February 7, 2018

Church Residences GP Inc. as a General Partner
and on behalf of Church Street Limited Partnership
134 Peter Street, Suite 200
Toronto, Ontario M5V 2H2

Re: Qualitative Pedestrian Level Wind Assessment
193-201 Church Street, Toronto
GWE File No.: 18-214-DTPLW

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Church Residences GP Inc., as a General Partner and on behalf of Church Street Limited Partnership, to undertake a qualitative pedestrian level wind assessment for the proposed mixed-use development at 193-201 Church Street in Toronto, Ontario. This report provides a qualitative assessment of pedestrian level wind comfort for the noted site based on drawings prepared by IBI Group in February 2019, consideration of existing and approved future surrounding buildings, statistical knowledge of the Toronto wind climate, and experience with similar projects in Toronto.

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 mixed-use high-rise development at 193-201 Church Street. The study site is located near the centre of a parcel of land bounded by Church Street to the west, Dundas Street East to the north, Dalhousie Street to the east, and Shuter Street to the south.

The proposed development is a 37-storey building of nearly rectangular planform with the long axis oriented along Church Street. Ground floor contains a residential lobby and townhouse units fronting Church Street (located north to south, respectively), as well as building support function rooms and a

loading area in the remaining space. A vehicle entrance at the northeast corner provides access from Dalhousie Street to the loading area and an indoor ramp leading to four levels of underground parking. Level 2 features indoor amenity spaces and two covered outdoor amenity spaces overlooking Church Street and Dalhousie Street (comprising a dog run for the east outdoor amenity area), whereas the remaining space is occupied by building support function spaces or a continuation of the use at ground floor. Level 3 similarly comprises a mixture of indoor amenity and larger covered outdoor amenity spaces. At Level 4, the floorplate variably sets back from the west side to accommodate a large outdoor amenity area, while indoor amenity and residential units occupy the remaining space. At Level 5, the floorplate extends at the west side to create a rectangular planform that partially overhangs the outdoor amenity area below. The floorplate extends on the west elevation at Level 10 and sets back from the south and east sides at Level 11. The floorplate also extends to the south at Level 29 and sets back on the north and west sides at Level 37. The building is topped by a 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 a mixture of low and medium-rise buildings in all directions. Notably, a row of attached medium-rise buildings occupies nearly the entire west perimeter of the adjacent city block to the east across Dalhousie Street, a 29-storey building is under construction at 60 Shuter Street to the south of the study site, and an approved development at 215-229 Church Street (52 storeys) is to the north of the site. The far-field surroundings (defined as the area beyond the near field and within a two-kilometer radius) comprises a mixture of low, medium, and scattered high-rise buildings, with increasing density and proportion of high-rise buildings from southwest clockwise to north, towards the downtown core and Bloor Street corridor.

The ground floor and roof plans are illustrated in Figures 1 and Figures 2-4, respectively (following the main text), with letter tags identifying wind sensitive pedestrian locations considered in this assessment.

