October 9th, 2020

Tenblock
30 Soudan Ave., Suite 200
Toronto, Ontario M4S 1V6

Re: Qualitative Pedestrian Level Wind Assessment
1875 Steeles Avenue West, North York
GWE File No.: 20-105-DTPLW

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Tenblock to undertake a qualitative pedestrian level wind assessment for the proposed residential development at 1875 Steeles Avenue West in North York, Ontario. This report provides a qualitative assessment of pedestrian level wind comfort for the noted site based on drawings prepared by Kirkor in October 2020, consideration of existing and approved future surrounding buildings, statistical knowledge of the North York wind climate, and experience with similar projects in the Toronto Area.

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 at 1875 Steeles Avenue West. The study site is situated approximately 120 metres east of Dufferin Street on the south side of Steeles Avenue West. The site is bordered by Don Valley lands to the east and south, a future public road to the west, and Steeles Avenue West to the north.

The proposed development comprises Buildings A, B, and C, oriented counter-clockwise from south to north above a shared three-storey podium and two levels of below-grade parking. The podium has a U-shaped planform, open to the west. The sloping topography of the site allows for grade-level entrances along the north elevation at Level P1, and along the south and west façades at Level 1. At Level P1, residential units are located at grade along the north façade, with the remainder of the floor reserved for

parking. At Level 1, the south, west, and north perimeter of the building contains residential units, with the interior spaces largely reserved for parking and building support functions. A parking entrance, loading zone, and entrances for each of the buildings face the central driveway / drop-off area, accessed from the future public road to the west. The primary entrance for Building C is located at the northwest corner of the podium. This floorplate is generally carried through to Levels 2 and 3, and at Level 4 the podium steps back from all elevations to meet the upper building floorplates, accommodating an outdoor amenity space over the centre of the podium rooftop. Building A rises 38-storeys from the south end of the podium; having a rectangular floorplan with the long axis aligned east-west. At Levels 6 and 7 the floorplate sets back from the east accommodating green roofs. Above Level 38 the floorplate sets back from the east and north to meet a two-storey-height mechanical penthouse. At the north end of the podium Buildings B and C are integrated, forming an L-shape open to the southwest. At Level 9 the floorplate sets back from the south, west, and north, accommodating private terraces and an outdoor amenity area at the north side of the building. At Level 10 the floorplate sets back from the west and north to meet the typical Building B floorplan, terminating Building C with a green roof. Building B rises with a uniform rectangular floorplate to Level 39, above which the floorplate steps back from the west to meet the mechanical penthouse.

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 green space of the Don River West valley from the northeast clockwise to the south-southwest. To the southwest and west of the study site are low-rise commercial buildings and parking areas. Two medium-rise buildings lie to the northwest across Steels Avenue West. A four-building development comprising medium- and high-rise buildings is proposed for the adjacent property at 1881 Steeles Avenue West. While this assessment describes conditions without the unapproved development present, a note has been included following the base analysis to comment on conditions should the development become developed in the future. The far-field surroundings (defined as the area beyond the near field and within a two-kilometer radius), are classified as predominantly low-rise suburban exposure to the north of Steeles Avenue West, with low-rise commercial and industrial exposures to the southwest. The southeast quadrant is a mixture of suburban developments and the more open exposure of the Don River West valley. A cluster of taller buildings is located to the east near the intersection of Steeles Avenue West and Bathurst Street.

