September 11, 2020

9378-0633 Québec Inc.
7 de Tellier
Gatineau, QC J87 8C2

Attn: Martin Chénier
chenierm@live.ca

Dear Mr. Chénier:

Re: Qualitative Pedestrian Level Wind Assessment
1009 Trim Road, Ottawa
Gradient Wind File 20-087

Gradient Wind Engineering Inc. (Gradient Wind) was retained by 9378-0633 Québec Inc. to undertake a qualitative pedestrian level wind (PLW) assessment for the proposed residential development located at 1009 Trim 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 Rodrick Lahey Architecture Inc. (RLA) in August 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

The focus of this PLW assessment is a proposed multi-building development located at 1009 Trim Road in Ottawa, Ontario. The subject site is situated on an irregular parcel of land bounded by Jeanne d'Arc Boulevard North to the south, Trim Road to the west, and vacant land to the north and east.

The site comprises three proposed, rectangular planform buildings with Building B1 (28 storeys) and Building B2 (32 storeys) forming Phase 1 and potential future Building B3 (30 storeys) which would be introduced in Phase 2. The second phase is subject to further due diligence being undertaken to confirm additional development lands that could accommodate a future third building. The buildings will share a common 4-storey podium. The development will be focused on the south side of the site along Inlet Private. Green space and a body of water occupy the remaining land, north of the high-water mark.

Rendering, South Perspective
(Courtesy of RLA Architecture)

Vehicular parking will be provided below grade as well as potentially within a portion of the podium. The first floor of the podium comprises retail space at the south side and amenity space in the remaining areas. A semi-circular driveway at the south side provides access to the site from Jeanne d'Arc Boulevard North. Outdoor amenity areas are provided at the northeast and northwest corners of the site. Levels 2 to 4 of the podium and all levels of each building are reserved for residential occupancy.

Regarding wind exposures, the near-field surroundings of the development (defined as an area falling within a 200-metre (m) radius of the site) include the Petrie's Landing high-rise development, which includes two existing buildings and three future buildings approximately 200 m to the east-northeast, the city maintenance yard immediately across Jeanne d'Arc Boulevard to the south-southwest, the Ottawa River to the immediate northwest, and open green space for the remainder of the compass. 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 open green space and low-rise suburban developments from the east-northeast clockwise to the southeast, by mostly low-rise suburban developments from the southeast clockwise to the west-southwest, and by the open exposures of Ottawa River and Petrie Island for the remaining compass directions.

A site plan is provided in Figure 1, while a ground floor plan is provided in Figure 2. The roof plan is illustrated in Figure 3, which includes the potential podium rooftop terraces. Figures 2 and 3 include letter tags identifying wind sensitive pedestrian locations considered in this assessment.

