sitting, 10-15 km/h = Standing, 15-20 km/h = Walking, >20 km/h = Uncomfortable
Pedestrian Safety	**0.1% exceedance wind speed** 0-90 km/h = Safe

TABLE D2: SUMMARY OF PEDESTRIAN COMFORT (PROPOSED WITH MITIGATION SCENARIO)

Sensor	Pedestrian Comfort				Pedestrian Safety	
	Summer		Winter		Annual	
	Wind Speed	Comfort Class	Wind Speed	Comfort Class	Wind Speed	Safety Class
36	11.8	Standing	14.0	Standing	49.9	Safe
37	13.9	Standing	16.4	Walking	59.4	Safe
38	10.3	Standing	11.8	Standing	48.8	Safe
39	15.7	Walking	18.4	Walking	65.2	Safe
40	12.9	Standing	15.7	Walking	66.3	Safe
41	9.5	Sitting	11.7	Standing	45.6	Safe
42	11.7	Standing	15.6	Walking	68.9	Safe
43	15.6	Walking	20.0	Walking	68.8	Safe
44	12.2	Standing	17.1	Walking	66.2	Safe
45	13.0	Standing	18.1	Walking	66.8	Safe
46	14.6	Standing	19.8	Walking	68.2	Safe
47	15.9	Walking	20.2	Uncomfortable	67.1	Safe
48	14.4	Standing	18.8	Walking	65.4	Safe
49	10.6	Standing	12.3	Standing	53.1	Safe
50	12.3	Standing	14.3	Standing	71.8	Safe
51	11.4	Standing	14.2	Standing	59.6	Safe
52	9.0	Sitting	11.3	Standing	44.8	Safe
53	13.0	Standing	16.8	Walking	64.2	Safe
54	14.0	Standing	18.8	Walking	76.1	Safe
55	14.0	Standing	16.7	Walking	58.2	Safe
56	14.8	Standing	17.4	Walking	62.7	Safe
57	12.9	Standing	15.9	Walking	65.5	Safe
58	15.8	Walking	18.9	Walking	65.7	Safe
59	12.6	Standing	16.1	Walking	56.1	Safe
60	13.1	Standing	16.8	Walking	60.8	Safe
61	14.7	Standing	17.4	Walking	60.4	Safe
62	13.8	Standing	17.4	Walking	65.5	Safe
63	12.0	Standing	14.6	Standing	57.3	Safe
64	11.1	Standing	13.6	Standing	54.6	Safe
65	13.8	Standing	16.4	Walking	60.3	Safe
66	13.2	Standing	16.7	Walking	59.5	Safe
67	12.5	Standing	14.6	Standing	50.8	Safe
68	12.0	Standing	14.9	Standing	59.5	Safe
69	10.0	Sitting	12.9	Standing	51.9	Safe
70	10.5	Standing	13.6	Standing	56.1	Safe

Guidelines	
Pedestrian Comfort	**20% exceedance wind speed** 0-10 km/h = Sitting, 10-15 km/h = Standing, 15-20 km/h = Walking, >20 km/h = Uncomfortable
Pedestrian Safety	**0.1% exceedance wind speed** 0-90 km/h = Safe

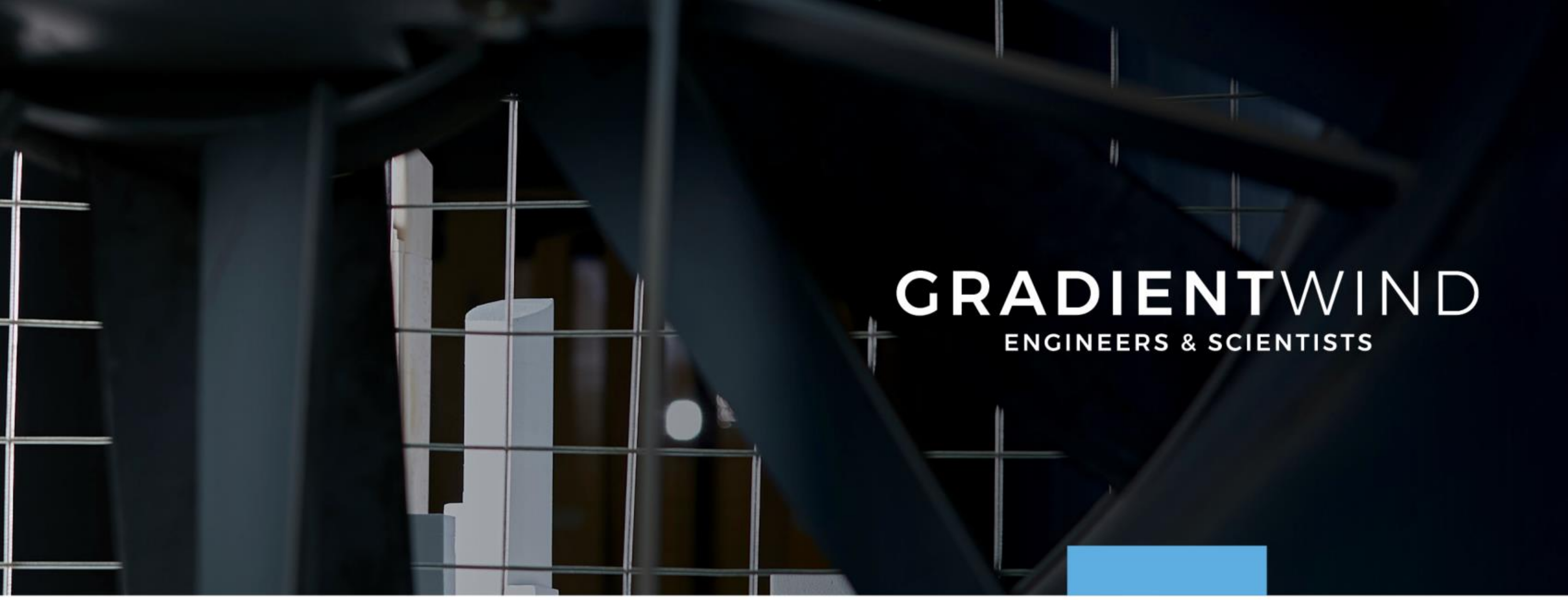
TABLE D3: SUMMARY OF PEDESTRIAN COMFORT (PROPOSED WITH MITIGATION SCENARIO)

