February 13, 2020

Yuen Lee
Capital Projects Manager, Construction Project Management
Real Property Asset Management
Corporate Services, Region of Peel
10 Peel Centre Drive, Suite B
Brampton, ON
L6T 4B9

Dear Mr. Lee:

Re: Qualitative Pedestrian Level Wind Assessment
Peel Living – 958 and 960 East Avenue,
Mississauga, Ontario
GWE File No.: 19-226-DTPLW

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Peel Housing Corporation to undertake a qualitative pedestrian level wind assessment for the proposed residential development located at 958 and 960 East Avenue in Mississauga, Ontario. This report provides a qualitative assessment of pedestrian level wind comfort for the noted site based on drawings prepared by RAW Design and received in February 2020, consideration of existing and approved future surrounding buildings, statistical knowledge of the Mississauga wind climate, and experience with similar projects in Mississauga.

In the early stages of design development, a qualitative wind assessment is useful to identify any significant massing features or design elements which may adversely impact pedestrian activities within the study area, and to provide initial recommendations for mitigation strategies, as may be required.

1. TERMS OF REFERENCE

The focus of this qualitative pedestrian wind assessment is the proposed residential development located at 958 and 960 East Avenue. The study site is situated to the southwest of the intersection of Lakeshore Road East and East Avenue in Mississauga, Ontario, approximately 500 metres northwest of Lake Ontario.

The proposed development is a 7-storey residential building with an ‘L-shaped’ planform. Loading space and access to one level of underground parking is provided along the south elevation of the building, while

surface parking and outdoor amenity space will be situated to the west of the building. At grade, the main lobby and residential units with private patios front East Avenue along the east elevation, while additional residential units are along the south elevation and indoor amenity spaces front Lakeshore Road East along the north elevation. The remaining floors comprise residential occupancy.

Regarding wind exposures, the near-field surroundings of the development (defined as an area falling within a 200-metre radius of the site) are characterized by the open exposure of Waterworks Park to the southeast, and a mixture of low-rise residential and commercial buildings in the remaining directions. The far-field surroundings (defined as the area beyond the near field and within a two-kilometer radius), are classified as low-rise suburban and commercial buildings from the southwest rotating clockwise to the northeast, and a mixture of low-rise massing and the open exposure of Lake Ontario in the remaining compass azimuth.

The ground floor plan is illustrated in Figure 1 (following the main text), with letter tags identifying wind sensitive pedestrian locations considered in this assessment.