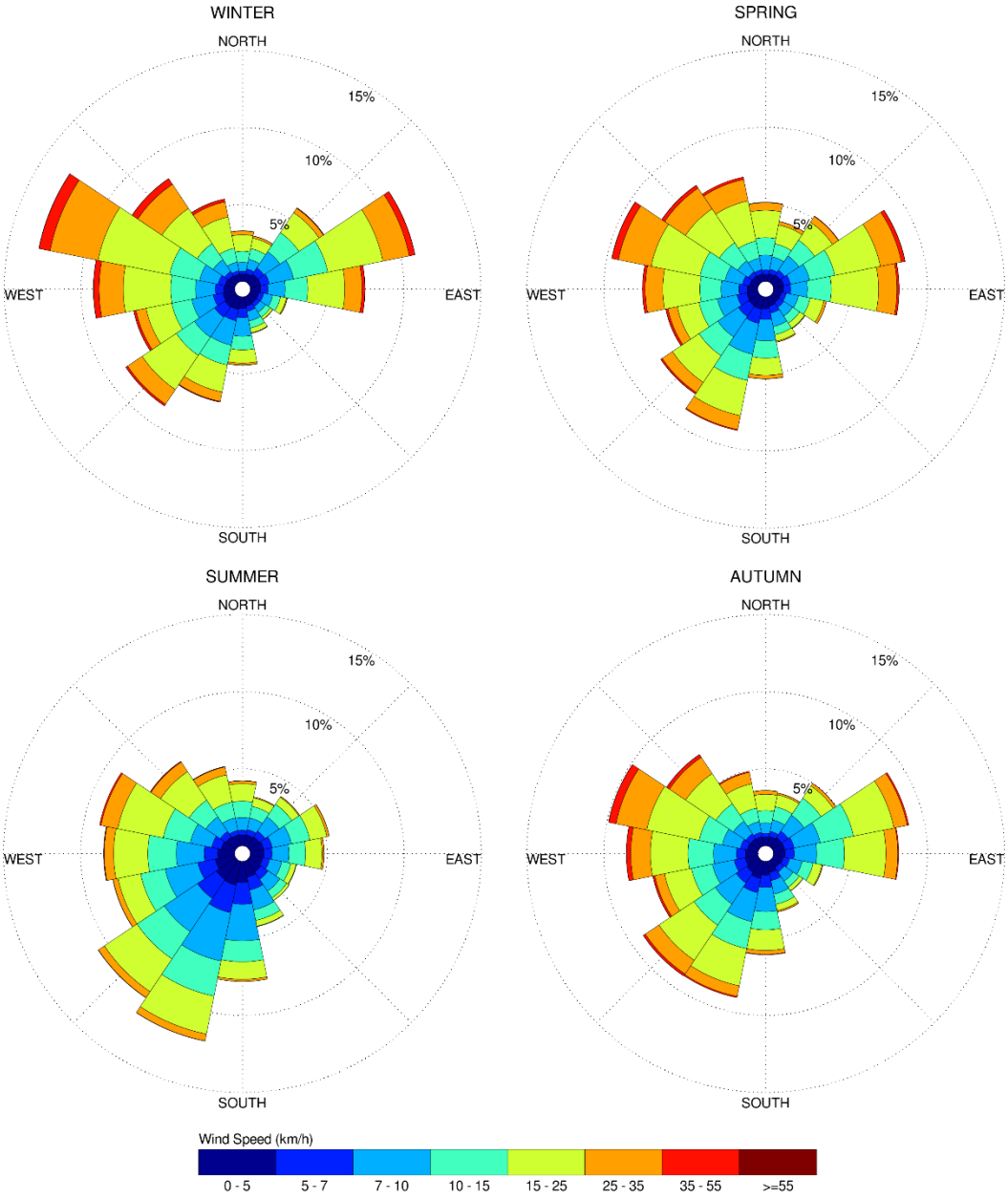
2. METHODOLOGY

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



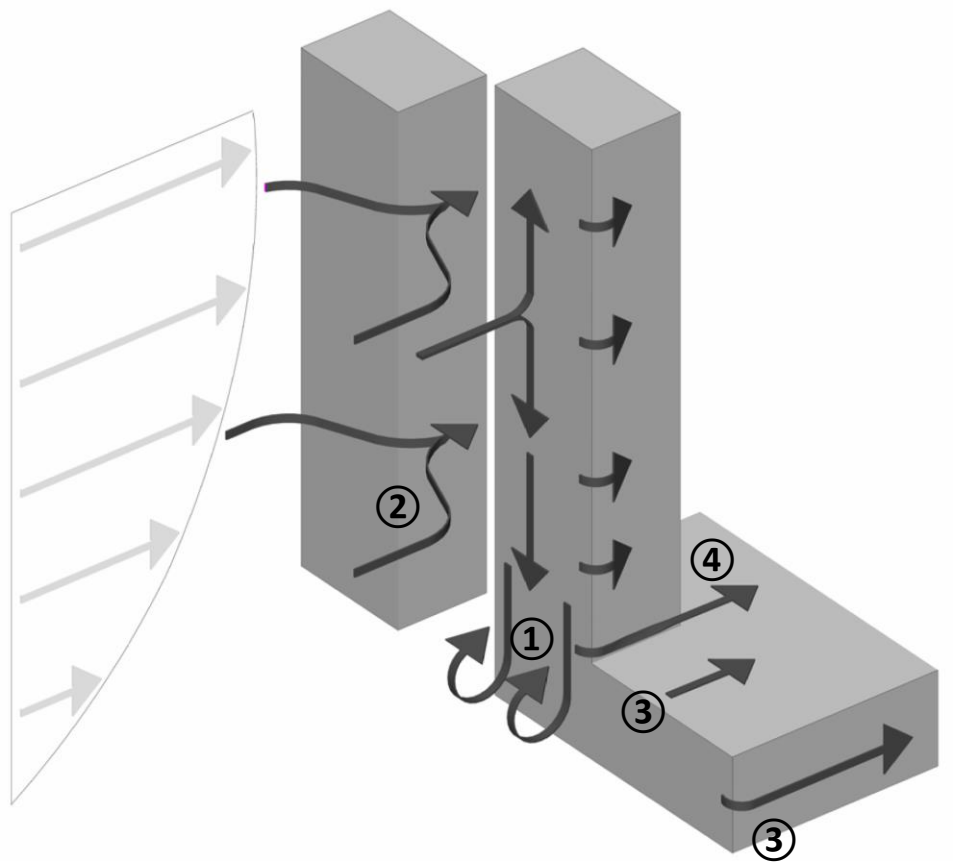
Notes:

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 and Building Entrances along Jeanne d'Arc Boulevard (Figure 2, Tags A & B): The proposed development is expected to provide protection from prominent northwesterly winds over the sidewalk along Jeanne d'Arc Boulevard. Downwash effects due to higher level winds are not expected, due to the low frequency of southeasterly winds combined with the narrow width of the proposed buildings as viewed from Jeanne d'Arc Boulevard.

Overall, conditions along the sidewalk (Tag A) are expected to be suitable for strolling, or better, during the summer and autumn season, becoming suitable for walking, or better, during the spring and winter. Owing to the protection provided by the building façade, conditions in the vicinity of building entrances (Tag B) are expected to be suitable for sitting during the summer and autumn, becoming suitable for standing, or better, during the spring and winter. These conditions are considered acceptable.

Outdoor Amenity Space at Northwest Corner (Figure 2, Tag C): While the outdoor amenity space at the northwest corner of the site will be open to direct winds from the northwest, the study building will provide protection from easterly winds. To ensure conditions are suitable for sitting during the typical use period of late spring through early autumn, mitigation may be necessary to protect from direct northwesterly winds, and from downwash effects from higher-level winds on Building B2. Mitigation strategies will be developed in collaboration with the building and landscape architects during the detailed design stage to ensure the comfort criteria are satisfied. Some potential strategies may include tall wind barriers (e.g. glazed guards and dense coniferous plantings), solid canopies, or locating more sedentary programming away from winder regions of the amenity space.

Outdoor Amenity Space at Northeast Corner (Figure 2, Tag D): While the outdoor amenity space at the northeast corner may experience some acceleration effects near the northeast corner of Building B3 during northerly winds, the study building will provide protection from direct westerly and southwesterly winds. Overall, conditions are expected to be suitable for sitting during the typical use period of late spring through early autumn, becoming suitable for strolling, or better, throughout the remainder of the year. These conditions are considered acceptable. Note, Building B3 will be introduced as a second phase of the project following confirmation that the lands are suitable for development.

Podium Rooftop Terraces (Figure 3, Tags E & F): If the podium rooftop terraces are intended to accommodate amenity space, it is recommended that the areas include wind barrier around their perimeters to protect the spaces from direct horizontal winds. Additionally, a canopy may be necessary to protect the areas over the east podium roof (Tag F) near Building B3 being considered for Phase 2from downwash of higher-level winds from the northwest. If amenity spaces are desired on these terraces, mitigation strategies will be developed in collaboration with the building and landscape architects during the detailed design stage to ensure the comfort criteria are satisfied.

Influence of the Proposed Development on Existing Wind Conditions near the Subject Site: The introduction of the proposed development is not expected to significantly influence pedestrian wind comfort over neighbouring areas. 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, the following general statements summarize our prediction of future wind conditions for the subject site at 1009 Trim Road in Ottawa, Ontario.

1. Wind comfort within most 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, and public sidewalks.

2. To ensure conditions are suitable for sitting during the typical use period of late spring through early autumn over the northwest amenity space, mitigation may be necessary to protect from direct northwesterly winds, and from downwash effects from higher-level winds on Building B2. Mitigation strategies will be developed in collaboration with the building and landscape architects during the detailed design stage to ensure the comfort criteria in Section 2.3 are satisfied. These mitigation strategies may include a combination of tall wind barriers and solid canopies to protect from direct and higher-level winds.

3. If amenity spaces are desired on the podium rooftop terraces, mitigation strategies will be developed in collaboration with the building and landscape architects during the detailed design stage to ensure the comfort criteria are satisfied.

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 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.

