August 10, 2020

Westboro Inc.
115 Champagne Avenue South
Ottawa, ON K1S 5V5

Attn: Martin Chénier
chenierm@live.ca

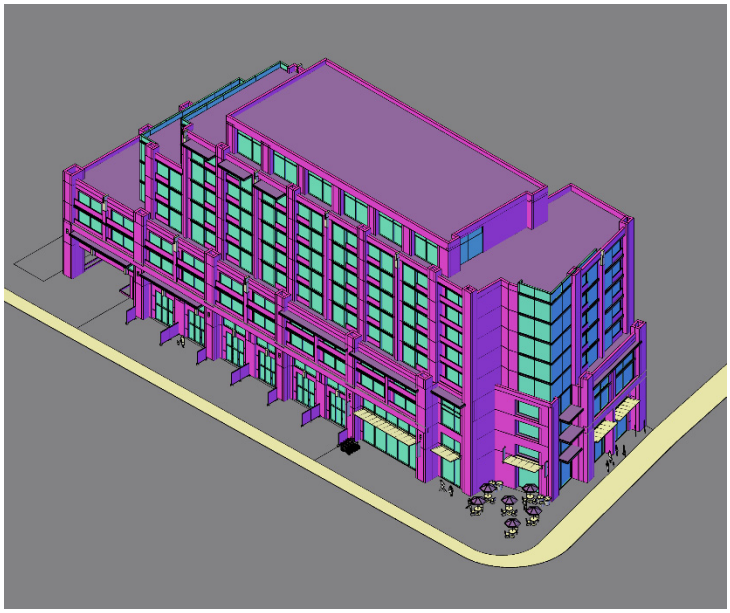
Dear Mr. Chénier:

Re: Qualitative Pedestrian Level Wind Assessment
403 Richmond Road, Ottawa
Gradient Wind File 20-174

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Westboro Inc. to undertake a qualitative pedestrian level wind (PLW) assessment for the proposed mixed-use development located at 403 Richmond Road in Ottawa, Ontario (hereinafter referred to as "subject site") in support of a joint Official Plan Amendment (OPA) and Zoning By-Law Amendment (ZBA) application. This report provides a qualitative assessment of pedestrian wind comfort and safety for the subject site based on architectural drawings provided by Roderick Lahey Architect Inc. (RLA) in July 2020, consideration of existing and approved future surrounding buildings, statistical knowledge of the Ottawa wind climate, and experience with similar past projects in Ottawa.

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. Any recommended mitigation could be confirmed during design development.

1. TERMS OF REFERENCE



Architectural Model, Southwest Axonometric Rendering (Courtesy of RLA)

The subject site is located 403 Richmond Road, on a parcel of land on the northeast corner of the intersection of Richmond Road and Roosevelt Road in Ottawa. The development comprises a 9-storey mixed-use building with an amenity room penthouse. Above two floors of below-grade parking, the ground floor comprises residential, amenity, and commercial space; the amenity space includes an outdoor terrace located along the east elevation. The residential space includes a lobby accessed via Roosevelt Avenue along the north elevation. The commercial space includes an outdoor patio at the southwest corner of the development. The building rises with a near-rectangular planform, with the floorplate stepping back on the north elevation at Levels 5, 8, and 10. Levels 2-9 comprise residential space, while an amenity space resides atop the building.

Regarding wind exposures, the near-field surroundings of the development (defined as an area falling within a 200-metre (m) radius of the site) are characterized by dense suburban low-rise buildings in all directions, with taller mid-rise buildings to the south and southeast along Richmond Road. The building to the immediate east of the site, 399 Richmond Road, is served by a rooftop patio. The far-field surroundings (defined as the area beyond the near field and within a two-kilometer (km) radius) are characterized by a mix of mostly low- and mid-rise buildings from the northeast clockwise to the southwest, and by a mix of mostly low-rise buildings, open exposure, and the Ottawa River from the west-southwest clockwise to the north-northeast. The Ottawa River runs southwest to northeast approximately 500 m to the northwest of the subject site.

A site plan is provided in Figure 1. Ground floor and roof plans are provided in Figures 2 and 3, respectively, which include letter tags identifying wind sensitive pedestrian locations considered in this assessment.