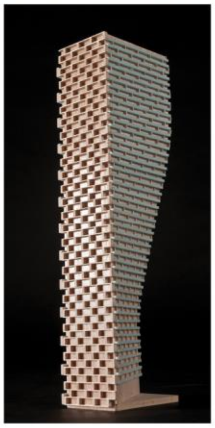
Sensor	Pedestrian Comfort				Pedestrian Safety	
	Summer		Winter		Annual	
	Wind Speed	Comfort Class	Wind Speed	Comfort Class	Wind Speed	Safety Class
71	12.1	Standing	14.8	Standing	53.0	Safe
72	10.5	Standing	13.3	Standing	53.3	Safe
73	9.2	Sitting	11.5	Standing	41.9	Safe
74	12.1	Standing	14.1	Standing	53.7	Safe
75	11.6	Standing	13.4	Standing	54.8	Safe
76	9.3	Sitting	11.2	Standing	48.4	Safe
77	11.1	Standing	14.0	Standing	54.9	Safe
78	13.8	Standing	16.8	Walking	61.2	Safe
79	15.0	Standing	19.4	Walking	67.9	Safe
80	9.1	Sitting	11.5	Standing	48.3	Safe
81	9.7	Sitting	12.3	Standing	58.6	Safe
82	13.9	Standing	17.5	Walking	71.2	Safe
83	12.2	Standing	15.1	Walking	60.0	Safe
84	13.5	Standing	16.7	Walking	64.1	Safe
85	10.5	Standing	11.5	Standing	49.8	Safe
86	8.5	Sitting	10.2	Standing	48.5	Safe
87	7.6	Sitting	9.5	Sitting	44.5	Safe
88	8.5	Sitting	10.6	Standing	45.6	Safe
89	8.3	Sitting	10.4	Standing	46.2	Safe
90	11.2	Standing	14.4	Standing	71.9	Safe
91	10.9	Standing	15.5	Walking	64.7	Safe
92	7.3	Sitting	9.2	Sitting	40.1	Safe
93	12.1	Standing	15.7	Walking	78.7	Safe
94	9.8	Sitting	11.0	Standing	43.1	Safe
95	7.7	Sitting	9.2	Sitting	31.7	Safe
96	7.4	Sitting	8.9	Sitting	33.0	Safe
97	9.6	Sitting	12.1	Standing	55.7	Safe
98	10.6	Standing	13.2	Standing	56.9	Safe
99	13.7	Standing	17.1	Walking	61.6	Safe
100	11.5	Standing	14.4	Standing	53.0	Safe
101	14.8	Standing	19.2	Walking	66.8	Safe
102	14.8	Standing	19.7	Walking	67.0	Safe
103	12.0	Standing	15.5	Walking	55.1	Safe
104	10.7	Standing	14.6	Standing	56.3	Safe
105	9.6	Sitting	13.2	Standing	54.0	Safe

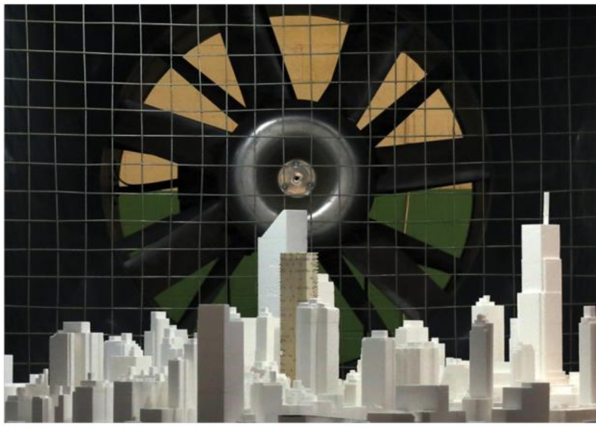
Guidelines	
Pedestrian Comfort	**20% exceedance wind speed** 0-10 km/h = Sitting, 10-15 km/h = Standing, 15-20 km/h = Walking, >20 km/h = Uncomfortable
Pedestrian Safety	**0.1% exceedance wind speed** 0-90 km/h = Safe

TABLE D4: SUMMARY OF PEDESTRIAN COMFORT (PROPOSED WITH MITIGATION SCENARIO)