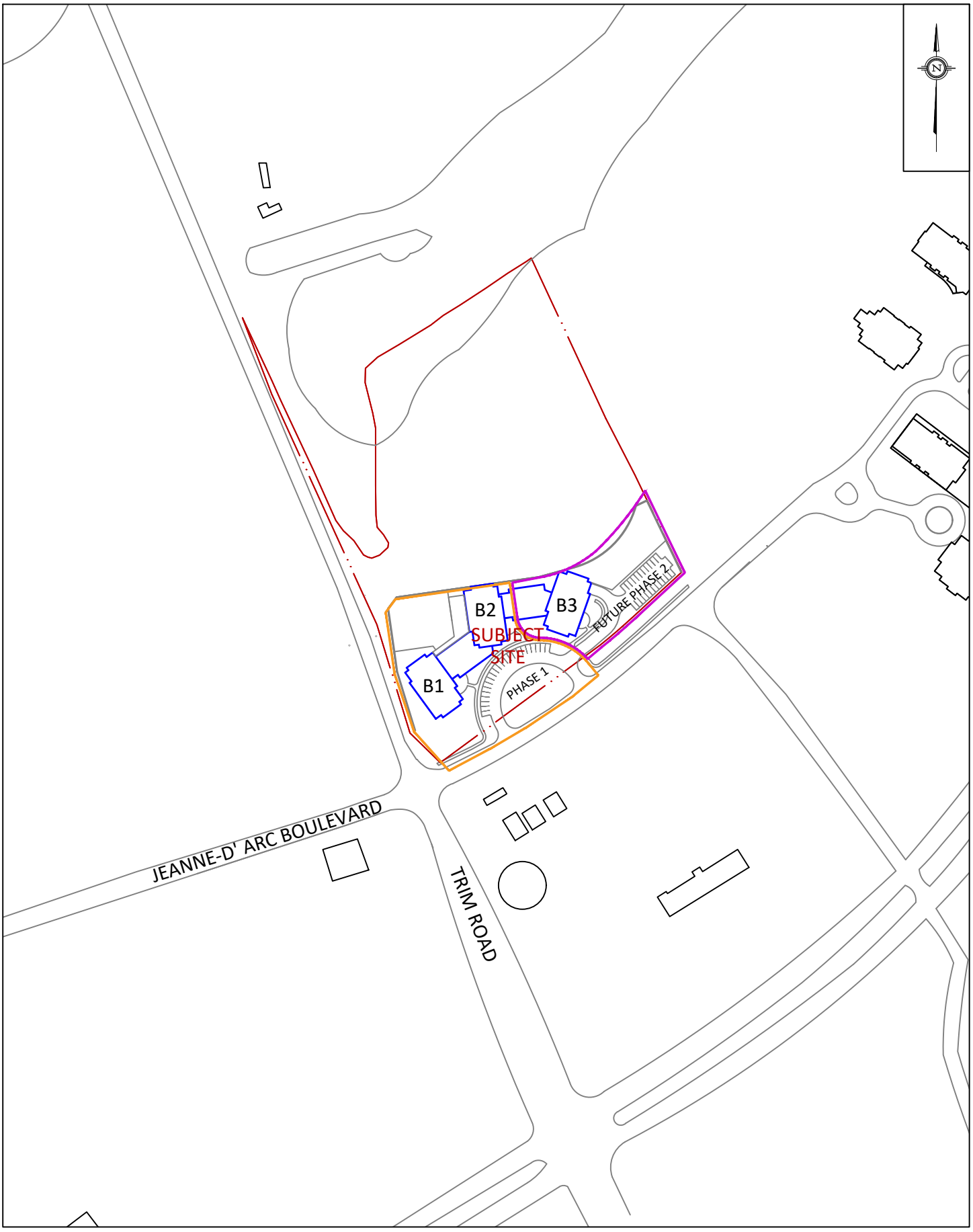
This concludes our qualitative assessment of pedestrian wind comfort. Please advise the undersigned of any questions or comments.