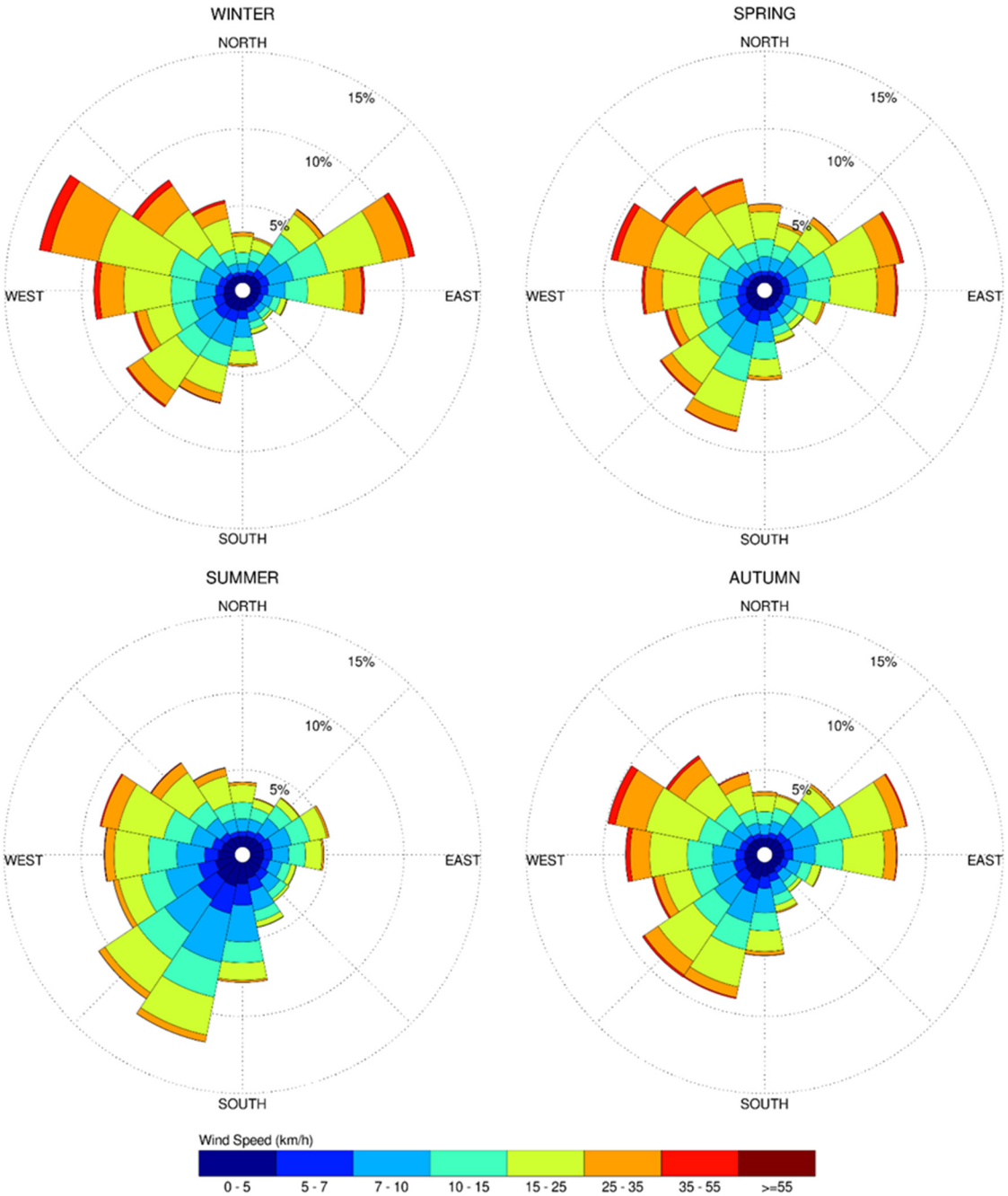
2. METHODOLOGY

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 Ottawa Wind Climate

The statistical model of the Ottawa wind climate is illustrated on the following page and indicates the directional character of local winds on a seasonal basis. 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 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 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 WIND
OTTAWA MACDONALD-CARTIER INTERNATIONAL AIRPORT, OTTAWA, ONTARIO



