April 13, 2023

Colonnade BridgePort
100 Argyle Avenue, Suite 200
Ottawa, ON K2P 1B6

Attn: Bonnie Martell, Development Manager
bmartell@colonnadebridgeport.ca

Dear Ms. Martell:

Re: Qualitative Pedestrian Level Wind Assessment
1900-2000 City Park Drive, Ottawa
Gradient Wind File 23-075

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Colonnade BridgePort to undertake a preliminary pedestrian level wind (PLW) assessment for the proposed development located at 1900-2000 City Park Drive in Ottawa, Ontario (hereinafter referred to as "subject site") to satisfy Official Plan Amendment (OPA) application requirements. This report provides a qualitative assessment of pedestrian wind conditions for the subject site based on architectural drawings provided by NEUF architect(e)s, in March 2023, consideration of existing and approved future surrounding buildings, statistical knowledge of the Ottawa wind climate, and experience with numerous similar developments. A quantitative PLW study will be performed for future development applications specifically as the design for each building within the subject site evolves.

1. TERMS OF REFERENCE

The subject site is situated on a parcel of land bordered by City Park Drive to the northwest, two high-rise buildings to the northeast, the confederation line light rail transit to the southeast, and the City Centre Park to the southwest. Throughout this report, City Park Drive is referred to as project north.

The proposed development is divided into two Phases. Phase 1 is located to the east of the subject site and comprises five Towers: A, B, C, D, and E, oriented from the northeast clockwise to the northwest. A park is proposed to the north between Towers A and E, while a driveway from City Park Drive provides access to underground parking to the west of Tower C and Tower B. Phase 2 is located to the west of the

subject site and comprises three Towers: F, G, and H, oriented from the north clockwise to the southwest. Conceptually, a second park is proposed at the northwest corner of the subject site, to the west of Tower F, and a driveway from City Park Drive provides access to underground parking between Towers G and H.

Conceptually, Tower A is a 20-storey building, inclusive of a 6-storey podium. The Tower steps back from the north elevation at Level 3, and from the north, east, and south elevations at Level 7. The ground floor includes common areas to the south and a central lobby. Towers B, C, D, G, and H are proposed to be 30-storey buildings, inclusive of a 6-storey podium. Towers B and C are identical and step back from the north and east elevations at Level 7. Their ground floors include common areas to the north and a lobby to the west. Tower D is a mirror building of Towers B and C. Tower G steps back from the north and east elevations, while Tower H steps back from the north and west elevations at Level 7. At the ground floor, Towers G and H include common areas and residential lobby to the northeast and northwest, and to the west and east, respectively. Towers E and F are proposed to be 20-storey buildings, inclusive of a 6-storey podium. The Towers step back from the north, west, and south elevations at Level 7. Their ground floors include common areas and residential lobby to the west and east, respectively.

The site wind conditions are influenced by the local wind exposures, which are characterized in the near field by a mix of open exposure and low-rise massing in all compass directions, with two high-rise buildings to the immediate east, and a high-rise building to the southeast. In the far-field, the wind exposures are primarily characterized by green space from the northeast clockwise to the south, and by a mix of green space, low-, and mid-rise massing from the south clockwise to the northeast. The Pine View Golf Course is located approximately 1.2 km to the east, and the Ottawa River flows west to east approximately 4 km to the north of the subject site.

A site plan is provided in Figure 1, while a ground floor plan is provided in Figure 2 and includes letter tags identifying the wind-sensitive pedestrian locations considered in this assessment.

2. METHODOLOGY

The main aspects of a desktop 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. The following sections describe this analysis procedure, including a discussion of the City of Ottawa pedestrian wind criteria[1].