Sensor	Pedestrian Comfort				Pedestrian Safety	
	Summer		Winter		Annual	
	Wind Speed	Comfort Class	Wind Speed	Comfort Class	Wind Speed	Safety Class
106	10.9	Standing	14.3	Standing	59.9	Safe
107	10.1	Standing	12.7	Standing	61.7	Safe
108	9.8	Sitting	11.3	Standing	51.2	Safe
109	9.3	Sitting	10.8	Standing	47.4	Safe
110	9.8	Sitting	11.5	Standing	48.6	Safe
111	10.5	Standing	12.3	Standing	49.8	Safe
112	8.6	Sitting	10.0	Sitting	44.2	Safe
113	8.3	Sitting	10.1	Standing	42.3	Safe
114	8.4	Sitting	10.4	Standing	44.6	Safe
115	12.0	Standing	16.0	Walking	58.1	Safe
116	10.8	Standing	14.2	Standing	48.7	Safe
117	9.3	Sitting	11.5	Standing	46.8	Safe
118	10.9	Standing	13.3	Standing	55.3	Safe
119	10.0	Sitting	12.4	Standing	48.5	Safe
120	8.7	Sitting	11.0	Standing	43.9	Safe
121	8.6	Sitting	10.8	Standing	45.0	Safe
122	11.5	Standing	14.7	Standing	58.9	Safe
123	12.7	Standing	15.5	Walking	64.1	Safe
124	8.7	Sitting	10.3	Standing	46.7	Safe
125	9.3	Sitting	11.1	Standing	41.2	Safe
126	8.7	Sitting	10.5	Standing	40.0	Safe
127	9.9	Sitting	12.9	Standing	52.3	Safe
128	10.0	Sitting	13.9	Standing	61.4	Safe
129	15.4	Walking	20.4	Uncomfortable	73.0	Safe
130	12.0	Standing	15.2	Walking	58.9	Safe
131	14.9	Standing	19.9	Walking	75.1	Safe
132	9.3	Sitting	13.3	Standing	64.3	Safe
133	8.7	Sitting	10.3	Standing	38.9	Safe
134	9.3	Sitting	12.7	Standing	52.2	Safe
135	8.1	Sitting	9.5	Sitting	83.4	Safe
136	8.7	Sitting	10.8	Standing	42.8	Safe
137	9.9	Sitting	12.3	Standing	53.2	Safe
138	9.1	Sitting	11.2	Standing	38.2	Safe
139	9.9	Sitting	13.9	Standing	78.1	Safe







APPENDIX E

PEDESTRIAN COMFORT SUITABILITY, TABLES E1-E4
(FUTURE WITH MITIGATION SCENARIO)

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Guidelines	
Pedestrian Comfort	**20% exceedance wind speed** 0-10 km/h = Sitting, 10-15 km/h = Standing, 15-20 km/h = Walking, >20 km/h = Uncomfortable
Pedestrian Safety	**0.1% exceedance wind speed** 0-90 km/h = Safe

TABLE E1: SUMMARY OF PEDESTRIAN COMFORT (FUTURE WITH MITIGATION SCENARIO)

Sensor	Pedestrian Comfort				Pedestrian Safety	
	Summer		Winter		Annual	
	Wind Speed	Comfort Class	Wind Speed	Comfort Class	Wind Speed	Safety Class
1	8.6	Sitting	11.0	Standing	44.6	Safe
2	10.5	Standing	13.4	Standing	56.0	Safe
3	13.6	Standing	16.8	Walking	74.3	Safe
4	15.1	Walking	18.5	Walking	77.8	Safe
5	15.7	Walking	19.6	Walking	72.2	Safe
6	12.8	Standing	15.9	Walking	56.2	Safe
7	10.1	Standing	12.6	Standing	65.7	Safe
9	15.5	Walking	18.1	Walking	70.7	Safe
10	15.6	Walking	18.6	Walking	68.0	Safe
12	11.0	Standing	12.8	Standing	54.2	Safe
13	15.2	Walking	18.0	Walking	61.9	Safe
14	10.3	Standing	12.3	Standing	51.3	Safe
15	10.2	Standing	12.7	Standing	54.2	Safe
16	12.7	Standing	14.7	Standing	55.3	Safe
17	11.3	Standing	13.2	Standing	59.8	Safe
18	10.0	Sitting	12.3	Standing	56.7	Safe
19	9.1	Sitting	11.2	Standing	50.1	Safe
20	8.4	Sitting	10.9	Standing	45.9	Safe
21	13.3	Standing	18.0	Walking	66.3	Safe
22	8.0	Sitting	10.6	Standing	48.7	Safe
23	8.1	Sitting	10.3	Standing	44.7	Safe
24	12.7	Standing	16.3	Walking	60.4	Safe
25	11.1	Standing	14.4	Standing	63.6	Safe
26	7.8	Sitting	9.8	Sitting	38.6	Safe
27	12.2	Standing	13.9	Standing	51.1	Safe
28	10.8	Standing	13.5	Standing	52.4	Safe
29	11.0	Standing	13.6	Standing	50.6	Safe
30	8.5	Sitting	10.3	Standing	39.3	Safe
31	12.4	Standing	13.9	Standing	47.9	Safe
32	12.9	Standing	13.5	Standing	52.1	Safe
33	12.7	Standing	13.5	Standing	52.2	Safe
34	13.2	Standing	14.4	Standing	56.6	Safe
35	11.7	Standing	13.4	Standing	48.9	Safe

Guidelines	
Pedestrian Comfort	**20% exceedance wind speed** 0-10 km/h = Sitting, 10-15 km/h = Standing, 15-20 km/h = Walking, >20 km/h = Uncomfortable
Pedestrian Safety	**0.1% exceedance wind speed** 0-90 km/h = Safe

TABLE E2: SUMMARY OF PEDESTRIAN COMFORT (FUTURE WITH MITIGATION SCENARIO)