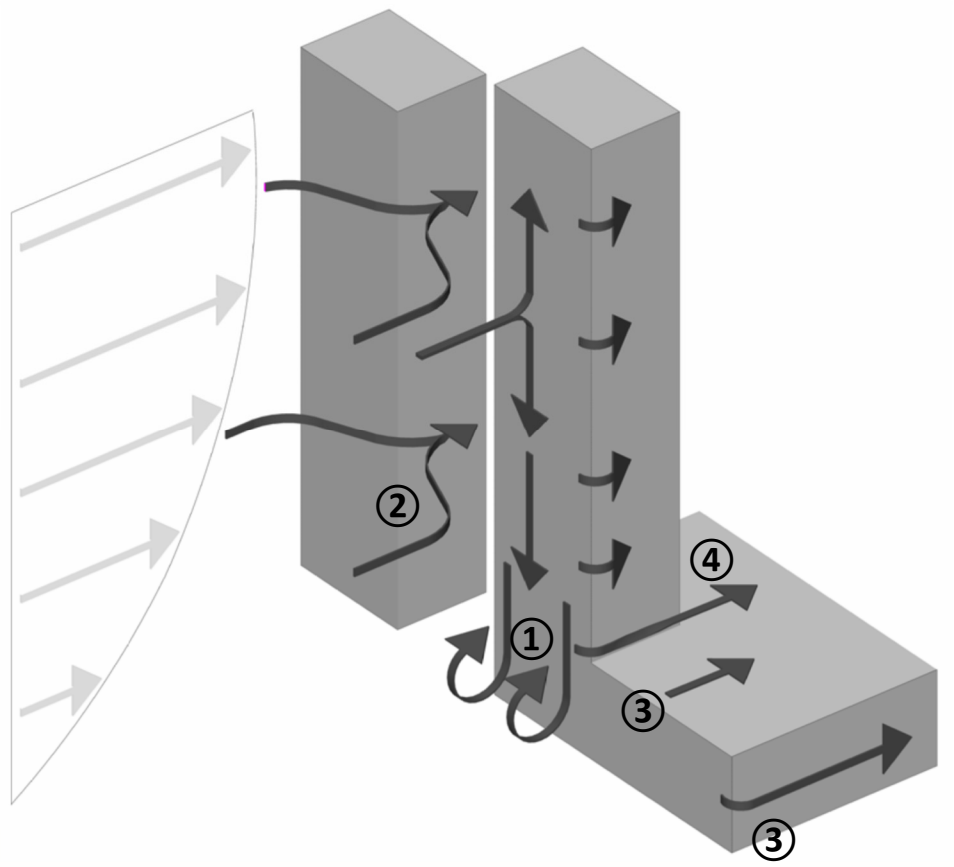
Notes:

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 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 80% 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 27 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.

The pedestrian safety wind speed criterion 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 90 km/h is classified as dangerous. The gust speeds, and equivalent mean speeds, are selected based on 'The Beaufort Scale', presented on the following page, which describes the effects of forces produced by varying wind speed levels on objects. Gust speeds are included because pedestrians tend to be more sensitive to wind gusts than to steady winds for lower wind speed ranges. For strong winds approaching dangerous levels, this effect is less important because the mean wind can also create problems for pedestrians.

3. ANTICIPATED PEDESTRIAN WIND COMFORT

Based on consideration of the subject site, surrounding building massing, and the relationship to the local wind climate, the statements below summarize our assessment of wind comfort at key pedestrian areas.

Sidewalk, Bus Stop, and Building Entrances along Richmond Road (Figure 2, Tags A-C): While there may be some channelling effects along the Richmond Road sidewalk, the prominent northwest winds will be sheltered by the subject building. Due to the low frequency of southwesterly winds, combined with the narrow width of the proposed building, downwash effects from higher level winds are not expected.

Overall, conditions along the sidewalk (Tag A) and bus stop (Tag C) are expected to be suitable for sitting during the summer and autumn season, becoming largely suitable for standing, or better, during the spring and winter seasons, which are considered acceptable. Owing to the protection provided by the building façade, conditions in the immediate vicinity of building entrances (Tag B) are expected to be somewhat calmer and acceptable throughout the year.