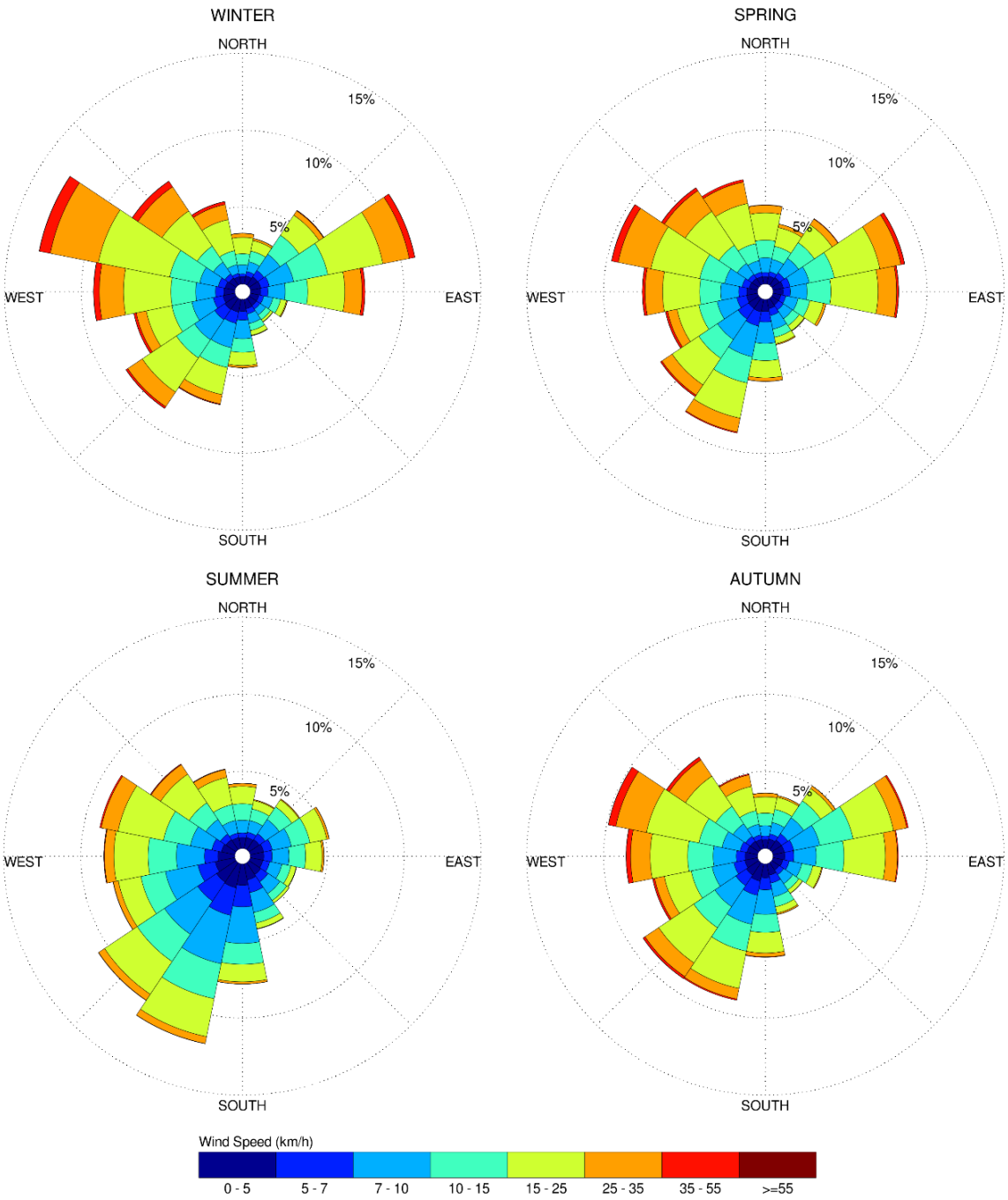
2.1 Wind Climate

A statistical model for winds in Ottawa was developed from approximately 40 years of hourly meteorological wind data recorded at Ottawa Macdonald-Cartier International Airport and obtained from Environment and Climate Change Canada. Wind speed and direction data were analyzed for each month of the year to determine the statistically prominent wind directions and corresponding speeds, and to characterize similarities between monthly weather patterns.

