November 13, 2014

Peter Swinton, B.Arch., MCIP, RPP
PMG Planning Consultants
227 Bridgeland Avenue
Toronto, Ontario
M6A 1Y7

Dear Mr. Swinton:

Re: Qualitative Pedestrian Wind Assessment
2313 & 2323 Lake Shore Blvd. W, Etobicoke
GWE File: 12-099-DTPLW-2014

1. INTRODUCTION

Gradient Wind Engineering Inc. (GWE) was retained by PMG Planning Consultants, on behalf of Osgoode Properties Ltd., to undertake a qualitative pedestrian wind assessment, and a shadow impact study, for rezoning approval of a planned residential development located at 2313 and 2323 Lake Shore Boulevard West in Etobicoke, Ontario. The study is based on architectural drawings provided by Richmond Architects Ltd. in October of 2014, landscape drawings provided by Aboud & Associates Inc. in November of 2014, a review of existing surrounding context and recently approved developments, statistical knowledge of the Greater Toronto Area (GTA) wind climate, and experience with similar past projects in the GTA.

Qualitative assessments, as compared to more elaborate wind tunnel or computational studies, serve to determine the suitability of anticipated wind conditions within various pedestrian areas, and to provide useful recommendations for mitigation that can be introduced early in the design process.

2. TERMS OF REFERENCE

The focus of this qualitative wind assessment is a proposed twenty-five (25) storey residential development located at 2313 and 2323 Lake Shore Boulevard West in Etobicoke, Ontario. The development is situated on the west bank of Lake Ontario and Humber River Bay, and immediately east of two (2) existing ten (10) storey apartment buildings with the same civic addresses. Additionally, the Humber Bay Park East Trail, which continues as the Martin Goodman Trail at the Humber River crossing, borders the proposed site to the east. Lake Shore Boulevard West is located approximately 115 meters (m) to the west.

The development comprises a twenty (20) storey rectangular building rising above a nearly rectangular five (5) storey podium having its long axis aligned parallel with Lake Shore Boulevard West; the residential building rises to a maximum height of 84.6 m above grade to the top of the mechanical penthouse. The ground floor is served by two (2) main residential entrance vestibules, on each of the east and west façades, a central lobby and elevator core, and individual suites covering the north and south façades. Access to three (3) levels of below-grade parking is provided at the southwest corner of the development, with a dedicated loading area at the northwest corner. The podium roof on the 6th floor provides a large landscaped terrace, parts of which are intended for occupant use. In addition, a raised pedestrian walkway and stair extends from the west façade on the 3rd floor to a large landscaped area at grade that extends between the two existing 10-storey apartment buildings on the west side.

Regarding wind exposure, local surroundings include a moderate-density mixture of mostly shorter residential, commercial and institutional buildings on the western half of the site, and the open waters of Lake Ontario creating the eastern exposure. As such, the site creates generally suburban exposures from the west half, and open exposures from the east half of the site, as defined in the National Building Code of Canada (NBC 2010). Figure 1 illustrates an overall context plan including surrounding buildings. Figure 2 illustrates the study site itself and letter tags for discussion reference in later paragraphs of this report.

Note: The foregoing assessment considers all existing buildings, and approved future developments (if applicable). Additionally, the City of Toronto revitalization initiative for the *Mimico-By-The-Lake community*[1] is addressed in Section 4.

3. METHODOLOGY

The following section describes the analysis process, including a background discussion of pedestrian comfort. The essential aspects of a qualitative pedestrian wind analysis include: (i) consideration of the statistical properties of the local wind climate; (ii) consideration of the massing of the site (i.e., the shape, height and orientation of the buildings); and (iii) evaluation of anticipated pedestrian comfort measured against industry standard guidelines based on in-house experience.