Sidewalk and Building Entrances along Roosevelt Avenue (Figure 2, Tags D & E): Due to the low height of the surrounding building massing, channeling effects are not expected over the sidewalk along Roosevelt Avenue. Regarding higher level winds, downwash effects will be reduced by the presence of balconies, as well as the setback of the building at Level 5. Overall, conditions over the sidewalk (Tag D) are expected to be suitable for standing, or better, during the summer, becoming suitable for strolling, or better, in the spring and autumn, and suitable for walking, or better during the winter. Owing to the protection provided by the building façade, conditions in the immediate vicinity of the building entrances (Tag E) are expected to be suitable for sitting during the summer, becoming suitable for standing, or better, throughout the remainder of the year. These conditions are considered acceptable.

Patio at Southwest Corner of Building (Figure 2, Tag F): The patio at the southwest corner of the proposed building will receive protection from prominent westerly winds by the surrounding building massing. Regarding higher level winds, downwash effects are expected to be reduced by solid canopies overhanging grade level. Overall, conditions are expected to be suitable for sitting during the typical use period of late spring through early autumn. These conditions are considered acceptable.

Walkway and Building Entrance at North Elevation (Figure 2, Tags G & H): The walkway and building entrance (Tags G and H, respectively) at the north elevation, beneath the Level 2 overhang, will be sheltered from direct winds by the surrounding building massing. Overall, conditions are expected to be suitable for sitting throughout the year. These conditions are considered acceptable.

Ground Level Amenity Terrace along East Elevation (Figure 2, Tag I): The amenity terrace at the east elevation will be shielded from direct winds by the surrounding building massing. Regarding higher level winds, downwash effects will be reduced by the presence of balconies on the east elevation. Overall, conditions are expected to be suitable for sitting during the typical use period of late spring through early autumn. These conditions are considered acceptable.

Rooftop Amenity Terrace (Figure 3, Tag J): To protect against direct winds over the amenity terrace, it is recommended that the terrace include a 1.6-m tall wind barrier around its perimeter. Overall, provided the terrace design incorporates the aforementioned wind barrier, conditions over the area are expected to be suitable for sitting during the typical use period, which are acceptable.

Rooftop Amenity Terrace at 399 Richmond Road (Figure 3, Tag K): The rooftop terrace at the neighbouring building (Tag K) will be shielded from prominent westerly winds by the subject site. Overall, wind conditions over the existing rooftop terrace are expected to be improved following the introduction of the proposed building at 403 Richmond Road.

Influence of the Proposed Development on Existing Wind Conditions near the Subject Site: The introduction of the subject site is not expected to significantly influence pedestrian wind comfort over neighbouring areas at grade level. Nearby building entrances, sidewalks, laneways, parking areas, transit stops, 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 Ottawa wind climate together with the City of Ottawa wind comfort and safety criteria, the following general statements summarize our prediction of future wind conditions for the subject site at 403 Richmond Road in Ottawa, Ontario.

1. Wind comfort at grade-level pedestrian-sensitive locations across the subject site are expected to be suitable for the anticipated uses without mitigation on a seasonal basis. The areas include nearby building entrances, walkways, bus stops, and public sidewalks.

2. To achieve conditions suitable for sitting during the typical use period of late spring through early autumn over the rooftop amenity terrace, mitigation is recommended in the form of a 1.6-m tall perimeter wind barrier.

3. The presence of the subject site is expected to create calmer conditions over the rooftop terrace serving the existing neighbouring building located at 399 Richmond Road.

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

The foregoing statements and conclusions apply to common weather systems, during which no dangerous or consistently strong wind conditions are expected anywhere over the subject 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.