The statistical model of the Ottawa area wind climate, which indicates the directional character of local winds on a seasonal basis, is illustrated on the following page. The plots illustrate seasonal distribution of measured wind speeds and directions in kilometers per hour (km/h). Probabilities of occurrence of different wind speeds are represented as stacked polar bars in sixteen azimuth divisions. The radial direction represents the percentage of time for various wind speed ranges per wind direction during the measurement period. The prominent wind speeds and directions can be identified by the longer length of the bars. For Ottawa, the most common winds occur for westerly wind directions, followed by those from the east, while the most common wind speeds are below 36 km/h. The directional prominence and relative magnitude of wind speed changes somewhat from season to season.

[1] City of Ottawa Terms of References: Wind Analysis
https://documents.ottawa.ca/sites/default/files/torwindanalysis_en.pdf

SEASONAL DISTRIBUTION OF WIND
OTTAWA MACDONALD-CARTIER INTERNATIONAL AIRPORT



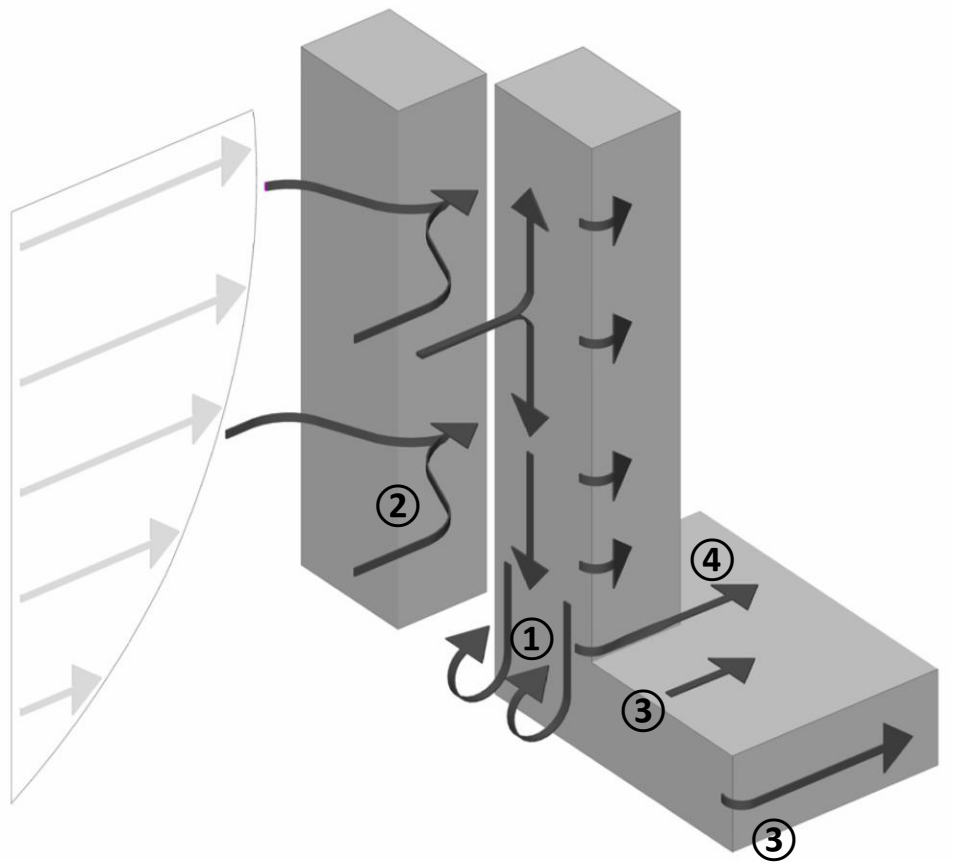
Notes:

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

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 Wind Comfort and Safety Criteria – City of Ottawa

Pedestrian comfort and safety criteria are based on the mechanical effects of wind without consideration of other meteorological conditions (i.e., temperature, relative humidity). The comfort criteria assume that pedestrians are appropriately dressed for a specified outdoor activity during any given season. Five pedestrian comfort classes are based on 20% non-exceedance mean wind speed ranges, which include (1) Sitting; (2) Standing; (3) Strolling; (4) Walking; and (5) Uncomfortable. More specifically, the comfort classes and associated mean wind speed ranges are summarized as follows:

1) **Sitting:** Mean wind speeds no greater than 10 km/h occurring at least 80% of the time. The equivalent gust wind speed is approximately 16 km/h.