Sensor	Pedestrian Comfort				Pedestrian Safety	
	Summer		Winter		Annual	
	Wind Speed	Comfort Class	Wind Speed	Comfort Class	Wind Speed	Safety Class
36	11.9	Standing	13.3	Standing	48.3	Safe
37	12.9	Standing	14.4	Standing	52.5	Safe
38	9.7	Sitting	10.7	Standing	46.6	Safe
39	14.6	Standing	16.7	Walking	64.2	Safe
40	12.6	Standing	15.0	Standing	62.3	Safe
41	8.4	Sitting	10.2	Standing	41.0	Safe
42	10.7	Standing	14.0	Standing	62.3	Safe
43	14.3	Standing	17.9	Walking	60.7	Safe
44	8.7	Sitting	11.2	Standing	43.4	Safe
45	9.5	Sitting	12.3	Standing	47.4	Safe
46	10.7	Standing	13.8	Standing	55.3	Safe
47	12.4	Standing	15.8	Walking	60.3	Safe
48	11.2	Standing	14.6	Standing	57.8	Safe
49	9.9	Sitting	11.8	Standing	53.8	Safe
50	11.1	Standing	13.6	Standing	59.9	Safe
54	10.8	Standing	13.1	Standing	68.2	Safe
55	10.6	Standing	12.9	Standing	56.4	Safe
56	15.7	Walking	18.6	Walking	69.0	Safe
57	12.6	Standing	14.2	Standing	78.9	Safe
58	13.6	Standing	16.0	Walking	60.5	Safe
59	8.8	Sitting	11.0	Standing	48.4	Safe
60	9.9	Sitting	12.1	Standing	52.9	Safe
61	12.1	Standing	13.6	Standing	54.1	Safe
62	12.1	Standing	13.8	Standing	61.1	Safe
63	11.1	Standing	12.3	Standing	53.5	Safe
64	10.9	Standing	12.2	Standing	52.1	Safe
65	12.6	Standing	14.0	Standing	52.2	Safe
66	11.9	Standing	14.7	Standing	59.0	Safe
67	11.3	Standing	13.3	Standing	53.4	Safe
68	11.6	Standing	13.0	Standing	50.8	Safe
69	9.6	Sitting	11.4	Standing	46.4	Safe
70	9.0	Sitting	10.8	Standing	40.3	Safe

Guidelines	
Pedestrian Comfort	**20% exceedance wind speed** 0-10 km/h = Sitting, 10-15 km/h = Standing, 15-20 km/h = Walking, >20 km/h = Uncomfortable
Pedestrian Safety	**0.1% exceedance wind speed** 0-90 km/h = Safe

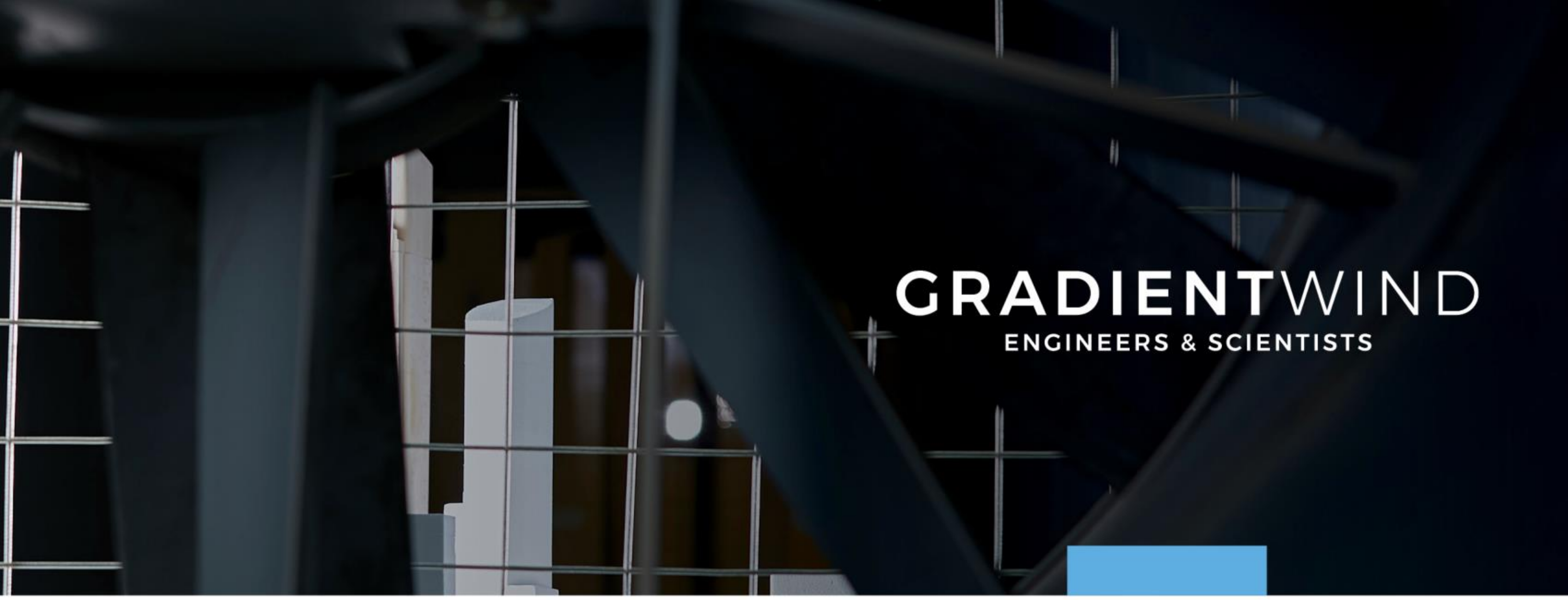
TABLE E3: SUMMARY OF PEDESTRIAN COMFORT (FUTURE WITH MITIGATION SCENARIO)