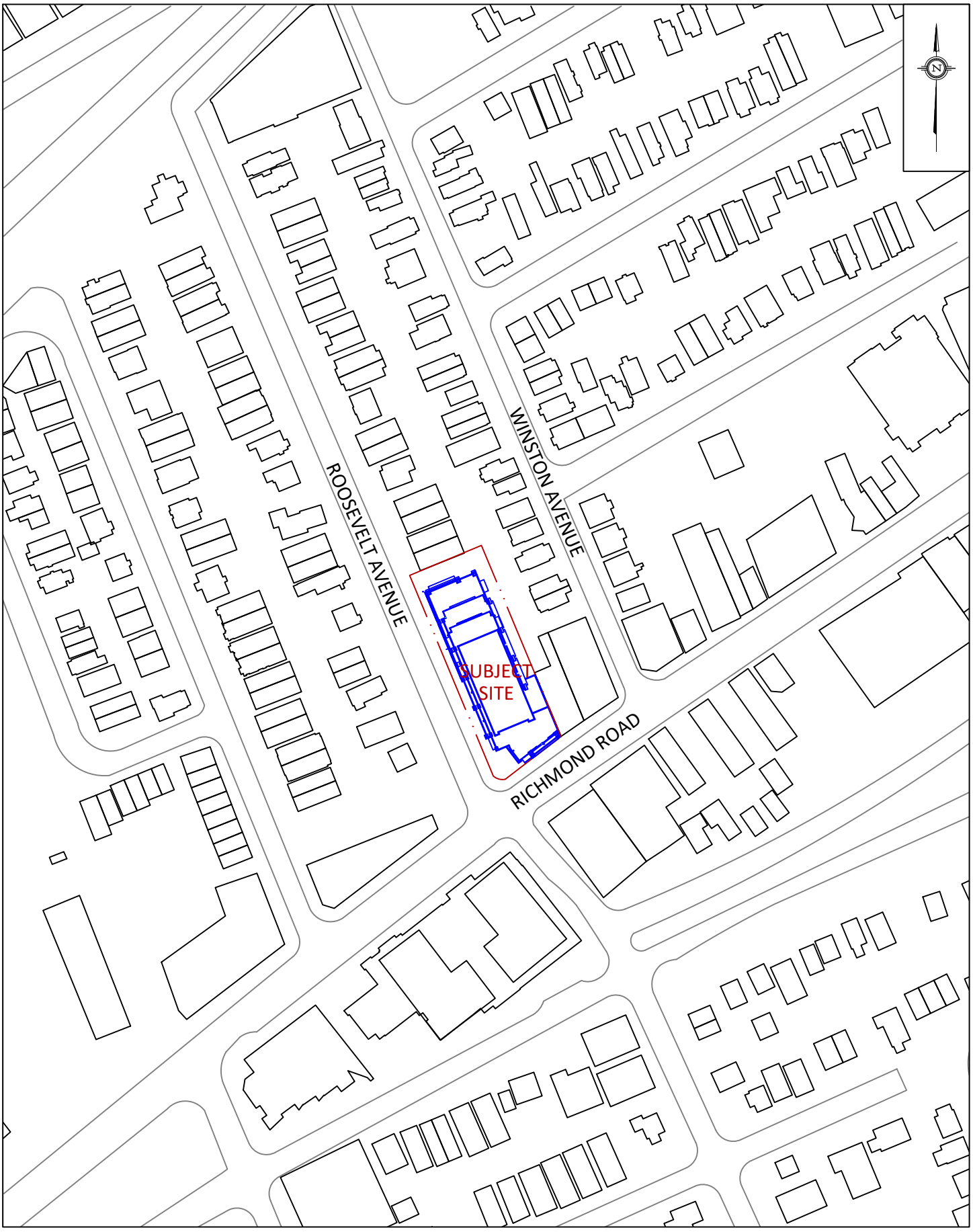
This concludes our qualitative assessment of pedestrian wind comfort. Please advise the undersigned of any questions or comments.

Sincerely,

Gradient Wind Engineering Inc.