2) **Standing:** Mean wind speeds no greater than 14 km/h occurring at least 80% of the time. The equivalent gust wind speed is approximately 22 km/h.

3) **Strolling:** Mean wind speeds no greater than 17 km/h occurring at least 80% of the time. The equivalent gust wind speed is approximately 22 km/h.

4) **Walking:** Mean wind speeds no greater than 20 km/h occurring at least 80% of the time. The equivalent gust wind speed is approximately 32 km/h.

5) **Uncomfortable:** Uncomfortable conditions are characterized by predicted values that fall below the 80% target for walking. Brisk walking and exercise, such as jogging, would be acceptable for moderate excesses of this criterion.

Regarding wind safety, gust wind speeds greater than 90 km/h, occurring more than 0.1% of the time on an annual basis are classified as dangerous.

The criteria are applied to the intended use of an outdoor area. For example, an entrance to a building should be suitable for standing, while a public sidewalk need only be suitable for walking in most circumstances.

3. ANTICIPATED PEDESTRIAN WIND COMFORT

Based on consideration of the subject site, surrounding building massing, and the relationship to the local wind climate, the following statements summarize our assessment of wind comfort and safety at key pedestrian areas, as identified by the letter tags in Figure 2.

3.1 Wind Comfort Conditions – Grade Level

Sidewalks and Bus Stops Along City Park Drive (Figure 2, Tag A): The public sidewalks and bus stops along City Park Drive will be exposed to the lower-level winds from the west-northwest. Regarding higher-level winds, the six storey podia of Towers A, E, and F are expected to reduce downwash effects. Overall, the public sidewalks and nearby transit stops are expected to be suitable for standing, or better, during the summer, becoming suitable for walking, or better, throughout the remainder of the year. A typical shelter, which provides pedestrians with means to protect themselves during periods of strong win activity, may be required for the nearby transit stops.

Sidewalks along Vantage Point Private (Figure 2, Tag B): While the sidewalks along Vantage Point Private are expected to experience downwash incident on Towers A and B, as well as on the high-rise building to the immediate east at 200 Frontier Path Private, the proposed massing will provide shelter from the prominent westerly winds. Overall, the sidewalks along Vantage Point Private are expected to be suitable for standing, or better, during the summer and autumn, expected to be suitable for strolling, or better, during the spring, becoming suitable for walking, or better, during the winter. The noted conditions are considered acceptable.

Sidewalks Along West Elevation (Figure 2, Tag C): The public sidewalks along the west elevation of the proposed development will be exposed to the lower-level winds from the west-northwest. Regarding higher-level winds, the six storey podia of Towers H and F are expected to reduce downwash effects. Overall, the public sidewalks are expected to be suitable for standing, or better, during the summer, becoming suitable for walking, or better, throughout the remainder of the year. The noted conditions are considered acceptable.

Sidewalks along Confederation Line Light Rail Transit (Figure 2, Tag D): While the sidewalks along the confederation line light rail transit are sheltered from the prominent west-northwest winds, the sidewalks are exposed to the lower- and higher-level winds from the south. The sidewalks are expected to experience downwash incident on the 30-storey towers along the south elevation of the proposed development (Towers B, C, D, G, and H). The introduction of balconies, as well as building setbacks along the south elevation of the towers, may prevent any significant downwash effects. Overall, the sidewalks are expected to be suitable for standing, or better, during the summer, becoming suitable for walking, or better, throughout the remainder of the year. The noted conditions are considered acceptable.

Proposed Parks (Figure 2, Tags E and F): The Phase 1 Park (Tag F) will be exposed to the lower-level winds from the north and shielded by the proposed towers form the remaining wind directions. The Park is also expected to experience moderate downwash from the northerly higher-level winds incident on Towers A, E, and C. The Phase 2 Park (Tag E) will be exposed to the lower- and higher-level winds from the prominent westerly winds, and is expected to experience downwash incident on Tower F. Overall, during the typical use period, the Phase 1 Park is expected to be suitable for a mix of sitting and standing, while the Phase 2 Park is expected to be suitable for standing within the majority of the area.