2. METHODOLOGY

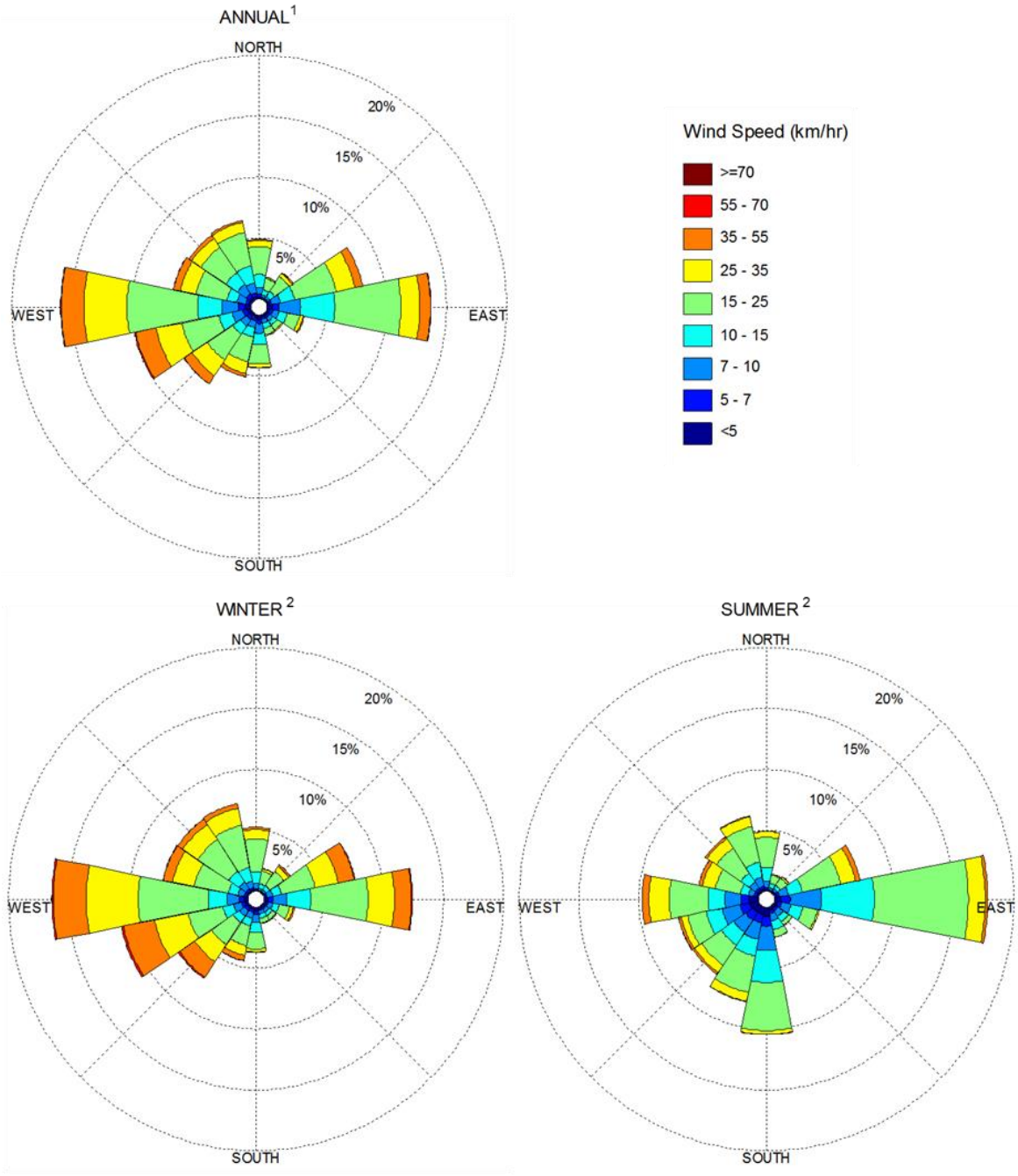
The main aspects of a qualitative pedestrian level wind assessment include (i) consideration of the statistical properties of the local wind climate; (ii) knowledge of wind flow behaviour in typical urban and suburban environments; and (iii) an understanding of how common wind conditions relate to typical pedestrian activity types.

2.1 Mississauga Wind Climate

A statistical model for winds in Mississauga was developed from approximately 35-years of hourly meteorological wind data recorded at Toronto Island Billy Bishop Airport. Wind speed and direction data were analyzed during the appropriate hours of pedestrian usage (i.e., between 06:00 and 23:00) and divided into two distinct seasons, as stipulated in the noted City of Mississauga Urban Design Terms of Reference – Pedestrian Wind Comfort and Safety Studies. More specifically, the summer season is defined as May through October, while the winter season is defined as November through April, inclusive.

The statistical model of the Mississauga area wind climate, which indicates the directional character of local winds on a seasonal basis, is illustrated on the following page. The plots illustrate seasonal distribution of measured wind speeds and directions in kilometers per hour (km/h). Probabilities of occurrence of different wind speeds are represented as stacked polar bars in sixteen azimuth divisions. The radial direction represents the percentage of time for various wind speed ranges per wind direction during the measurement period. The preferred wind speeds and directions can be identified by the longer length of the bars. For Mississauga (south of the Queen Elizabeth Way), the most common winds concerning pedestrian comfort during the winter season occur for westerly wind directions, followed by those from the east. The most common winds during the summer season occur for easterly wind directions. The directional preference and relative magnitude of the wind speed varies somewhat from season to season. Also, by convection in microclimate studies, wind direction refers to the wind origin (e.g., a north wind blows from north to south).