3.1 Greater Toronto Area Wind Climate

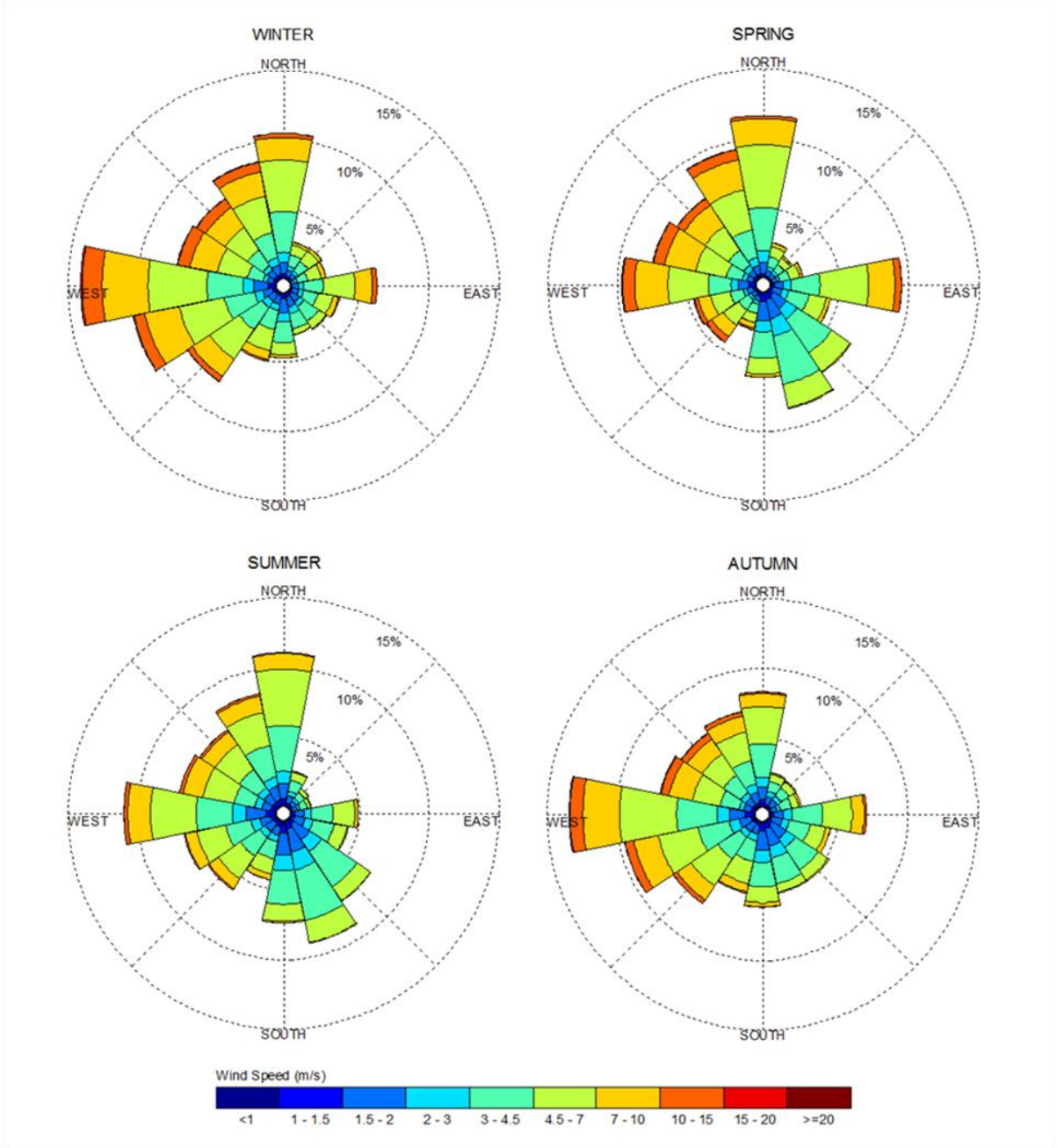
The statistical model of the GTA wind climate, which indicates the directional character of local winds on a seasonal basis, is illustrated on the following page. The plots illustrate seasonal distribution of measured wind speeds and directions in meters per second. Probabilities of occurrence of different 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 a 40-year measurement period. The preferred wind speeds and directions can be identified by the longer length of the bars. For the GTA, the most common winds occur for westerly wind directions, followed by those from the east, while the most common wind speeds are below 10 meters per second (m/s).