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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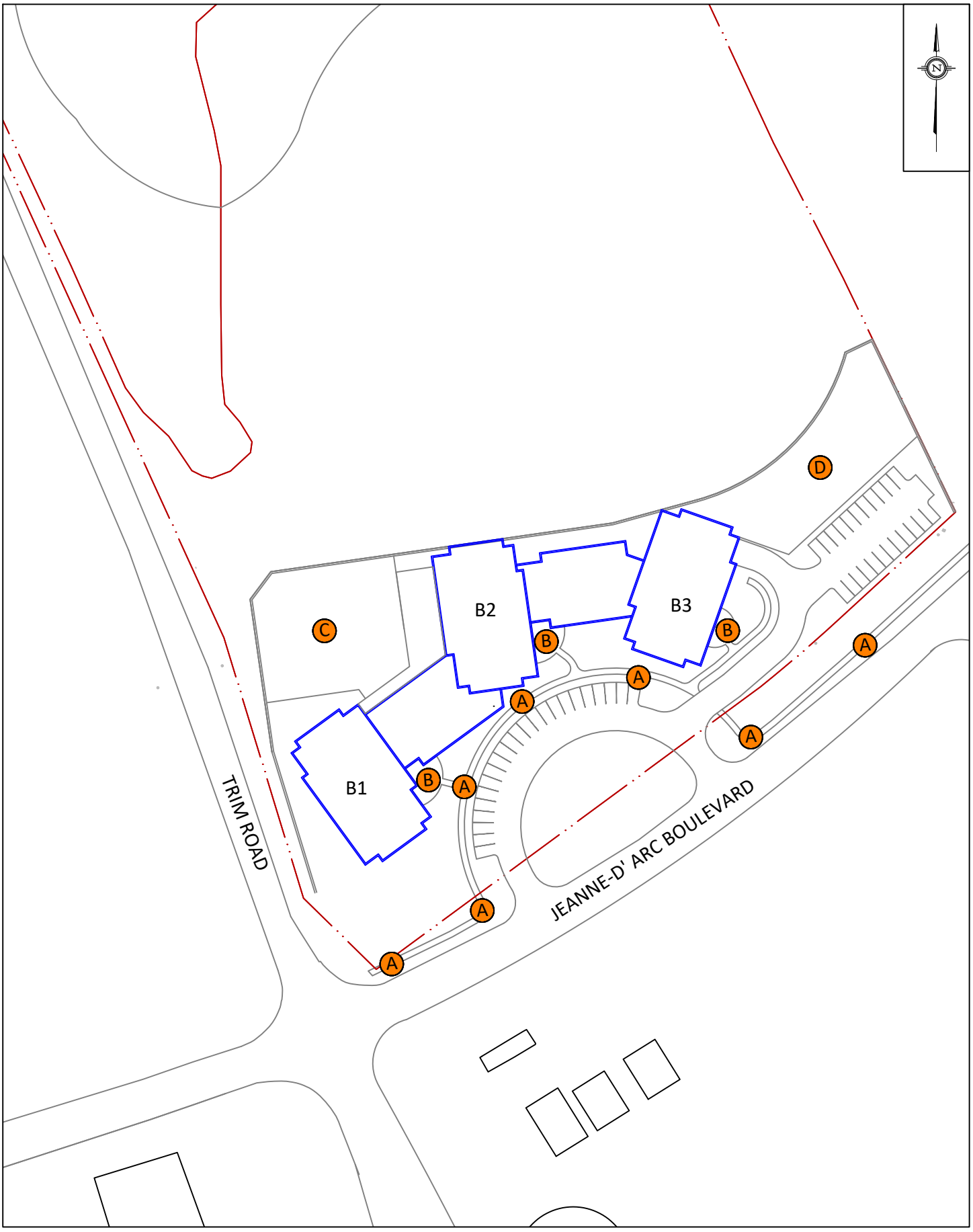
PROJECT	1009 TRIM ROAD, OTTAWA QUALITATIVE PEDESTRIAN LEVEL WIND ASSESSMENT		DESCRIPTION
SCALE	1:2000	DRAWING NO. 20-087-DTPLW-1	FIGURE 1: SITE PLAN AND SURROUNDING CONTEXT
DATE	SEPTEMBER 11, 2020	DRAWN BY N.M.P.	