Internal Walkways and Parking Access (Figure 2, Tags G-J): The internal walkways and parking access will be mostly shielded from prevailing winds by the proposed Towers to the north and east of the subject site. Overall, the noted areas are expected to be suitable for standing, or better, during the summer and autumn, becoming suitable for strolling, or better, during the spring and winter. The noted conditions are considered acceptable.

Principal Building Access (Tag K): Owing to the protection of the building façade, the principal building access serving all the Towers of the proposed development are expected to be suitable for standing, or better, throughout the year. The noted conditions are considered acceptable.

City Centre Park Soccer Field (Figure 2, Tag L): While the City Centre Park Soccer Field to the immediate west of the subject is shielded from the easterly winds by the proposed development, it is exposed to the prominent westerly winds and is expected to experience moderate downwash from the higher-level winds incident on Tower H. Overall, the City Centre Park Soccer Field is expected to be suitable for standing, or better, during the typical use period. Since the area is intended for walking or more vigorous activities, the noted conditions may be considered acceptable.

3.2 Wind Comfort Conditions – Beyond the Subject Site

Influence of the Proposed Development on Existing Wind Conditions near the Subject Site: The introduction of the proposed development is not expected to significantly reduce wind comfort over neighbouring areas beyond the subject site. Nearby building entrances, sidewalks, laneways, parking areas, transit stops, and other pedestrian-sensitive areas beyond the subject site are expected to continue to experience acceptable wind conditions.

3.3 Wind Safety

Within the context of typical weather patterns, which exclude anomalous localized storm events such as tornadoes and downbursts, no pedestrian areas within or surrounding the subject site are expected to experience conditions that could be considered dangerous, as defined in Section 2.3.

3.4 Applicability of Predictions

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

4. SUMMARY OF WIND CONDITIONS

Based on a qualitative assessment of the current architectural drawings, surrounding building massing, and the Ottawa wind climate, the following general statements summarize our prediction of future wind conditions for the proposed development in Ottawa, Ontario.

1. Wind comfort conditions at all pedestrian-sensitive locations within and surrounding the subject site are expected to be suitable for the anticipated uses without mitigation throughout the year. The areas include nearby public sidewalks, building access, walkways, parking access, and the City Centre Park Soccer Field. Exceptions are described as follows:

    a. The nearby transit stops along City Park Drive are expected to be suitable for standing, or better, during the summer, becoming suitable for walking, or better, throughout the remainder of the year. A typical shelter, which provides pedestrians with means to protect themselves from the elements, including during periods of strong wind activity, may be required for the nearby transit stops.

    b. During the typical use period, the Phase 1 Park is expected to be suitable for a mix of sitting and standing, while the Phase 2 Park is expected to be suitable for standing within the majority of the area.

2. The introduction of the proposed development is not expected to significantly reduce wind comfort over neighbouring areas beyond the subject site. Nearby building entrances, sidewalks, parking areas, transit stops, and other pedestrian-sensitive areas beyond the subject site are expected to continue to experience acceptable wind conditions, or conditions similar to those that presently exist (that is, prior to the introduction of the proposed development).