The directional preference and relative magnitude of wind speed changes somewhat from season to season. Also, by convention in microclimate studies, wind direction refers to the wind origin (e.g., a north wind blows from north to south).

[1] City of Toronto. "Mimico 20/20: A Revitalization Action Plan." Etobicoke York District, February 2013. http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=5a960621f3161410VgnVCM10000071d60f89RCRD&vgnextchannel=82e352cc66061410VgnVCM10000071d60f89RCRD [Last Accessed: 13 November 2014].

SEASONAL DISTRIBUTION OF WINDS FOR VARIOUS PROBABILITIES

PEARSON INTERNATIONAL AIRPORT, TORONTO



NOTES:

1. Radial distances indicate percentage of time of wind events.
2. Wind speeds represent mean hourly wind speeds measured at 10 metres above the ground.

3.2 Pedestrian Wind Comfort Guidelines

The pedestrian comfort guidelines used by GWE, which parallel industry standards, are based on the correlation between a variety of pedestrian activity types, and acceptable wind speed ranges for those activities. More specifically:

(i) Wind conditions are considered to be comfortable for *sitting* when gust wind speeds less than or equal to 14 kilometers per hour (km/h) occur at least 70% of the time.

(ii) Wind conditions are considered to be comfortable for *standing* when gust wind speeds less than or equal to 22 km/h occur at least 80% of the time.

(iii) Wind conditions are considered to be comfortable for *walking* when gust wind speeds less than or equal to 30 km/h occur at least 80% of the time.

GWE's guidelines are based on gust wind speeds since people are most sensitive to wind gusts rather than to constant wind speeds, and are applied according to the intended use of the outdoor area. For example, an entrance not served by a vestibule should be suitable for standing but need not be suitable for sitting, while a public sidewalk need only be suitable for walking in most circumstances.

3.3 Consideration of Massing and Climate

The physical features of a site that influence the local wind microclimate include: the density of surrounding buildings, the massing of the study site, and the geometry of the study building(s). Of particular importance for microclimate studies, massing density typically increases over time, which can provide greater shielding to wind and calmer wind conditions at grade.

For the study site, pedestrian comfort will primarily be influenced by winds originating from the southwest clockwise through to northwest, as well as from the east. Although the remaining wind directions have a lower statistical frequency of occurrence, strong wind flows associated with multiple low probability wind directions can cumulatively influence pedestrian comfort. Based on the orientation of the development relative to prominent wind directions, exposure to Lake Ontario, the form of the study building, and in-house knowledge of common wind impacts, overall wind conditions at grade are expected to be moderately windy but acceptable at all building access points. Specific wind conditions for the study site are discussed in the following section.

4. ANTICIPATED PEDESTRIAN COMFORT

Based on the massing of the study site, surrounding building massing, and the orientation of the project to the local wind climate, the following statements summarize our experience of how these conditions affect pedestrian comfort in key areas.

Landscaped Area between Existing Apartment Buildings (Figure 2, Tag A): This area will generally be protected by the two existing buildings and the study building for most wind directions, except for a narrow range of southwest and west winds. As a result, pedestrians using the elevated walkway and landing area around the base of the stairs will experience wind conditions suitable for standing during the three warmer seasons, and suitable for walking during the winter. Wind conditions over the west half of the area, between the two existing buildings, will be suitable for sitting during the summer, standing during the spring and autumn, and suitable for walking during the winter. These conditions represent an improvement over existing conditions between these buildings, due to additional protection provided by the new development for easterly winds. **As such, the landscaped area around the base of the stairs is considered to provide acceptable pedestrian wind comfort, which will likely be improved over existing conditions.**