SEASONAL DISTRIBUTION OF WINDS FOR VARIOUS PROBABILITIES
TORONTO ISLAND BILLY BISHOP AIRPORT, TORONTO



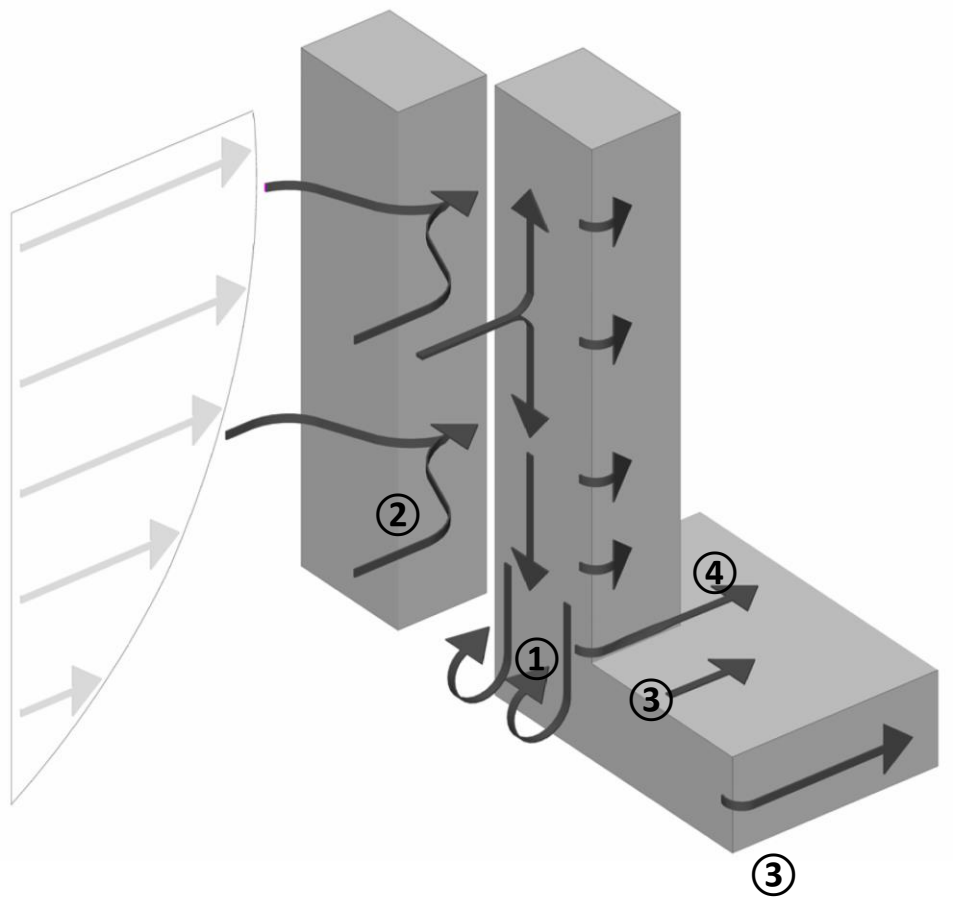
Notes:

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

2.2 Massing vs. Climate – Geometric Effects

The physical features of a development site that are most influential to the local wind conditions include the massing and relative spacing of surrounding buildings, the geometry and orientation of the study building, and the alignment of the study building with respect to statistically prominent wind directions.

Wind flow characteristics which combine to determine how conditions will develop include phenomena known as downwash, channelling coupled with acceleration, and shielding, as illustrated in the image below. Downwash ① relates to the effect of winds against a tall building, whereby much of the impinging flow on the windward side of the building, nominally below two-thirds of the total height, is directed to lower levels. Taller buildings with smooth façades and no podiums produce the strongest downwash effects at grade, while the presence of protruding balconies and a tower setback from the podium edge mitigates downwash effects at the ground level. Channelling ② refers to acceleration of wind through gaps between buildings, while acceleration of wind ③ occurs around building corners. Shielding ④ relates to calm zones on the leeward side of buildings, protected from prevailing winds.