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

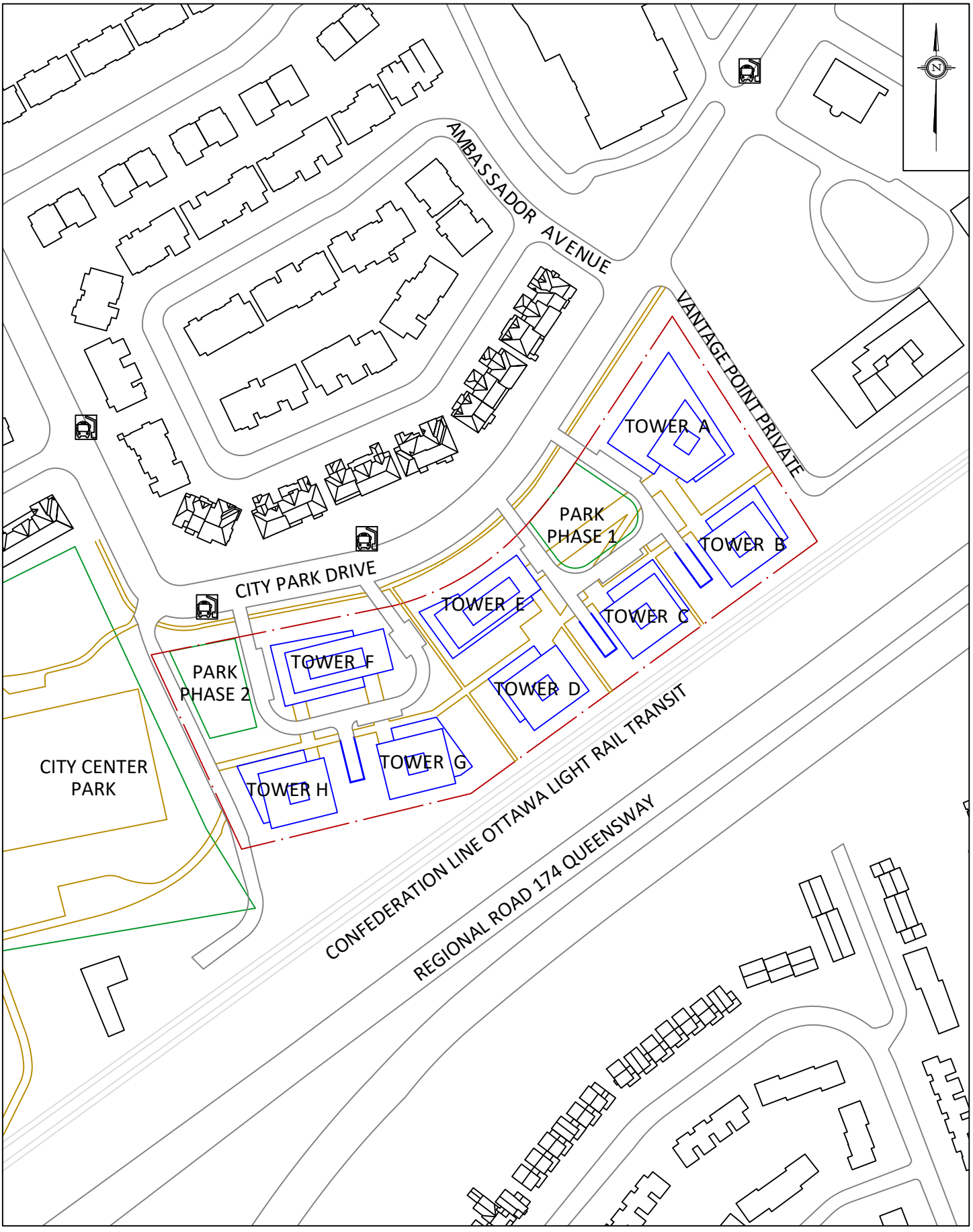
A quantitative PLW study based on computer simulations using the computational fluid dynamics (CFD) technique will be performed for future development applications specifically as the design for each building within the subject site evolves.

Sincerely,

Gradient Wind Engineering Inc.