Steven Hall, M.A.Sc., P.Eng.
Wind Engineer

Justin Ferraro, P.Eng.
Principal



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ENGINEERS & SCIENTISTS

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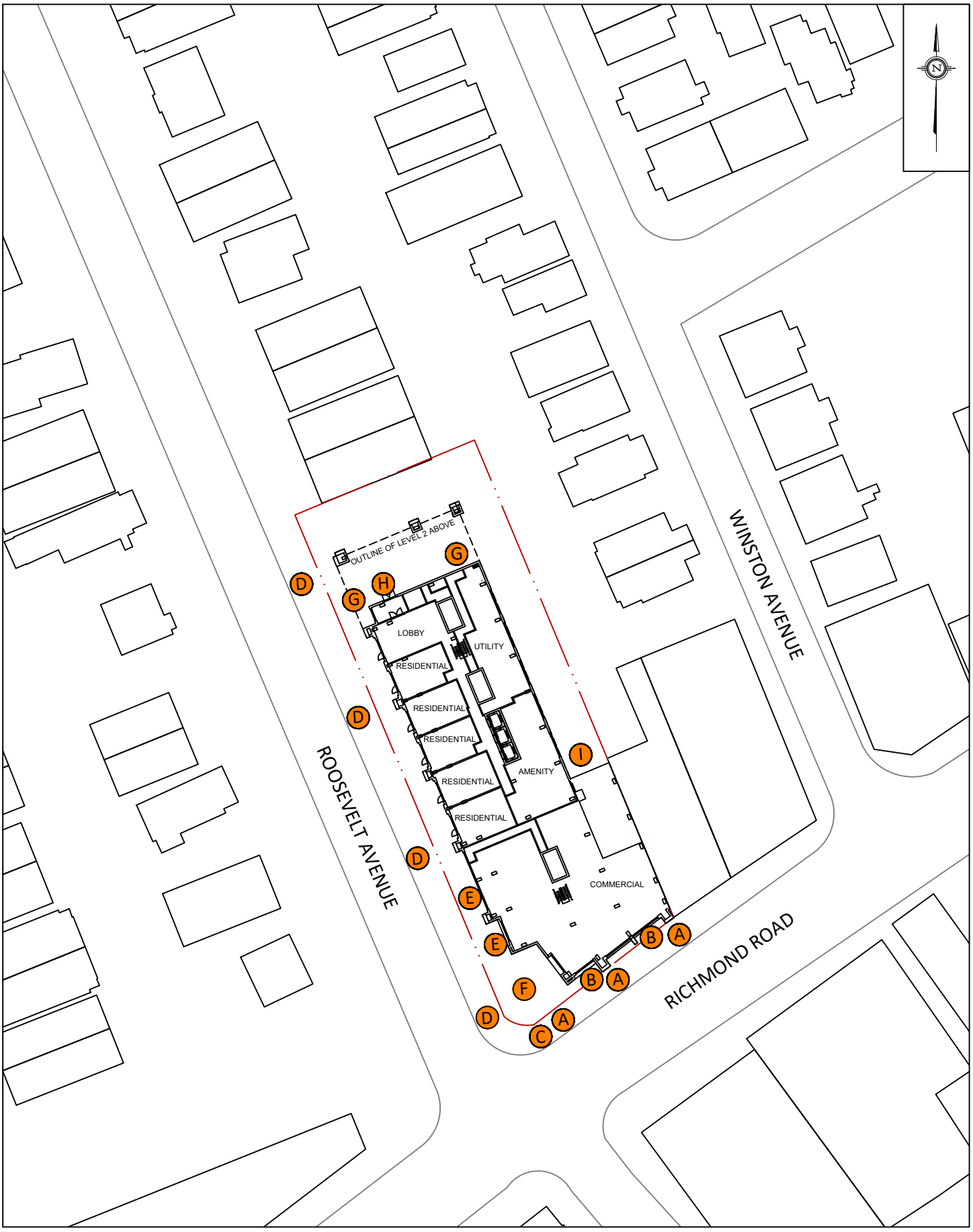
PROJECT	403 RICHMOND ROAD, OTTAWA QUALITATIVE PEDESTRIAN LEVEL WIND ASSESSMENT		
SCALE	1:2000	DRAWING NO.	20-174-DTPLW-1
DATE	AUGUST 7, 2020	DRAWN BY	N.M.P.