West Side of Development (Figure 2, Tag B): The laneway and pedestrian walkway areas between the proposed development and existing apartment buildings are generally protected for many wind directions by existing and proposed buildings, but have some exposure to winds from the south, west, and northeast. In addition, downwash from the proposed building for westerly winds is expected to be minimal. **As a result, pedestrian wind comfort over the laneway is expected to be suitable for standing during the three warmer seasons, and suitable for walking during the winter; conditions which are acceptable for the intended uses of the area.**

West Elevation Access Points (Figure 2, Tag C): Building access points along the west façade include a main residential vestibule, five corridor exits, access to two visitor bicycle parking areas, building corridor access, a loading area, and vehicular access to below-grade parking. Although the west façade is exposed to some statistically prominent wind directions, the set back of the 25-storey building on its 5-storey podium will reduce wind channeling and downwash off the tower to create acceptable conditions. More specifically, pedestrian comfort during the summer months is expected to be suitable for sitting over the north half of the west elevation, and suitable for standing or sitting over the south half. The majority of the west elevation will be suitable for standing during the autumn, and suitable for walking during the colder winter and spring seasons. The principle entrance on the west elevation will be suitable for standing, or better, throughout the year. **The noted wind conditions along the west elevation of the development are considered acceptable for all of the building access points, including the main residential vestibule.**

South Side of Development (Figure 2, Tag D): The south side of the proposed development experiences prominent east winds approaching over Lake Ontario, as well as south winds approaching over the shoreline. Although the set back of the tall building from its podium will be beneficial to prevent wind downwash, moderately strong winds are expected to occur over the south side of the development, particularly during the autumn and winter months. More specifically, wind conditions within the south side of the development are expected to be suitable for standing during the summer months, and suitable for walking throughout the remainder of the year. Since building access points are not planned to serve the south façade, the area is considered a pedestrian walkway for the purpose of this assessment. **As a result, the noted wind conditions within the south side of the development are considered acceptable without mitigation.**

East Elevation, Central Area (Figure 2, Tag E): The central area of the east elevation, including the main entrance and private suite access, will be exposed to direct east winds coming off Lake Ontario, but will be protected from wind downwash by the podium, and most all other wind directions by the massing of the study building itself. Pedestrian wind comfort over the central area of this elevation is expected to be suitable for standing during the summer and autumn, and suitable for walking during the colder spring and winter seasons. **These conditions are considered appropriate for the intended uses of the area.**

Pedestrian comfort along the Humber Bay Park East Trail / Martin Goodman Trail, further removed from the east elevation of the building (not illustrated in Figures 1 and 2), will be somewhat windier but remain suitable for standing during the summer, and suitable for walking during the three colder months. **As such, the noted conditions over the main building access areas, and along the public trail, are considered acceptable and suitable for the intended uses of the spaces. Furthermore, the proposed development is expected to have a largely neutral impact on the Humber Bay Park East / Martin Goodman Trail.**

East Elevation, Northeast and Southeast Corners (Figure 2, Tag F): Wind speeds around the northeast and southeast corners of the podium will likely be stronger due to the partial loss of overhang protection, and the natural tendency for winds to downwash off the podium and flow around the corners close to grade level. As a result, frequent easterly winds, together with infrequent southeast and northeast winds, will combine to create wind conditions at the north and south ends of the east elevation that are suitable for walking over the three warmer seasons. Although there is some concern that the winter months may be uncomfortable around these corners, adequate mitigation to achieve the walking condition, or better, could be realized with a dense arrangement of coniferous plantings, as schematically illustrated in the upper half of Figure 2. **With mitigation as described, wind comfort is considered to be acceptable for pedestrian access over the noted areas.**