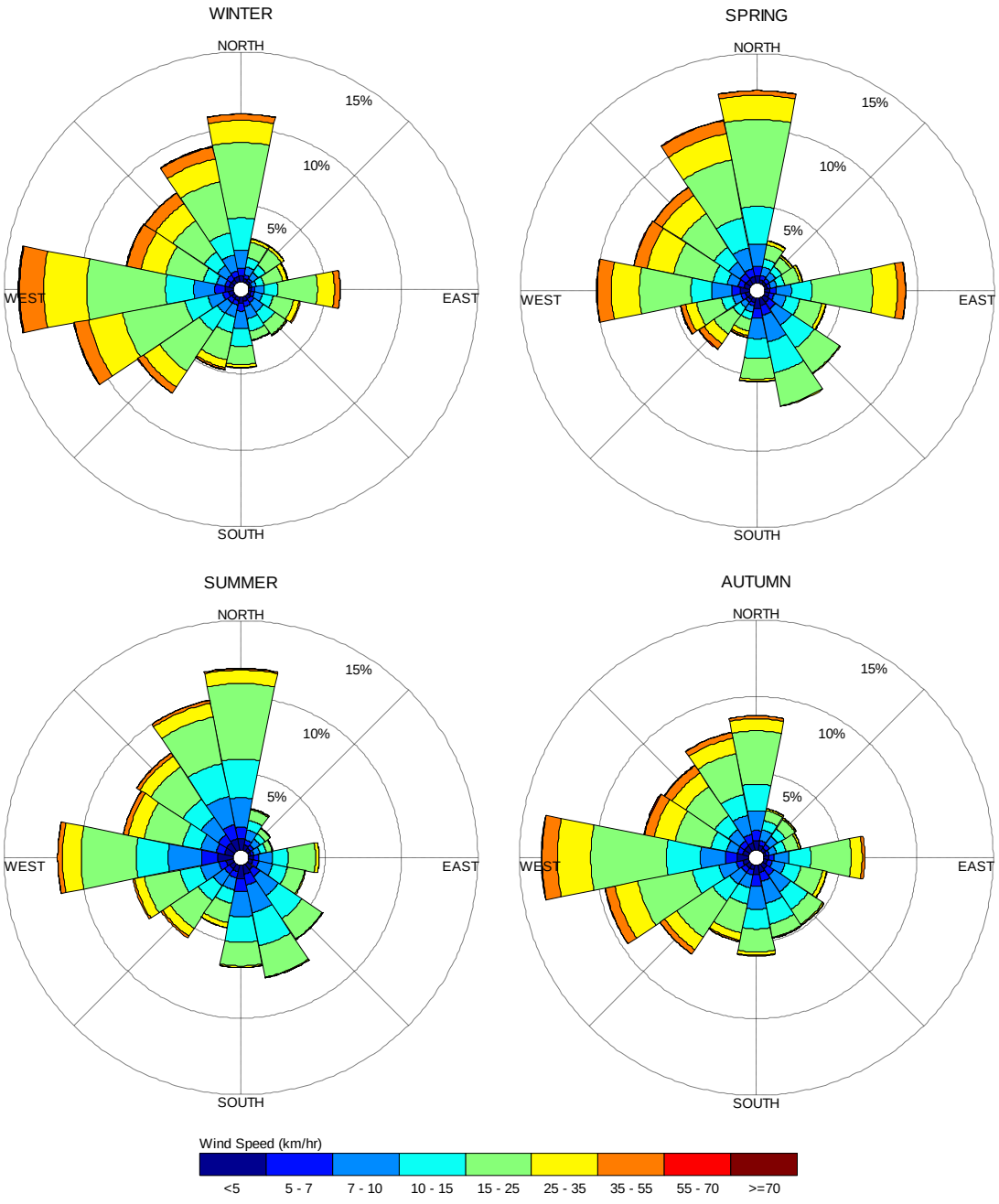
2. METHODOLOGY

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 Toronto Wind Climate

The statistical model of the Toronto 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 Toronto, 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



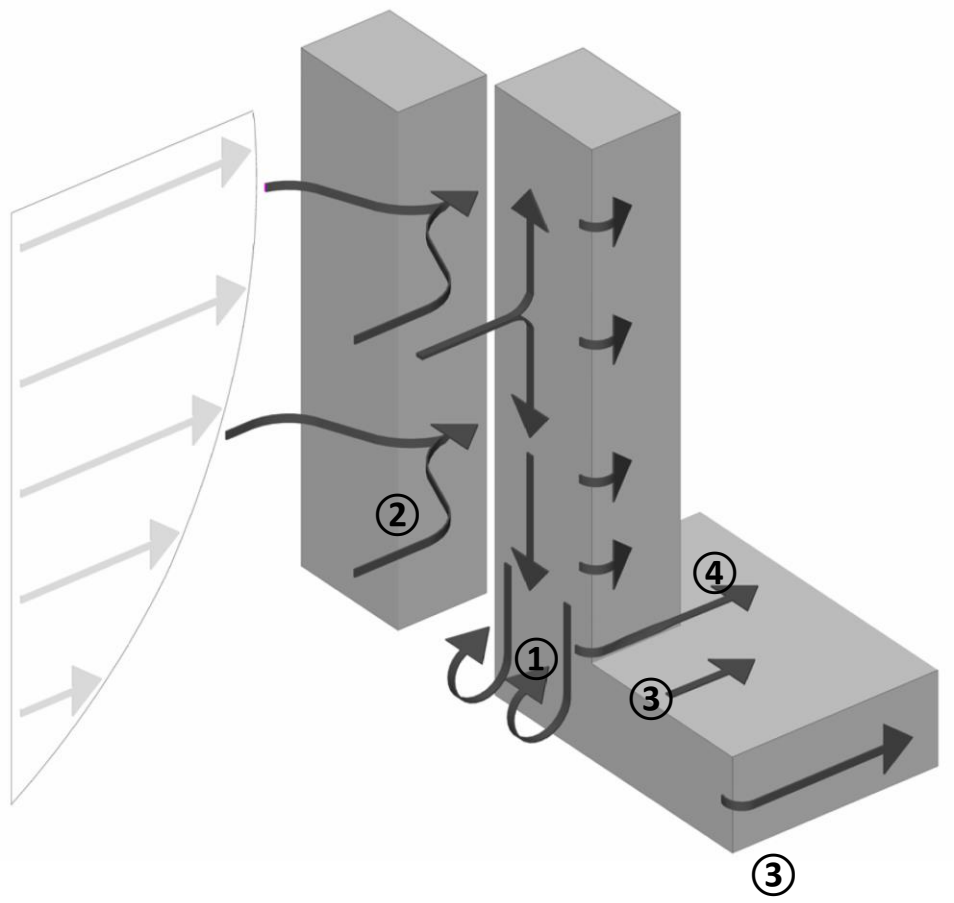
Notes:

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 mixed-use development at 193-201 Church Street in Toronto, 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 Church Street, inclusive of Building Entrances (Tags A and B): Although the Church Street corridor is aligned with prominent northwesterly wind directions and populated with several high-rise buildings in the vicinity of the study site, the surrounding massing is mostly low to medium-rise and is therefore not expected to significantly promote additional channeling effects along the roadway. The corridor is well shielded from all remaining wind directions by the surrounding massing. The relatively narrow width of the tower facing prominent westerly winds, combined with the various setbacks and overhangs, will also limit the downwash of high-level winds towards grade.

Overall, the sidewalk along Church Street is expected to be suitable for sitting or standing throughout the spring, summer, and autumn, and for standing or walking during the winter. The building entrances from

Church Street will experience additional protection from winds due to their proximity to the building façade, and are therefore expected to be suitable for sitting during the summer and autumn and sitting or standing for the remainder of the year. These conditions are acceptable.

Sidewalk along Dalhousie Street, inclusive of Building Entrances (Tags C & D): The Dalhousie Street corridor is populated by medium to higher-rise buildings and is similarly aligned with northwest wind directions. The channeling of prominent northwesterly winds along the corridor may therefore be anticipated. Downwash of less-frequent easterly winds is not expected to influence pedestrian comfort along the sidewalk. Additionally, the area will be shielded from prominent grade-level westerly and easterly winds by the surrounding massing.

The sidewalk along Dalhousie Street to the east of the study building (Tag C), as well as all adjacent entrances (Tag D), are therefore expected to be suitable for sitting or standing during the summer and standing for the remainder of the year. These conditions are acceptable for the intended uses of the spaces.

Existing Parking Lot (Tag E): The existing parking lot near the northeast corner of the study building will be well protected from all prominent wind directions by the surrounding massing and the study building itself. The high-rise development at 215-229 Church Street will also shield the space from high-level northerly winds travelling down the study building. Conditions over this lot are expected to be suitable for sitting throughout the year, which is acceptable.

Elevated Outdoor Amenity Areas Overlooking Church Street (Tags F, H & J): The elevated outdoor amenity areas serving Levels 2 and 3 at the northwest corner of the building (Tags F and H, respectively) are well shielded from southerly and easterly winds by the massing of the study building, while remaining more exposed to direct west and north quadrant winds. These spaces are also shielded from downwash winds by the floorplate of the floors above. Overall, these terraces are expected to be suitable for sitting during the intended use period of late spring to early autumn without mitigation, which is acceptable.

The large outdoor amenity area located at the west side of Level 4 (Tag J), will be shielded from easterly winds by the study building itself, and to an extent from northerly winds by the adjacent development at 215-229 Church Street. The terrace will remain more exposed to prominent westerly winds with less upwind resistance. The various setbacks and overhangs in the tower above Level 4 will serve to somewhat

mitigate the downwash of high-level westerly winds from impacting the space. To ensure acceptable wind conditions suitable for sitting occur over this amenity area during the intended use period, it may be necessary to provide a vertical wind barrier along the perimeter of the terrace. The need for, and extent of, mitigation will be confirmed as part of a detailed wind study, to be completed at a later date.