DESCRIPTION

FIGURE 1:
EXISTING SCENARIO
SITE PLAN AND SURROUNDING CONTEXT



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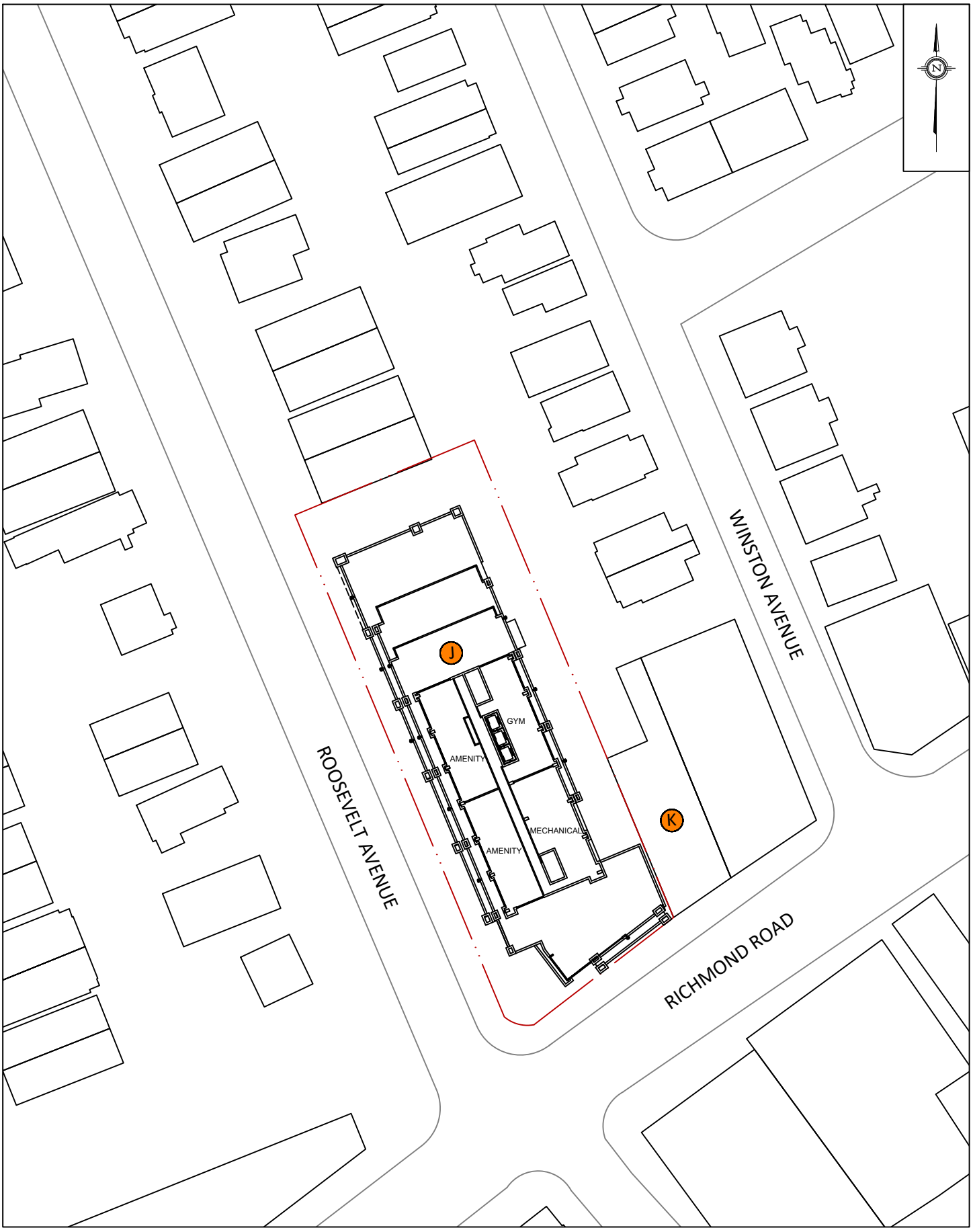
SCALE	1:800	DRAWING NO.	20-174-DTPLW-2
DATE	AUGUST 7, 2020	DRAWN BY	N.M.P.

DESCRIPTION

FIGURE 2:
GROUND FLOOR PLAN
WITH REFERENCE MARKERS



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SCALE	1:800
DRAWING NO.	20-174-DTPLW-3
DATE	AUGUST 7, 2020
DRAWN BY	N.M.P.
DESCRIPTION	FIGURE 3: TERRACE PLAN WITH REFERENCE MARKERS