North Side of Development (Figure 2, Tag G): The north side of the development includes three private patios and access to pathways. Due to the exposure of the area to prominent winds from the northwest clockwise through to east, conditions are expected to be windy immediately outside the patio areas, and therefore suitable for walking throughout the year. Since the windy conditions may intrude into the patio areas, particularly for the patio at the northwest corner, mitigation is considered mandatory to provide comfortable conditions. Downwash from the main tower is eliminated as a concern due to the podium extension and tower setback. Regarding mitigation, it will be necessary to introduce a cluster of coniferous plantings (minimum height of 2.4 m) at the northwest corner of the podium, similar to the plan illustrated in the landscape schedule (Aboud & Associates, Figure L2, dated February, 2014). **With the noted mitigation in place, conditions will be suitable for sitting in the patio areas during the three warmer seasons, and suitable for standing, or better, along the adjacent green space and pathway throughout the year.**

Terrace on Podium Roof (Figure 1, Tag H, I and J): The landscape plan for the podium roof, which coincides with the development's 6th floor, includes private terrace areas for individual units immediately adjacent to the north, west, and south sides of the tower portion. Additionally, a large common amenity space is situated on the east side of the roof, including dedicated seating areas within the southeast and northeast corners. Wind conditions over the roof are expected to vary considerably from moderately windy to very windy. These conditions are anticipated due to area exposures to many prominent wind directions and downwash from the tower portion above the podium.

The calmest area is likely to occur at the base of the west elevation, identified by Tag 'H' in Figure 2. Conditions over this area are expected to be suitable for standing during the summer and autumn, and suitable for walking during the spring and winter. Wind comfort over most other terrace areas, identified by Tag 'I', is likely to be suitable for standing during the summer, and suitable for walking for the remainder of the year.

Without consideration of mitigation, inclusive of landscaping, the strongest winds and least comfortable areas are likely to be at the southeast corner of the podium, identified by Tag 'J'. Significant mitigation would be required to achieve sitting conditions, and to improve conditions to standing, as required, over the remainder of the podium roof terrace. Mitigation could take the form

of perimeter wind barriers, solid canopies, and clusters of dense plantings, or a combination of these elements. **With mitigation in place, conditions over selected terrace areas can be made comfortable for the intended purposes. More specifically, effective mitigation would be based on a detailed wind study and coordination with the landscape architect. Furthermore, given the podium roof plan illustrated in the landscape schedule (Aboud & Associates, Figure L3, dated February, 2014), the anticipated wind conditions would not require the relocation of the planned amenity and patio spaces. Additionally, specific landscape elements to ensure adequate wind comfort could be designed at the time of Site Plan Approval.**

Existing vs Future Wind Conditions: The introduction of the proposed development is not expected to significantly influence existing grade-level wind conditions beyond the study site boundaries. Although modest changes to wind speeds may occur beyond the site property, pedestrian comfort over areas outside the immediate influence of the study site is expected to remain similar to existing conditions. The area between the existing 10-storey buildings at the base of the stairway on the east side is likely to experience calmer winds as compared to existing conditions.

Regarding future influences on the proposed development, the City of Toronto revitalization initiative for the *Mimico-By-The-Lake community*, as referenced in Section 2 of this report, is not expected to significantly impact, either positively or negatively, the subject areas. More specifically, the development of the additional massing to the west, as illustrated in Precincts C through F in Section 4 of the Mimico 20/20 report (Figure 6), will not significantly alter westerly flows to change the discussion and conclusions of this assessment.

Within the context of typical weather patterns, excluding anomalous local storm events, such as thunderstorms, tornadoes and downbursts, dangerous or consistently strong wind conditions are not expected anywhere over the subject site on an annual basis. Of particular interest, no areas over the study site at grade are likely to experience conditions that would be considered unsafe for elderly persons or consistently troublesome.

5. SUMMARY AND RECOMMENDATIONS

Based on the qualitative review of the study building massing, existing context, and wind statistics for the GTA, wind conditions over most grade level areas, including main building access points, are expected to be suitable for the intended uses throughout the year without mitigation. However, given the location and exposure of the site to Lake Ontario, a few areas are expected to be windy for the intended uses and would therefore justify mitigation to create comfortable conditions. These areas include: (i) the patio and surrounding areas on the north side of the building; (ii) the area at the northeast corner of the building; and (iii) the similar area around the southeast corner of the building, as illustrated in the top half of Figure 2.