Elevated Outdoor Amenity Areas Overlooking Dalhousie Street (Tags G & I): The elevated outdoor amenity areas inset to Levels 2 and 3 at the east side of the building (Tags G and I, respectively) will be protected from all wind directions by the study building and the surrounding massing. These spaces are also shielded from downwash winds by the floorplate of the floors above and are therefore expected to be suitable for sitting without mitigation throughout the year, which is acceptable.

Influence of the Proposed Development on Existing Wind Conditions near the Study 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, 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 Toronto wind climate, the following general statements summarize our prediction of future wind conditions for the proposed mixed-use development at 193-201 Church Street in Toronto, Ontario.

1. Wind comfort at all 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 and building access points.

2. Wind conditions over the outdoor amenity areas serving Levels 2 and 3 will be suitable for sitting during the intended use period of late spring to early autumn without mitigation, which is acceptable. For the Level 4 outdoor amenity terrace, mitigation in the form of wind barriers may be recommended to ensure appropriate wind conditions. The need for, and extent of, mitigation will be confirmed as part of a detailed wind study, to be completed at a later date.

3. 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, laneways, 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.

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.

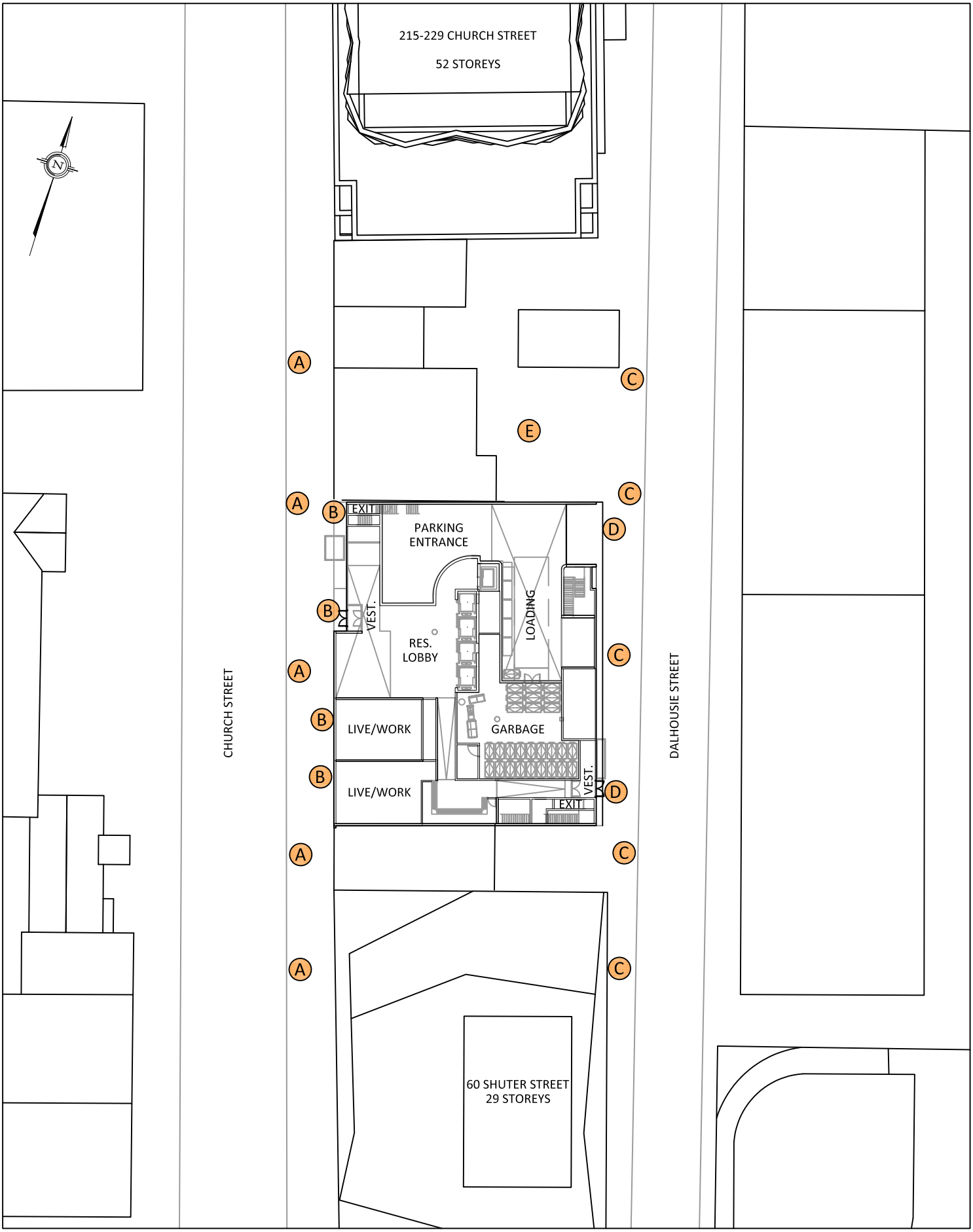
Sincerely,

Gradient Wind Engineering Inc.