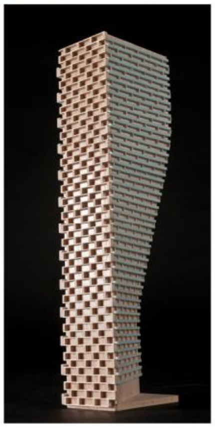
Sensor	Pedestrian Comfort				Pedestrian Safety	
	Summer		Winter		Annual	
	Wind Speed	Comfort Class	Wind Speed	Comfort Class	Wind Speed	Safety Class
71	11.3	Standing	13.6	Standing	51.3	Safe
72	10.5	Standing	13.3	Standing	56.2	Safe
73	9.5	Sitting	12.0	Standing	54.5	Safe
74	11.9	Standing	13.8	Standing	50.6	Safe
75	10.6	Standing	12.3	Standing	49.7	Safe
76	8.6	Sitting	10.3	Standing	43.2	Safe
77	9.4	Sitting	11.2	Standing	47.4	Safe
78	10.4	Standing	11.8	Standing	50.1	Safe
79	11.4	Standing	13.3	Standing	58.1	Safe
80	7.9	Sitting	9.8	Sitting	45.6	Safe
81	8.8	Sitting	10.9	Standing	53.6	Safe
82	11.4	Standing	13.9	Standing	62.2	Safe
83	10.3	Standing	12.8	Standing	57.1	Safe
84	11.4	Standing	13.9	Standing	64.7	Safe
85	10.2	Standing	11.2	Standing	47.6	Safe
86	8.5	Sitting	10.3	Standing	47.5	Safe
87	7.6	Sitting	9.5	Sitting	44.8	Safe
88	8.6	Sitting	10.9	Standing	44.4	Safe
89	8.0	Sitting	10.2	Standing	44.1	Safe
90	11.5	Standing	15.8	Walking	71.2	Safe
91	9.3	Sitting	12.0	Standing	51.6	Safe
92	7.6	Sitting	9.4	Sitting	48.0	Safe
93	12.4	Standing	14.9	Standing	77.2	Safe
94	11.8	Standing	13.7	Standing	60.7	Safe
95	7.6	Sitting	9.3	Sitting	35.1	Safe
96	7.8	Sitting	9.4	Sitting	39.7	Safe
97	10.0	Sitting	12.9	Standing	55.7	Safe
98	9.8	Sitting	12.8	Standing	59.7	Safe
99	11.7	Standing	14.4	Standing	56.7	Safe
100	10.3	Standing	12.4	Standing	47.4	Safe
101	11.6	Standing	14.7	Standing	57.9	Safe
102	13.1	Standing	17.0	Walking	61.1	Safe
103	10.7	Standing	13.6	Standing	49.9	Safe
104	7.7	Sitting	10.3	Standing	49.4	Safe
105	7.0	Sitting	8.9	Sitting	38.4	Safe

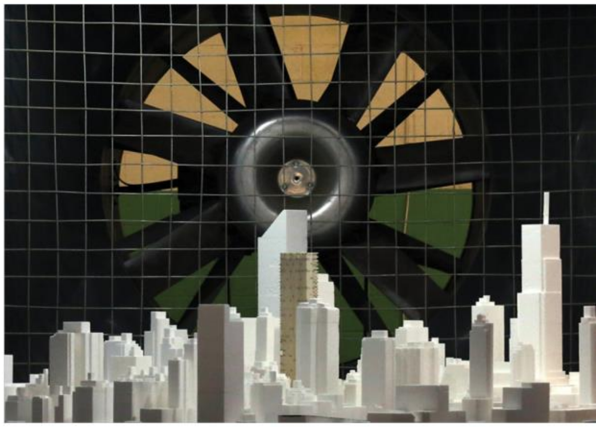
Guidelines	
Pedestrian Comfort	**20% exceedance wind speed** 0-10 km/h = Sitting, 10-15 km/h = Standing, 15-20 km/h = Walking, >20 km/h = Uncomfortable
Pedestrian Safety	**0.1% exceedance wind speed** 0-90 km/h = Safe

TABLE E4: SUMMARY OF PEDESTRIAN COMFORT (FUTURE WITH MITIGATION SCENARIO)

Sensor	Pedestrian Comfort				Pedestrian Safety	
	Summer		Winter		Annual	
	Wind Speed	Comfort Class	Wind Speed	Comfort Class	Wind Speed	Safety Class
106	8.1	Sitting	9.9	Sitting	46.2	Safe
107	8.2	Sitting	9.9	Sitting	49.6	Safe
108	9.9	Sitting	11.2	Standing	50.9	Safe
109	9.1	Sitting	10.4	Standing	47.8	Safe
110	9.7	Sitting	11.2	Standing	48.6	Safe
111	10.3	Standing	12.3	Standing	48.9	Safe
112	8.5	Sitting	10.0	Sitting	42.0	Safe
113	7.9	Sitting	9.5	Sitting	38.8	Safe
114	8.2	Sitting	10.3	Standing	42.5	Safe
115	8.7	Sitting	10.9	Standing	44.0	Safe
116	9.5	Sitting	11.9	Standing	55.3	Safe
117	9.3	Sitting	11.5	Standing	47.3	Safe
118	10.7	Standing	13.1	Standing	50.7	Safe
119	9.4	Sitting	11.5	Standing	45.8	Safe
120	8.2	Sitting	10.2	Standing	41.4	Safe
121	8.5	Sitting	10.8	Standing	43.1	Safe
122	11.7	Standing	15.7	Walking	62.3	Safe
123	11.6	Standing	14.2	Standing	61.5	Safe
124	9.7	Sitting	11.3	Standing	46.2	Safe
125	13.2	Standing	15.4	Walking	60.3	Safe
126	14.1	Standing	16.8	Walking	62.3	Safe
127	14.7	Standing	17.5	Walking	67.9	Safe
128	11.6	Standing	13.1	Standing	58.5	Safe
129	9.9	Sitting	11.5	Standing	60.4	Safe
130	9.8	Sitting	11.1	Standing	52.7	Safe
131	9.3	Sitting	11.2	Standing	51.8	Safe
132	7.9	Sitting	10.8	Standing	55.0	Safe
133	8.4	Sitting	9.7	Sitting	36.6	Safe
134	8.3	Sitting	10.8	Standing	46.7	Safe
135	7.2	Sitting	8.2	Sitting	56.4	Safe
136	8.5	Sitting	10.1	Standing	43.3	Safe
137	9.6	Sitting	11.5	Standing	47.1	Safe
138	8.2	Sitting	10.2	Standing	34.3	Safe
139	9.4	Sitting	12.4	Standing	61.9	Safe