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

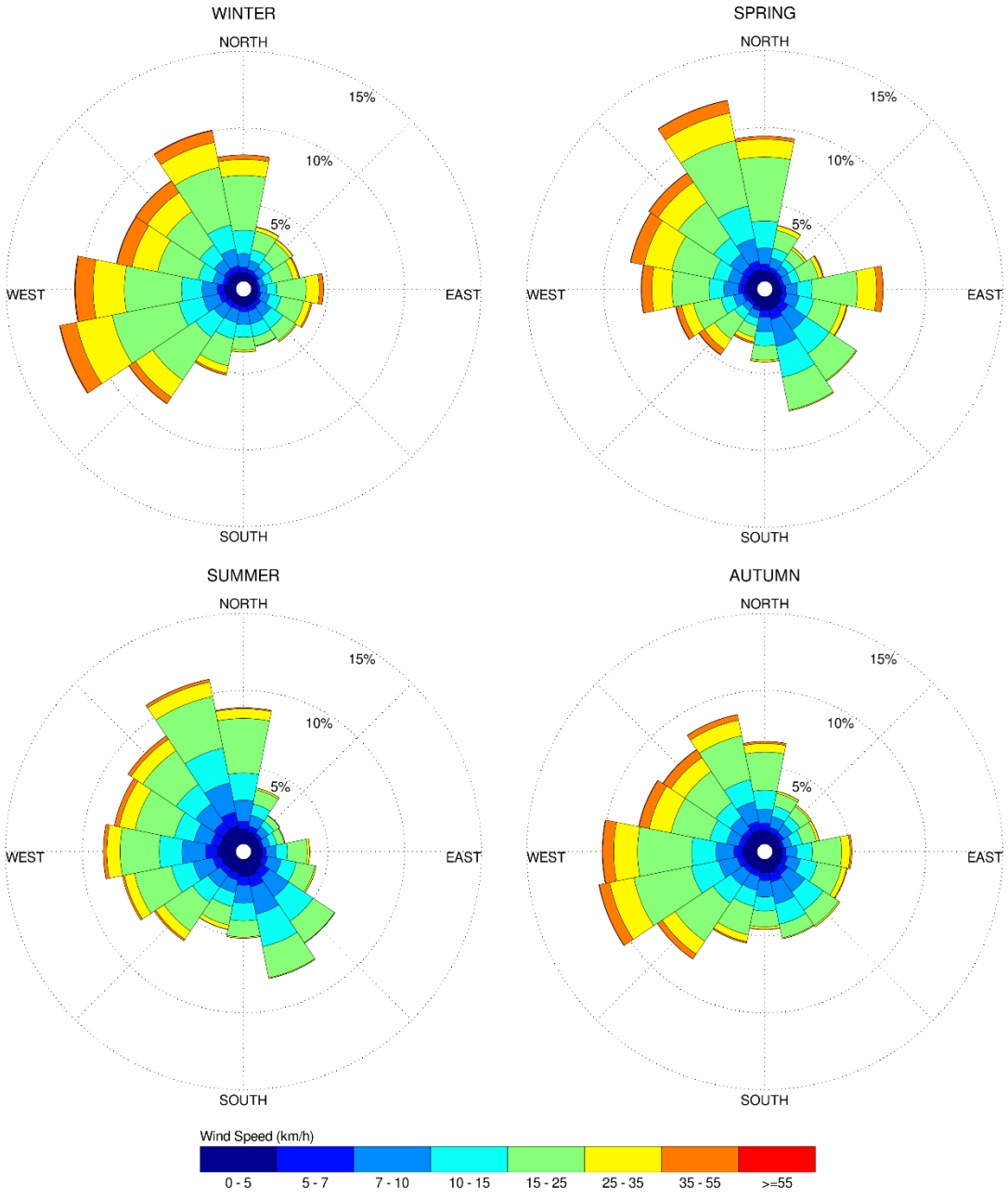
2. METHODOLOGY

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 North York Wind Climate

The statistical model of the North York 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 a 40-year measurement period. The preferred wind speeds and directions can be identified by the longer length of the bars. For North York, 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, TORONTO, ONTARIO