Megan Prescott, MESc.,
Project Manager

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

GWE18-214-DTPLW



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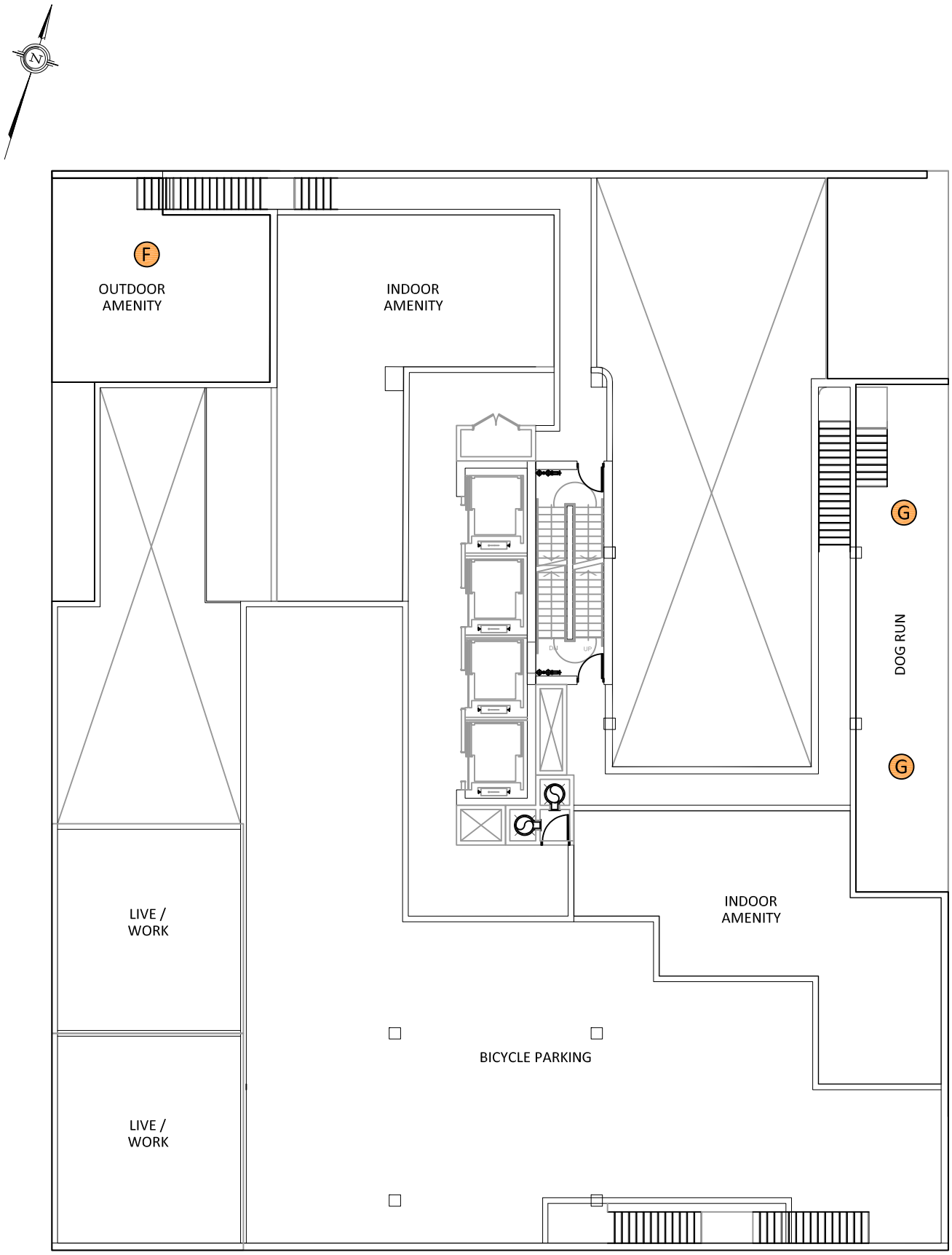
PROJECT	193-201 CHURCH STREET, TORONTO QUALITATIVE PEDESTRIAN LEVEL WIND ASSESSMENT
SCALE	1:600 (APPROX.)
DRAWING NO.	GWE18-214-DTPLW-1
DATE	FEBRUARY 7, 2019
DRAWN BY	B.J.
DESCRIPTION	FIGURE 1: GROUND FLOOR PLAN WITH REFERENCE MARKERS