Daniel Davalos, MESc.
Junior Wind Scientist

Justin Ferraro, P.Eng.
Principal

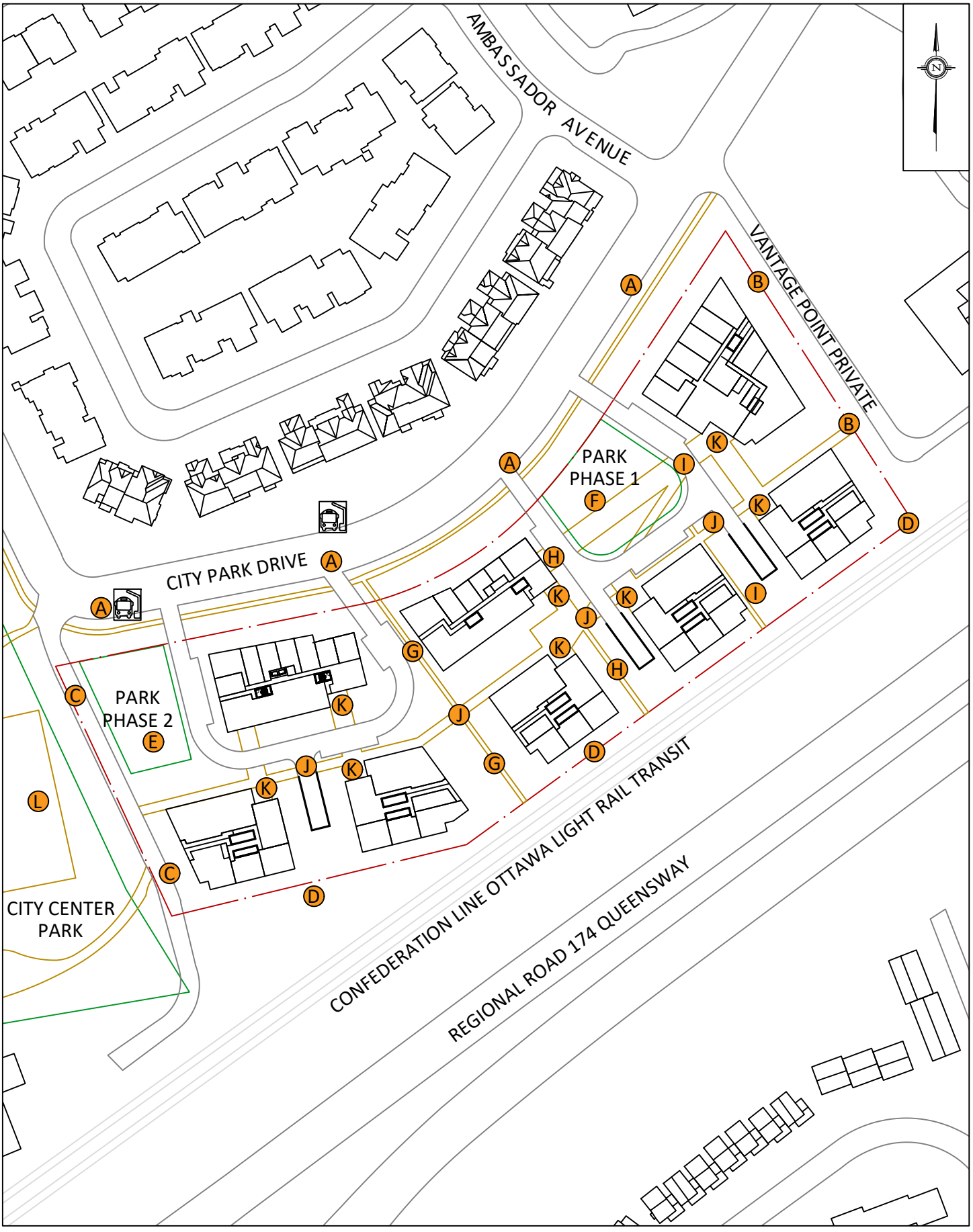


GRADIENTWIND
ENGINEERS & SCIENTISTS
127 WALGREEN ROAD, OTTAWA, ON
613 836 0934 • GRADIENTWIND.COM

PROJECT	1900-2000 CITY PARK DRIVE, OTTAWA DESKTOP PEDESTRIAN LEVEL WIND STUDY
SCALE	1:2250
DRAWING NO.	23-075-DTPLW-1
DATE	APRIL 13, 2023
DRAWN BY	N.M.P.

DESCRIPTION

FIGURE 1:
PROPOSED SITE PLAN AND SURROUNDING CONTEXT



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PROJECT	1900-2000 CITY PARK DRIVE, OTTAWA DESKTOP PEDESTRIAN LEVEL WIND STUDY
SCALE	1:1750
DRAWING NO.	23-075-DTPLW-2
DATE	APRIL 13, 2023
DRAWN BY	N.M.P.

DESCRIPTION

FIGURE 2:
GROUND FLOOR PLAN WITH REFERENCE MARKERS