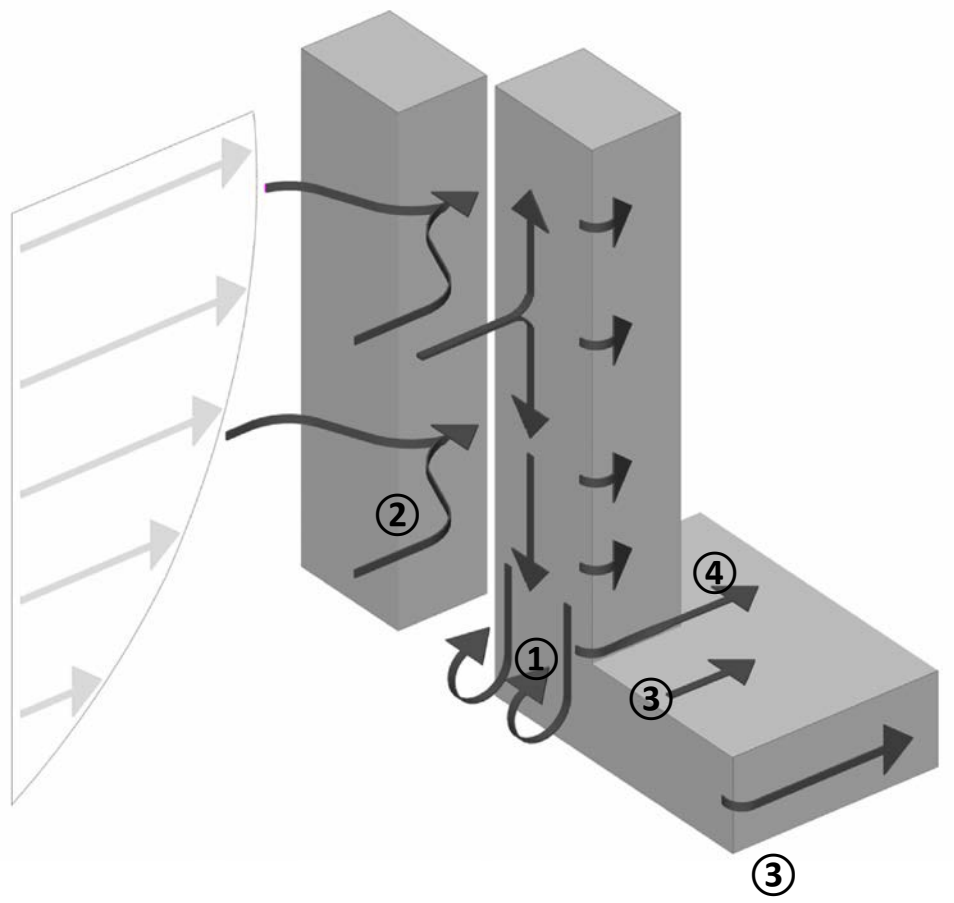
Notes:

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.

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

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 gust wind speeds no greater than 16 km/h occur at least 80% of the time;
- Wind conditions are comfortable for *standing* when gust wind speeds no greater than 22 km/h occur at least 80% of the time; and
- Wind conditions are comfortable for *walking* when gust wind speeds no greater than 30 km/h occur at least 80% of the time.

These guidelines are based on gust wind speeds, since people are most sensitive to wind gusts rather than to constant wind speeds. The guidelines 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 at 1875 Steeles Avenue West in North York, 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 Steele Avenue West, inclusive of Building Entrances (Figure 1, Tags A, B, & C): Although Steeles Avenue West (Tag A) is aligned with prominent winds from the east and west with minimal upwind resistance, these winds will not be exacerbated by channeling effects due to the relatively open surrounding exposure. Further, successive setbacks on the north elevation at higher levels will mitigate the downwash of northerly winds. Balconies overhanging the Level P1 private residential entrances (Tag B) will provide additional protection from any downwash flows. Conditions will be somewhat windier at the secondary entrances near the northeast corner (Tag C) due to acceleration of winds around the building corner. Overall, conditions along the sidewalk and at the noted building entrances are expected to be suitable for standing or better during the summer months and walking or better for the remainder of the year. These conditions are acceptable for sidewalks and private entrances.

North Portion of Future Public Road, inclusive of Building Entrances and Parking Areas (Figure 1, Tags D & E): The north portion of the Future Public Road, including the sidewalk, adjacent parking lot, and secondary entrances (Tag D), as well as the Building C lobby entrance (Tag E) is exposed to prominent westerly winds, and to a lesser degree northerly winds, while being shielded by the study building from south and east quadrant winds. Some shielding from the northwest is offered by the collection of medium-rise buildings across Steeles Avenue West. Conditions over this area are expected to be comfortable for standing or better during the summer and walking or better throughout the remaining seasonal periods. For the Building C lobby entrance, it is recommended to maintain the proposed sliding door configuration.

South End of Future Public Road, inclusive of Building Entrances (Figure 1, Tag F): The south end of the Future Public Road, including the sidewalk and secondary entrances, is shielded from most prevailing winds by the surrounding massing and the study building itself, with exposure to certain northerly wind directions. To the southeast is largely open land, however, for the North York wind climate, winds from this direction are statistically uncommon. Conditions are expected to be suitable for standing or better on a seasonal basis, which is acceptable.