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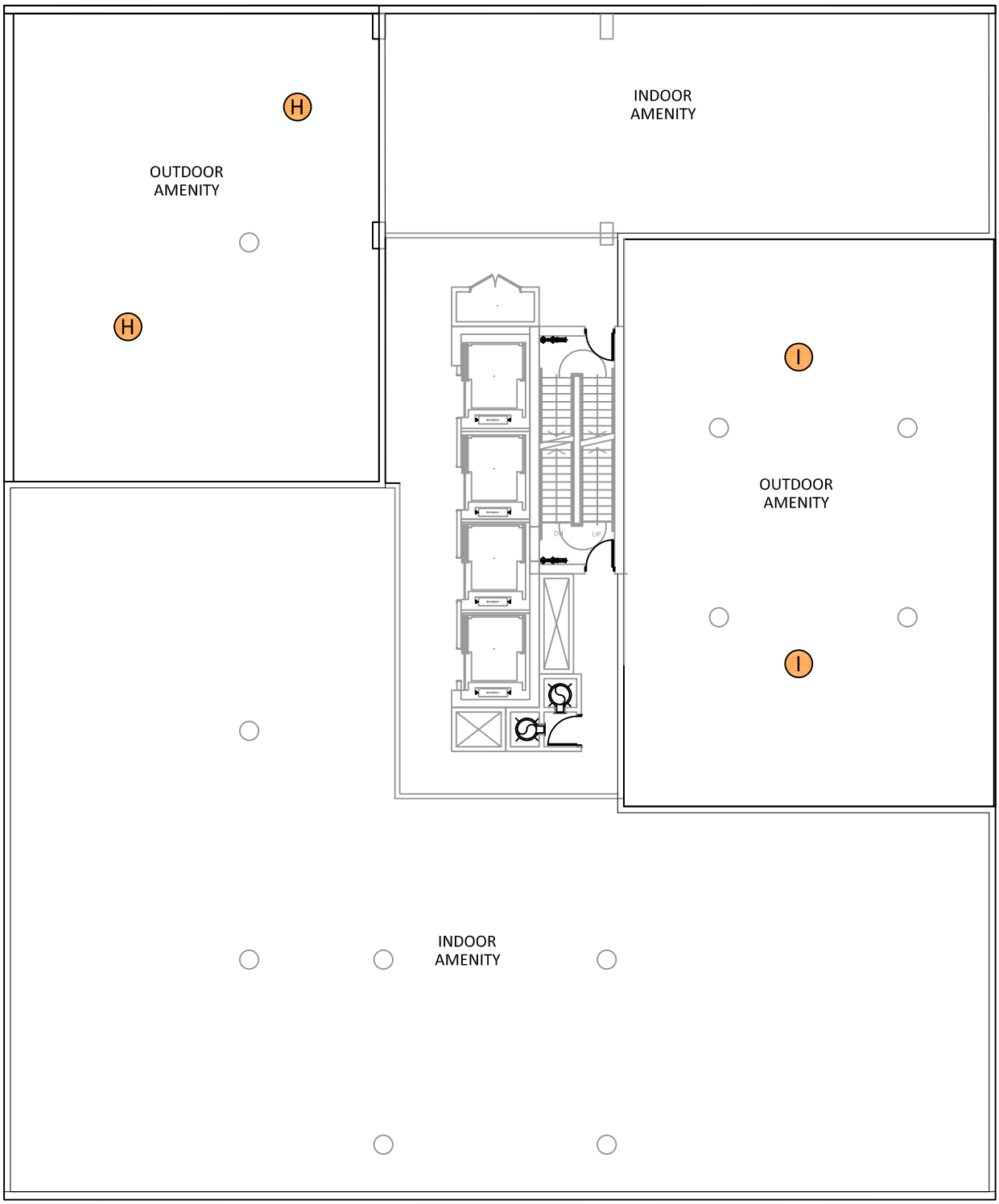
PROJECT	193-201 CHURCH STREET, TORONTO QUALITATIVE PEDESTRIAN LEVEL WIND ASSESSMENT		DESCRIPTION FIGURE 2: LEVEL 2 OUTDOOR AMENITY AREA WITH REFERENCE MARKERS
SCALE	1:200 (APPROX.)	DRAWING NO.	GWE18-214-DTPLW-2
DATE	FEBRUARY 7, 2019	DRAWN BY	B.J.