2.3 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. Since both mean and gust wind speeds affect pedestrian comfort, their combined effect is defined in the City of Mississauga Urban Design Terms of Reference – Pedestrian Wind Comfort and Safety Studies. More specifically, the criteria are defined as a Gust Equivalent Mean (GEM) wind speed, which is the greater of the mean wind speed or the gust wind speed divided by 1.85.

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

- Wind conditions are comfortable for *sitting* when GEM wind speeds no greater than 10 km/h occur at least 80% of the time;
- Wind conditions are comfortable for *standing* when GEM wind speeds no greater than 15 km/h occur at least 80% of the time; and
- Wind conditions are comfortable for *walking* when GEM wind speeds no greater than 20 km/h occur at least 80% of the time.

These guidelines are based on GEM wind speeds and are applied to the intended use of an outdoor area. For example, an entrance to a building 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. ANTICIPATED PEDESTRIAN COMFORT

Based on consideration of the proposed residential development located at 958 and 960 East Avenue in Mississauga, surrounding building massing, and the relationship to the local wind climate, the following statements summarize our assessment of wind comfort at key pedestrian areas.

Sidewalk along Lakeshore Road East, inclusive of Transit Stop (Figure 1, Tags A and B): Although the Lakeshore Road East sidewalk (Tag A) is aligned with the prominent southwest wind direction, wind flow

along the sidewalk is not expected to be exacerbated by focusing effects, such as wind channeling, due to the low overall height of the study building and setback from the roadway corridor. Overall, conditions along the sidewalk are expected to be suitable for standing or better throughout the year. The nearby transit stop adjacent to the sidewalk to the southwest of the intersection of Lakeshore Road East and East Avenue (Tag B), is equipped with a three-walled transit shelter. The noted wind conditions are considered acceptable for public sidewalks and sheltered transit stops.

Walkway and Building Access Points along North Elevation (Figure 1, Tag C): The walkway and various retail and non-residential building access points along the north elevation will benefit from the added protection offered by the study building façade and setback from Lakeshore Road East. Overall, the areas are expected to be comfortable for sitting throughout the summer months, and for standing or better during the remaining seasonal periods, which is acceptable.

Sidewalk along East Avenue, inclusive of Private Patios and Building Access Points (Figure 1, Tag D): The public sidewalk along East Avenue, as well as the adjacent private patios and building access points, will be well-sheltered from salient westerly winds by the study building itself, and sheltered to a lesser extent from the less-prominent east and north quadrant winds by the surrounding low-rise massing. Overall, the area is expected to be comfortable for sitting during the summer months, and for standing or better throughout the rest of the year, which is considered appropriate for the intended uses of the spaces.

Area to South of Study SIte (Figure 1, Tag E): Areas to the south of the site will generally be sheltered from most prominent wind directions by the surrounding suburban massing, except for certain easterly winds approaching the site from Lake Ontario through Waterworks Park. Overall, this space is expected to be comfortable for standing or better through the summer months, becoming suitable for walking or better throughout the remaining colder months, which is appropriate.

Laneway, Loading Zone, and Building Access Points along South Elevation (Figure 1, Tags F & G): The vehicular laneway, loading area, and entrance to underground parking (Tag F), to the immediate south of the study building, will be well-sheltered from prominent north, east and west quadrant winds by the study building itself wrapping around the northwest and northeast sides of the space. These areas are expected to be suitable for sitting during the summer, and for standing or better during the remaining seasons, which is acceptable.

The adjacent building access points along the south and west elevations (Tag G) are further sheltered by the study building facades and are expected to be comfortable for sitting on a seasonal basis, without the need for mitigation.