Regarding the amenity terrace on the podium roof, wind conditions are expected to be generally windy and not suitable for sitting and similar sedentary activities due to the exposure of the site and downwash winds from the tower portion. However, with mitigation, conditions over selected terrace areas can be made comfortable for the intended purposes. More specifically, effective mitigation would be based on a detailed wind study and coordination with the landscape architect. Furthermore, given the podium roof plan illustrated in the landscape schedule (Aboud & Associates, Figure L3, dated February, 2014), the anticipated wind conditions would not require the relocation of the planned amenity and patio spaces. Additionally, specific landscape elements to ensure adequate wind comfort could be designed at the time of Site Plan Approval.

The foregoing analysis and statements are based on experience and knowledge of wind flow patterns in suburban and open settings. Hence, this assessment is intended to assure adequate pedestrian safety relating to wind while providing general guidance relating to pedestrian comfort around the subject site.

This concludes our qualitative pedestrian level wind assessment and report. Please advise the undersigned of questions or concerns.

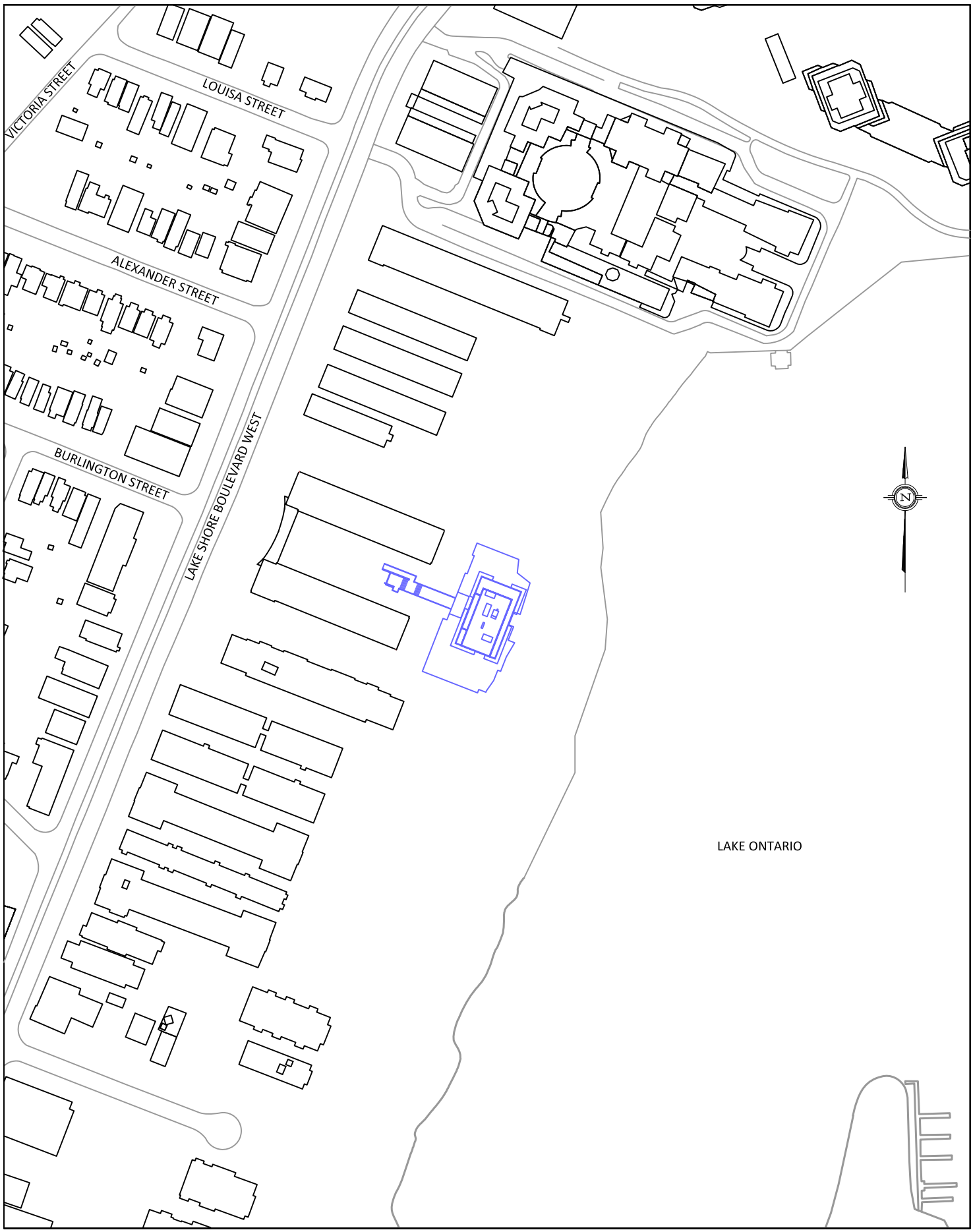
Sincerely,

Gradient Wind Engineering Inc.

Justin Ferraro, B.Eng., EIT
Project Manager

Vincent Ferraro, M.Eng., P.Eng.
Principal

GWE12-099-DTPLW-2014



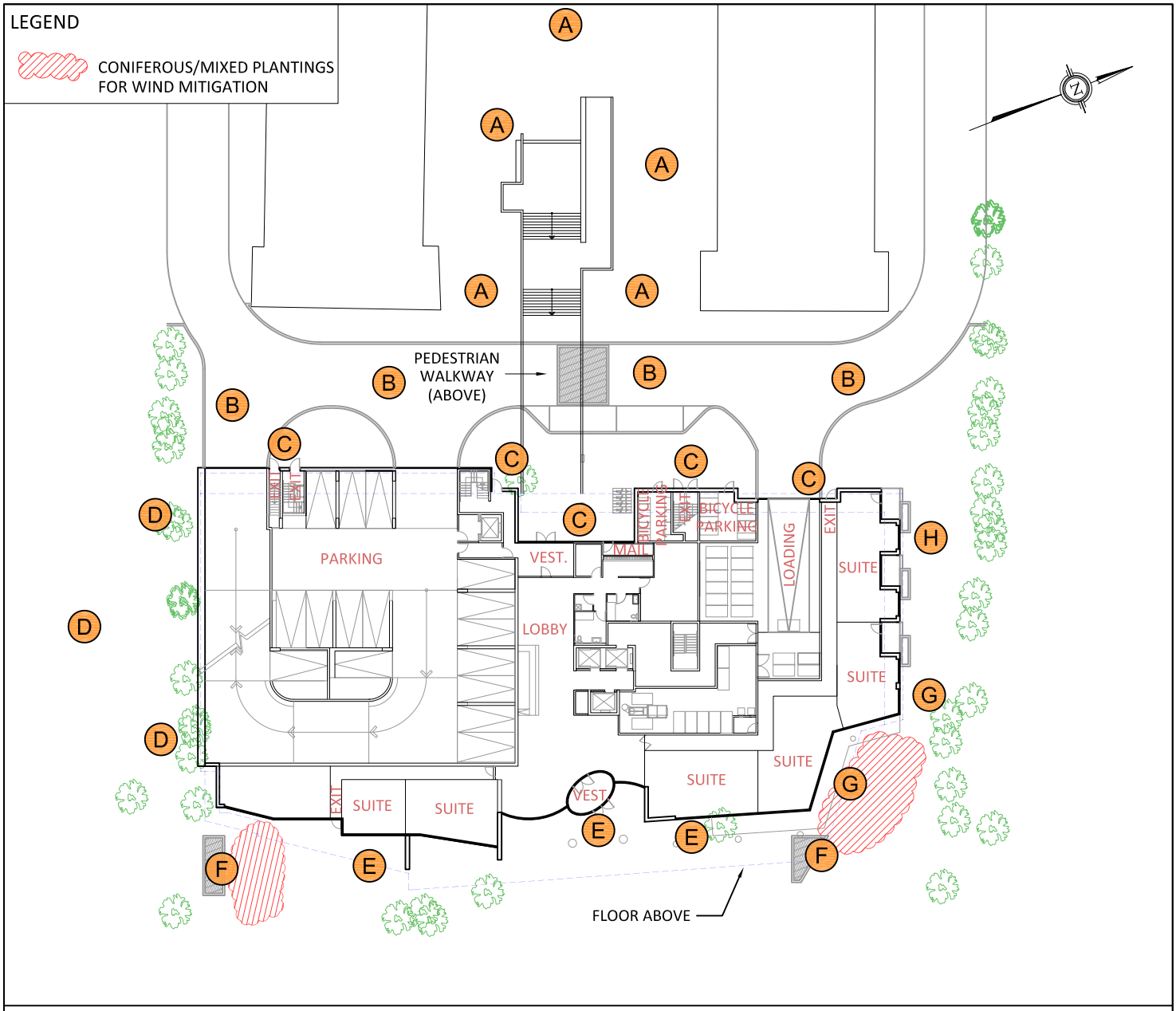
127 Walgreen Road
Ottawa, Ontario
(613) 836 0934