APPENDIX F

WIND TUNNEL SIMULATION OF THE NATURAL WIND

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WIND TUNNEL SIMULATION OF THE NATURAL WIND

Wind flowing over the surface of the earth develops a boundary layer due to the drag produced by surface features such as vegetation and man-made structures. Within this boundary layer, the mean wind speed varies from zero at the surface to the gradient wind speed at the top of the layer. The height of the top of the boundary layer is referred to as the gradient height, above which the velocity remains more-or-less constant for a given synoptic weather system. The mean wind speed is taken to be the average value over one hour. Superimposed on the mean wind speed are fluctuating (or turbulent) components in the longitudinal (i.e. along wind), vertical and lateral directions. Although turbulence varies according to the roughness of the surface, the turbulence level generally increases from nearly zero (smooth flow) at gradient height to maximum values near the ground. While for a calm ocean the maximum could be 20%, the maximum for a very rough surface such as the center of a city could be 100%, or equal to the local mean wind speed. The height of the boundary layer varies in time and over different terrain roughness within the range of 400 metres (m) to 600 m.

Simulating real wind behaviour in a wind tunnel requires simulating the variation of mean wind speed with height, simulating the turbulence intensity, and matching the typical length scales of turbulence. It is the ratio between wind tunnel turbulence length scales and turbulence scales in the atmosphere that determines the geometric scales that models can assume in a wind tunnel. Hence, when a 1:200 scale model is quoted, this implies that the turbulence scales in the wind tunnel and the atmosphere have the same ratios. Some flexibility in this requirement has been shown to produce reasonable wind tunnel predictions compared to full scale. In model scale the mean and turbulence characteristics of the wind are obtained with the use of spires at one end of the tunnel and roughness elements along the floor of the tunnel. The fan is located at the model end and wind is pulled over the spires, roughness elements and model. It has been found that, to a good approximation, the mean wind profile can be represented by a power law relation, shown below, giving height above ground versus wind speed.

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

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.

Figure F1 on the following page plots three velocity profiles for open country, and suburban and urban exposures.

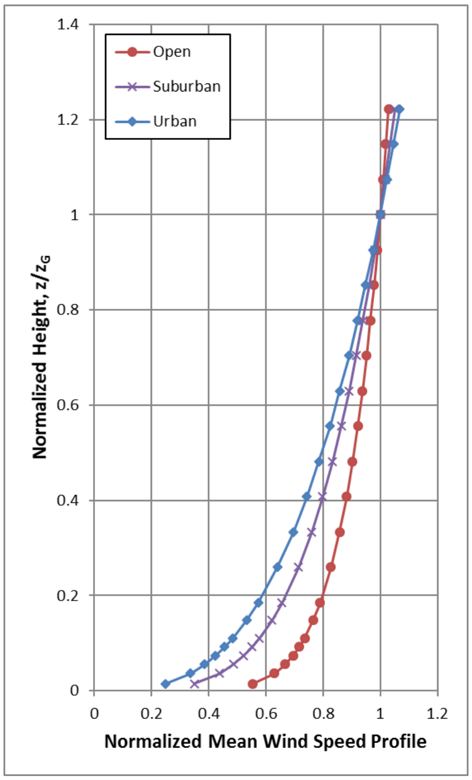
The exponent α varies according to the type of upwind terrain; α ranges from 0.14 for open country to 0.33 for an urban exposure. Figure F2 illustrates the theoretical variation of turbulence for open country, suburban and urban exposures.

The integral length scale of turbulence can be thought of as an average size of gust in the atmosphere. Although it varies with height and ground roughness, it has been found to generally be in the range of 100 m to 200 m in the upper half of the boundary layer. Thus, for a 1:300 scale, the model value should be between 1/3 and 2/3 of a metre. Integral length scales are derived from power spectra, which describe the energy content of wind as a function of frequency. There are several ways of determining integral length scales of turbulence. One way is by comparison of a measured power spectrum in model scale to a non-dimensional theoretical spectrum such as the Davenport spectrum of longitudinal turbulence. Using the Davenport spectrum, which agrees well with full-scale spectra, one can estimate the integral scale by plotting the theoretical spectrum with varying L until it matches as closely as possible the measured spectrum:

$$f \times S(f) = \frac{\dfrac{4(Lf)^2}{U_{10}{}^2}}{\left[1 + \dfrac{4(Lf)^2}{U_{10}{}^2}\right]^{\frac{4}{3}}}$$

Where, f is frequency, S(f) is the spectrum value at frequency f, U10 is the wind speed 10 m above ground level, and L is the characteristic length of turbulence.

Once the wind simulation is correct, the model, constructed to a suitable scale, is installed at the center of the working section of the wind tunnel. Different wind directions are represented by rotating the model to align with the wind tunnel center-line axis.