Outdoor Amenity Space along West Elevation and Walkway along South Elevation (Figure 1, Tag H): The walkway along the south elevation will generally be sheltered from oncoming wind directions, and conditions are likely to be suitable for sitting during the warmer months. The area adjacent to the west elevation will be more exposed to dominant west quadrant winds approaching the site with limited upwind buffering. This area is expected to experience wind conditions suitable for standing or better throughout the summer months, becoming suitable for walking or better during the colder winter months. To ensure the west portion of the outdoor amenity space will be calm and suitable for sitting or more sedentary activities, it is recommended to install 1.8-metre-tall vertical wind barriers along the perimeter of the terrace to the west of the building. Such barriers may comprise raised planters with coniferous planting, high-solidity windscreens, or a combination thereof.

Surface Parking at West Side of Site (Figure 1, Tag I): Similar to the adjacent amenity space, the surface parking area to the west of the site will be exposed to west quadrant winds with limited upwind resistance and is expected to experience wind conditions suitable for standing or better throughout the summer, becoming suitable for walking or better during winter. The noted conditions are considered acceptable.

Influence of the Proposed Development on Existing Wind Conditions near the Study Site: The introduction of the proposed 958 and 960 East Avenue development is not expected to significantly influence pedestrian wind comfort over neighbouring areas. Nearby building entrances, sidewalks, laneways, parking areas, parks, and other pedestrian-sensitive areas beyond the development site are expected to continue to experience acceptable wind conditions.

Applicability of Predictions: The forgoing statements and conclusions apply to common weather systems, during which no dangerous or consistently strong wind conditions are expected anywhere over the study site. During such extreme weather events, (e.g. thunderstorms, tornadoes, and downbursts), pedestrian safety is the main concern. However, these events are generally short-lived and infrequent and there is often sufficient warning for pedestrians to take appropriate cover.

4. SUMMARY AND RECOMMENDATIONS

Based on a qualitative analysis of architectural drawings, surrounding building massing, and the Mississauga wind climate, the following general statements summarize our prediction of future wind conditions for the proposed residential development located at 958 and 960 East Avenue in Mississauga, Ontario.

1. Wind comfort at most grade-level pedestrian-sensitive locations across the full study site is expected to be suitable for the anticipated uses without mitigation. These grade-level areas include nearby sidewalks, parks, walkways, patios, parking spaces, laneways, transit stops, and building access points. Regarding the outdoor amenity area along the west elevation, mitigation is recommended as detailed in Section 5.2 to ensure calm conditions suitable for sitting or more sedentary activities.

2. The introduction of the proposed building is not expected to significantly influence pedestrian wind comfort at neighbouring areas beyond the development site. In particular, nearby building entrances, sidewalks, parks, parking areas, and other pedestrian-sensitive areas beyond the development site are expected to continue to experience wind conditions similar to those that presently exist without the proposed building in place.

Minor refinements to the building envelope are not anticipated to alter the expected wind conditions or recommendations provided in this study.

The forgoing statements and conclusions apply to common weather systems, during which no dangerous or consistently strong wind conditions are expected anywhere over the study site. During such extreme weather events, (e.g. thunderstorms, tornadoes, and downbursts), pedestrian safety is the main concern. However, these events are generally short-lived and infrequent and there is often sufficient warning for pedestrians to take appropriate cover.

This concludes our qualitative assessment of pedestrian wind comfort. Please advise the undersigned of any questions or comments.