Interior Driveway at West Side of Podium (Figure 1, Tag G): The driveway at the west side of the podium provides access to the lobbies of each of the building, as well as to parking and loading areas. This space is well shielded in all directions. Setbacks above the podium and canopies over the pedestrian entrances mitigate downwash effects. Conditions are expected to be suitable for sitting throughout the year, which is ideal.

Valley Lands, inclusive of Walkways and Secondary Building Access Points (Figure 1, Tags H & I): The Valley Lands as well as the proposed and existing walkways to the east of the study building (Tag H) are exposed to the open vegetated land of the Don River West Branch to the north, east, and south, and shielded by the study building from the salient west quadrant winds. Conditions are expected to be comfortable for standing or better during the summer and autumn months, becoming suitable for walking or better throughout the rest of the year, which is appropriate. The secondary building access points inset at the southeast corner of the building (Tag I) will likely experience sitting conditions throughout each seasonal period, which is ideal.

Walkway, Building Entrances and Parkland Dedication along South Elevation (Figure 1, Tags J & K): The south end of the study site features parkland dedication and an adjacent parking lot (Tag J), as well as a walkway and private residential entrances (Tag K). This area is open to the east and south but is well-shielded from dominant westerly and northerly winds. The narrow profile of Building A in the east-west direction will limit downwash of higher-level westerly winds at the base of the building. Overall, these spaces are expected to be comfortable for sitting during the summer, standing or better throughout the spring and autumn, and for walking or better during the winter. The noted conditions are considered appropriate for the intended uses of the spaces.

Level 4 Outdoor Amenity (Figure 1, Tag L): The outdoor amenity space over the podium rooftop is variably exposed from the west clockwise to the southeast. Conditions will be exacerbated by channeling effects between Buildings A and B, and by occasional downwash off the taller towers. Without mitigation, conditions are expected to be comfortable for standing or better during the summer months, transitioning to walking or better in the colder months. To ensure conditions are suitable for sitting during the intended use period of late spring to early autumn, mitigation is recommended. The exact type and configuration of the mitigation can be coordinated with the design team as the terrace plan progresses.

Level 9 Outdoor Amenity (Figure 1, Tag M): The Level 9 outdoor amenity serving Building C is variably exposed from the southwest clockwise to the east. Downwash of north winds off the Tower B façade will be mitigated by the setback at Level 10. Overall, conditions are expected to be suitable for walking or better on a seasonal basis. To ensure sitting conditions from late spring to early autumn, it is recommended to install wind barriers along the perimeter of this space.

Influence of the Proposed Development at 1881 Steeles Avenue West: Should the proposed four-building development to the immediate west of the study site at 1881 Steeles Avenue West be developed, increased shielding of westerly winds is expected over most of the study site. At the same time, the channeling of north and south winds along the Future Public Road is expected to increase. Taken together, grade-level conditions are expected to continue to be suitable for their intended uses. Conditions over the Level 4 outdoor amenity area are expected to improve somewhat, as the channeling of westerly winds will be diminished, and the extent of potential mitigation is therefore also expected to reduce. Although the Level 9 outdoor amenity will also benefit from the increased shielding to the southwest, potential mitigation is still recommended.

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 North York wind climate, the following general statements summarize our prediction of future wind conditions for the proposed residential development at 1875 Steeles Avenue West in North York, 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 sidewalks, walkways, building access points, parkland, and parking lots. It is recommended that the current Building C lobby entrance configuration be maintained.

2. To ensure conditions will be suitable for sitting throughout the typical use period of late spring to early autumn, mitigation is recommended for the Level 4 outdoor amenity area. The extent of the mitigation can be coordinated with the design team as the terrace plan progresses.

3. The Level 9 outdoor amenity area is expected to be comfortable for walking or better on a seasonal basis. Mitigation is recommended as described in Section 3.

4. 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 sidewalks, walkways, 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.

5. Should the proposed four-building development at 1881 Steeles Avenue West be developed, similar grade-level wind conditions are anticipated throughout the site. Conditions over the Level 4 and Level 9 outdoor amenity areas are expected to improve due to the increased shielding.

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.