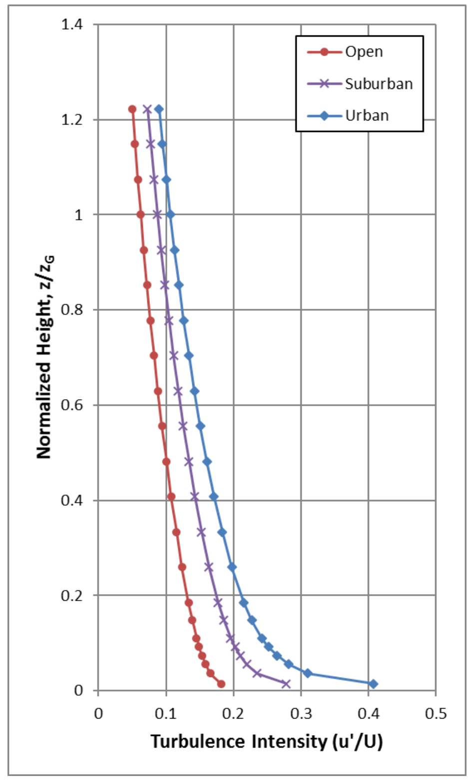


FIGURE F1 (LEFT): MEAN WIND SPEED PROFILES;
FIGURE F2 (RIGHT): TURBULENCE INTENSITY PROFILES

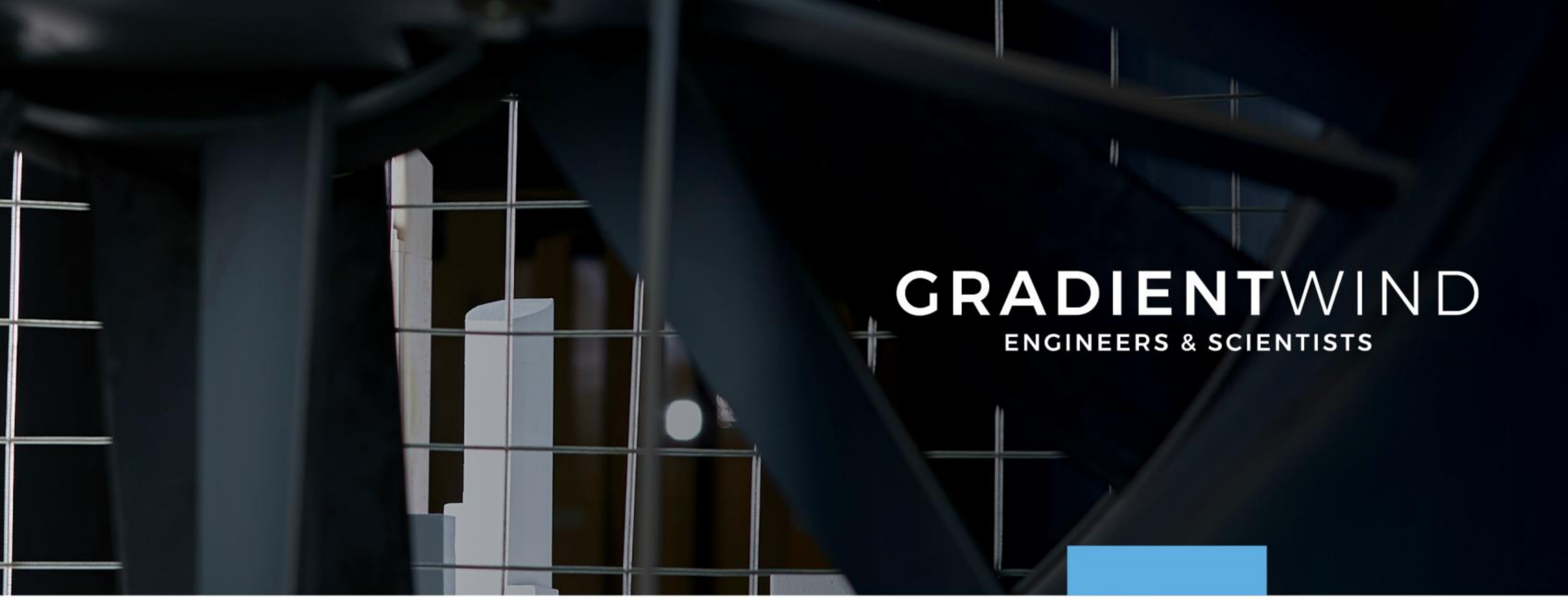
REFERENCES

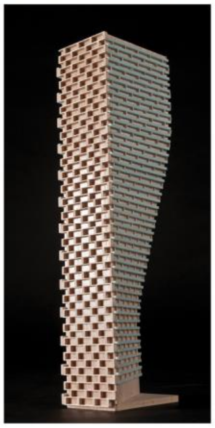
1. Teunissen, H.W., 'Characteristics of The Mean Wind And Turbulence In The Planetary Boundary Layer', Institute For Aerospace Studies, University Of Toronto, UTIAS # 32, Oct. 1970

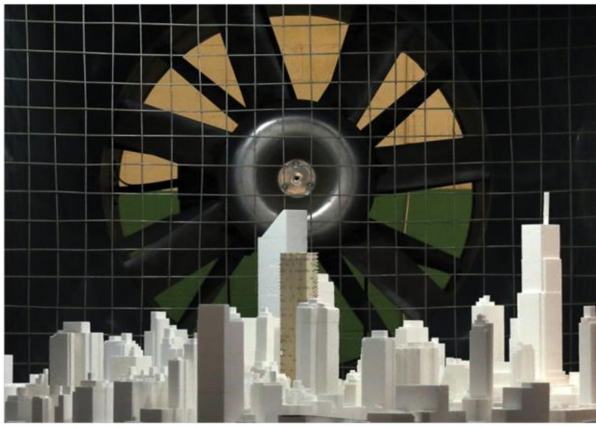
2. Flay, R.G., Stevenson, D.C., 'Integral Length Scales in an Atmospheric Boundary Layer Near The Ground', 9th Australian Fluid Mechanics Conference, Auckland, Dec. 1966