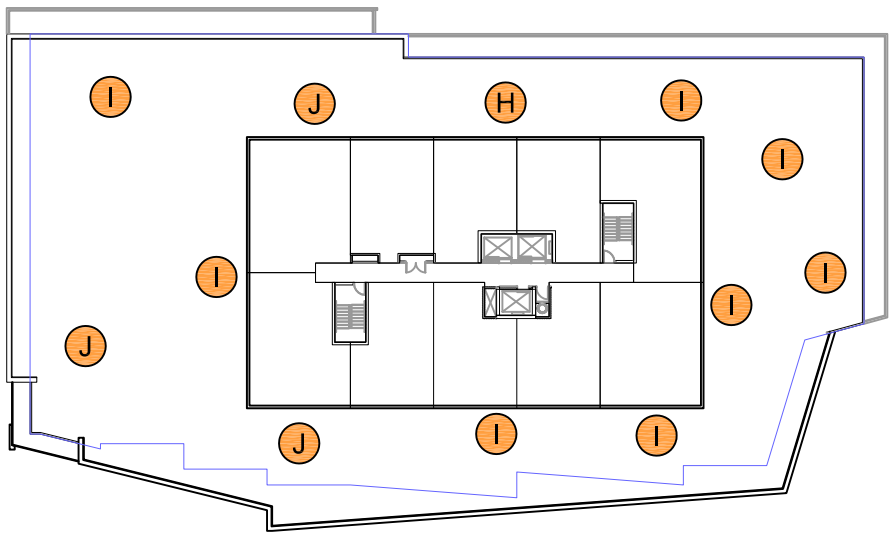
GRADIENT WIND ENGINEERING INC

PROJECT	2313-2323 LAKE SHORE BOULEVARD WEST, ETOBICOKE QUALITATIVE PEDESTRIAN LEVEL WIND ASSESSMENT
SCALE	1:2500 (APPROX.)
DRAWING NO.	GWE12-099-DTPLW-2014-1
DATE	NOVEMBER 13, 2014
DRAWN BY	K.A.

DESCRIPTION

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT





6TH FLOOR AMENITY TERRACE

127 Walgreen Road
Ottawa, Ontario
(613) 836 0934
GRADIENT WIND ENGINEERING INC

PROJECT	2313-2323 LAKE SHORE BOULEVARD WEST, ETOBICOKE QUALITATIVE PEDESTRIAN LEVEL WIND ASSESSMENT
SCALE	1:600 (APPROX.)
DRAWING NO.	GWE12-099-DTPLW-2014-2
DATE	NOVEMBER 13, 2014
DRAWN BY	K.A.

DESCRIPTION

FIGURE 2:
GROUND FLOOR AND
6TH FLOOR AMENITY TERRACE
WITH REFERENCE TAGS