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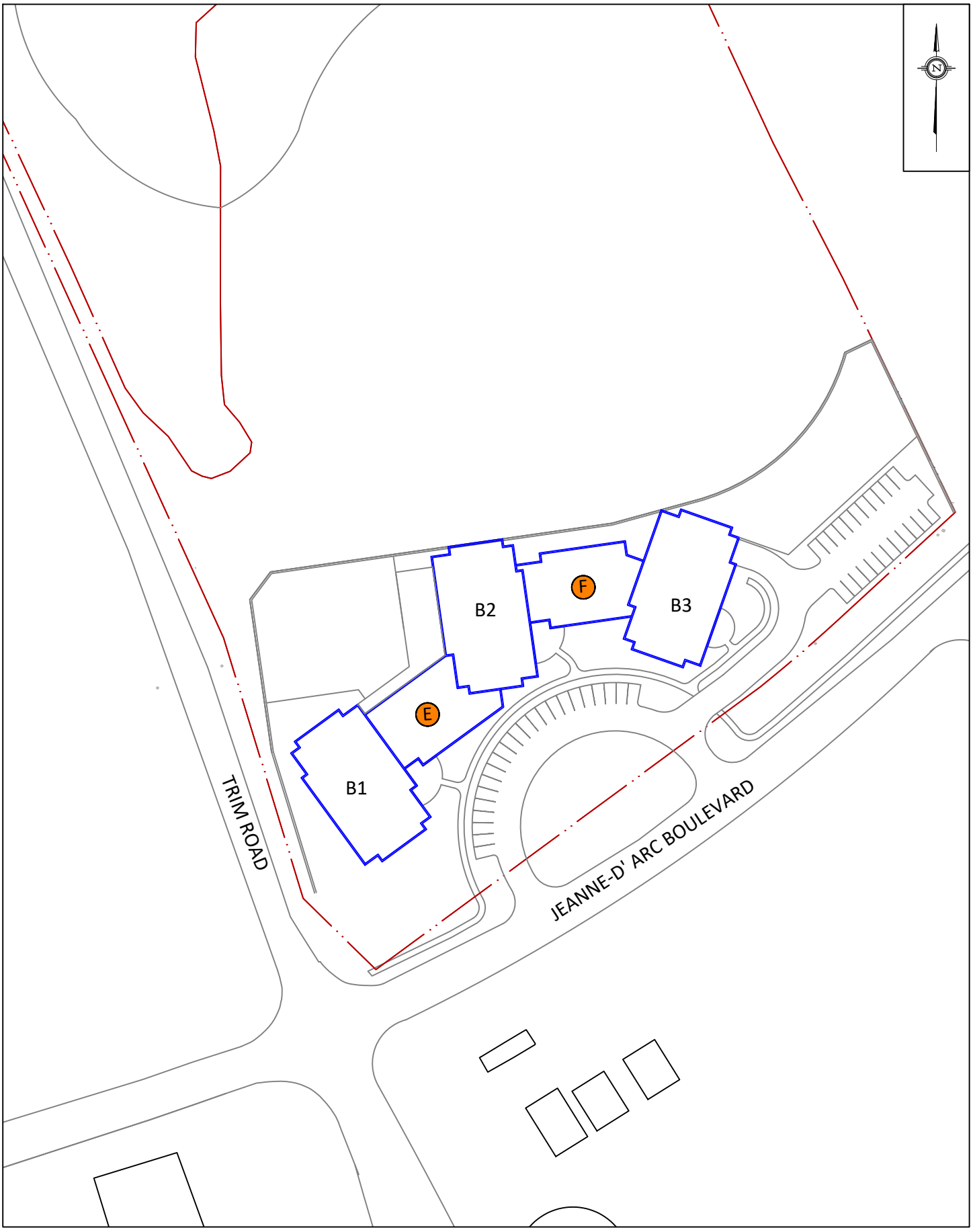
PROJECT	1009 TRIM ROAD, OTTAWA QUALITATIVE PEDESTRIAN LEVEL WIND ASSESSMENT		
SCALE	1:1250	DRAWING NO.	20-087-DTPLW-2
DATE	SEPTEMBER 11, 2020	DRAWN BY	N.M.P.

DESCRIPTION

FIGURE 2:
GROUND FLOOR PLAN
WITH REFERENCE MARKERS



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PROJECT	1009 TRIM ROAD, OTTAWA QUALITATIVE PEDESTRIAN LEVEL WIND ASSESSMENT		
SCALE	1:1250	DRAWING NO.	20-087-DTPLW-3
DATE	SEPTEMBER 11, 2020	DRAWN BY	N.M.P.

DESCRIPTION

FIGURE 3:
TERRACE PLAN
WITH REFERENCE MARKERS