3. ESDU, 'Characteristics of Atmospheric Turbulence Near the Ground', 74030

4. Bradley, E.F., Coppin, P.A., Katen, P.C., '*Turbulent Wind Structure Above Very Rugged Terrain*', 9th Australian Fluid Mechanics Conference, Auckland, Dec. 1966







APPENDIX G

PEDESTRIAN LEVEL WIND MEASUREMENT METHODOLOGY

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PEDESTRIAN LEVEL WIND MEASUREMENT METHODOLOGY

Pedestrian level wind studies are performed in a wind tunnel on a physical model of the study buildings at a suitable scale. Instantaneous wind speed measurements are recorded at a model height corresponding to 1.5 m full scale using either a hot wire anemometer or a pressure-based transducer. Measurements are performed at any number of locations on the model and usually for 36 wind directions. For each wind direction, the roughness of the upwind terrain is matched in the wind tunnel to generate the correct mean and turbulent wind profiles approaching the model.

The hot wire anemometer is an instrument consisting of a thin metallic wire conducting an electric current. It is an omni-directional device equally sensitive to wind approaching from any direction in the horizontal plane. By compensating for the cooling effect of wind flowing over the wire, the associated electronics produce an analog voltage signal that can be calibrated against velocity of the air stream. For all measurements, the wire is oriented vertically so as to be sensitive to wind approaching from all directions in a horizontal plane.

The pressure sensor is a small cylindrical device that measures instantaneous pressure differences over a small area. The sensor is connected via tubing to a transducer that translates the pressure to a voltage signal that is recorded by computer. With appropriately designed tubing, the sensor is sensitive to a suitable range of fluctuating velocities.

For a given wind direction and location on the model, a time history of the wind speed is recorded for a period of time equal to one hour in full-scale. The analog signal produced by the hot wire or pressure sensor is digitized at a rate of 400 samples per second. A sample recording for several seconds is illustrated in Figure G1. This data is analyzed to extract the mean, root-mean-square (rms) and the peak of the signal. The peak value, or gust wind speed, is formed by averaging a number of peaks obtained from sub-intervals of the sampling period. The mean and gust speeds are then normalized by the wind tunnel gradient wind speed, which is the speed at the top of the model boundary layer, to obtain mean and gust ratios. At each location, the measurements are repeated for 36 wind directions to produce normalized polar plots, which will be provided upon request.

In order to determine the duration of various wind speeds at full scale for a given measurement location the gust ratios are combined with a statistical (mathematical) model of the wind climate for the project site. This mathematical model is based on hourly wind data obtained from one or more meteorological stations (usually airports) close to the project location. The probability model used to represent the data is the Weibull distribution expressed as:

$$P\left(>U_g\right) = A_\theta \bullet \exp\left[\left(-\frac{U_g}{C_\theta}\right)^{K_\theta}\right]$$

Where,

P (> U_g) is the probability, fraction of time, that the gradient wind speed ***U_g*** is exceeded; ***θ*** is the wind direction measured clockwise from true north, ***A***, ***C***, ***K*** are the Weibull coefficients, (Units: A - dimensionless, C - wind speed units [km/h] for instance, K - dimensionless). ***A_θ*** is the fraction of time wind blows from a 10° sector centered on ***θ***.

Analysis of the hourly wind data recorded for a length of time, on the order of 10 to 30 years, yields the ***A_θ, C_θ*** and ***K_θ*** values. The probability of exceeding a chosen wind speed level, say 20 km/h, at sensor *N* is given by the following expression:

$$P_N(>20) = \Sigma_\theta P\left[\frac{(>20)}{\left(\frac{U_N}{U_g}\right)}\right]$$

$$P_N(>20) = \Sigma_\theta P\{>20/(U_N/U_g)\}$$

Where, ***U_N/U_g*** is the gust velocity ratios, where the summation is taken over all 36 wind directions at 10° intervals.

If there are significant seasonal variations in the weather data, as determined by inspection of the C_θ and K_θ values, then the analysis is performed separately for two or more times corresponding to the groupings of seasonal wind data. Wind speed levels of interest for predicting pedestrian comfort are based on the comfort guidelines chosen to represent various pedestrian activity levels as discussed in the main text.

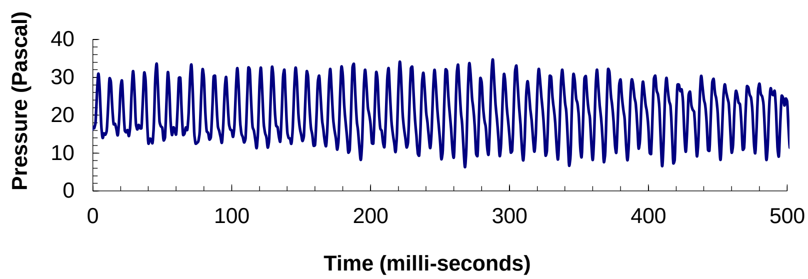

FIGURE G1: TIME VERSUS VELOCITY TRACE FOR A TYPICAL WIND SENSOR

REFERENCES

1. Davenport, A.G., '*The Dependence of Wind Loading on Meteorological Parameters*', Proc. of Int. Res. Seminar, Wind Effects on Buildings & Structures, NRC, Ottawa, 1967, University of Toronto Press.

2. Wu, S., Bose, N., 'An *Extended Power Law Model for the Calibration of Hot-wire/Hot-film Constant Temperature Probes*', Int. J. of Heat Mass Transfer, Vol.17, No.3, pp.437-442, Pergamon Press.