Patrick Shorey, B.A.Sc.,
Junior Wind Scientist

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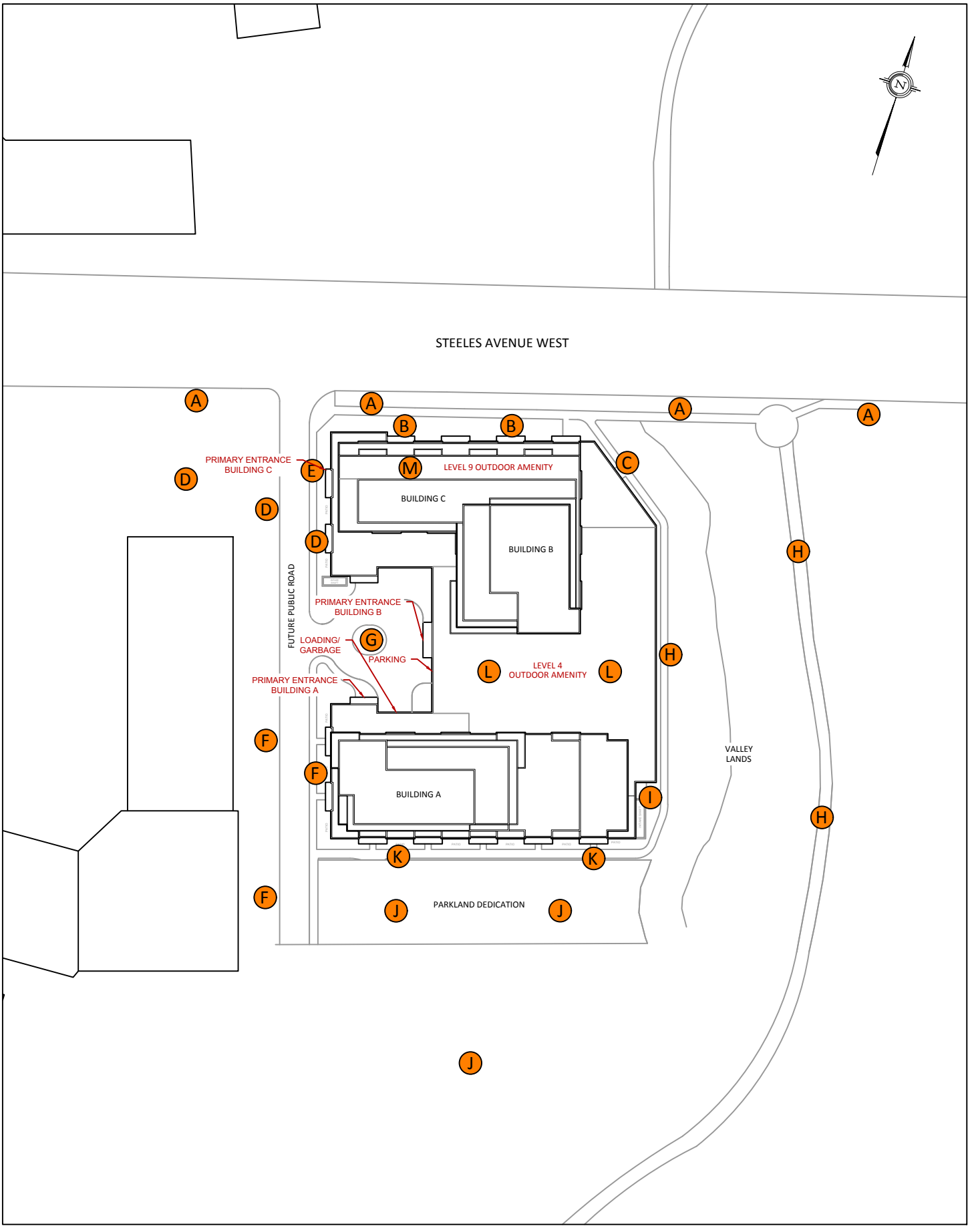
Principal

GW20-105-DTPLW



GRADIENTWIND
ENGINEERS & SCIENTISTS

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PROJECT	1875 STEELES AVENUE WEST, NORTH YORK QUALITATIVE PEDESTRIAN LEVEL WIND ASSESSMENT
SCALE	1:1200 (APPROX.)
DRAWING NO.	GW20-105-DTPLW-1
DATE	OCTOBER 9, 2020
DRAWN BY	P.S.

DESCRIPTION

FIGURE 1:
SITE PLAN WITH
REFERENCE MARKERS