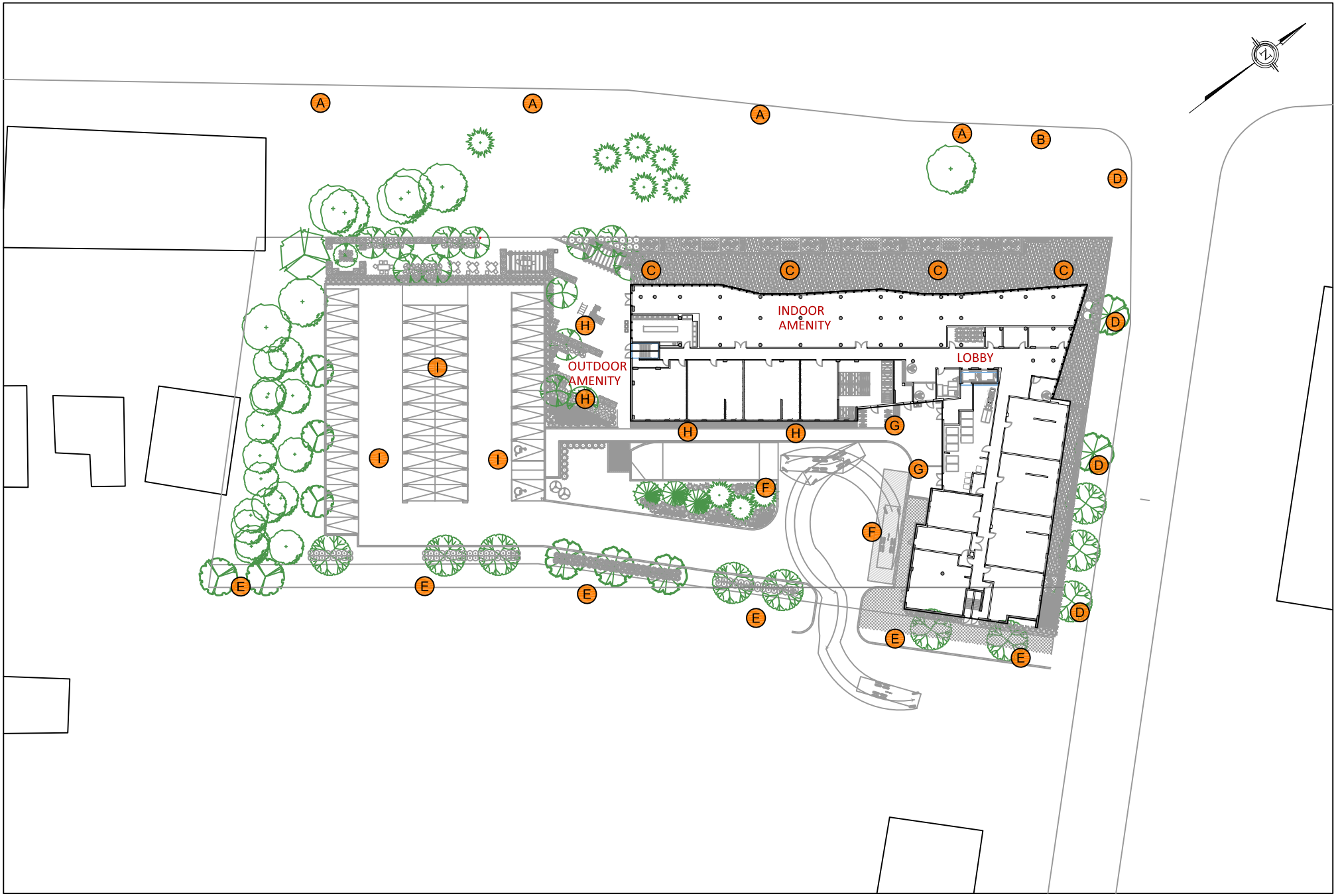
Sincerely,

Gradient Wind Engineering Inc.

Nick Petersen, B.Eng., EIT,
Junior Wind Scientist

Andrew Sliasas, M.A.Sc., P.Eng.,
Principal

GW19-226-DTPLW



GRADIENTWIND
ENGINEERS & SCIENTISTS

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PROJECT	958 AND 960 EAST AVENUE, MISSISSAUGA QUALITATIVE PEDESTRIAN LEVEL WIND ASSESSMENT
SCALE	1:1100 (APPROX.)
DRAWING NO.	GWE19-226-DTPLW-1
DATE	FEBRUARY 13 2020
DRAWN BY	C.E.

DESCRIPTION

FIGURE 1:
GROUND FLOOR PLAN
WITH REFERENCE MARKERS