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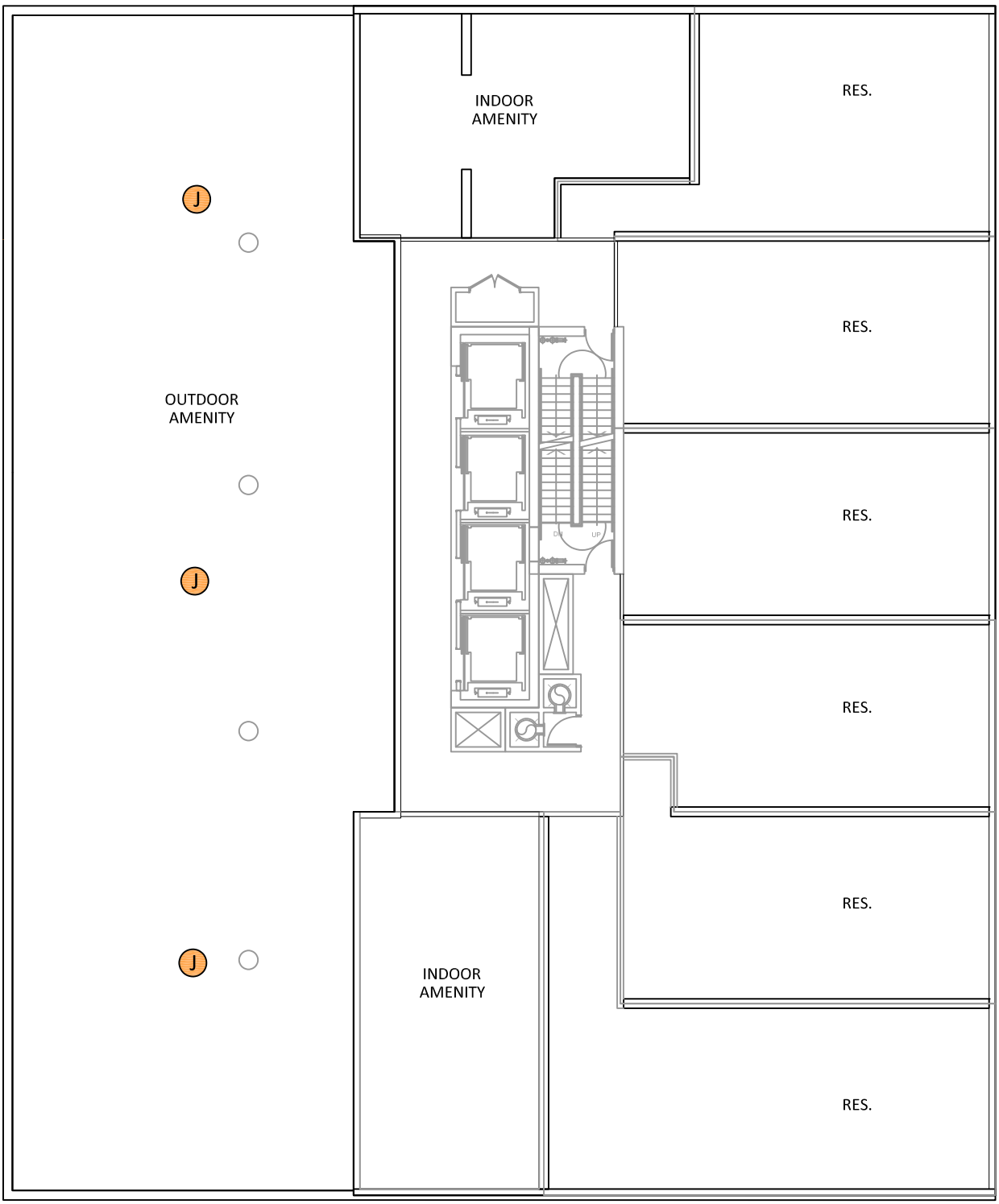
PROJECT	193-201 CHURCH STREET, TORONTO QUALITATIVE PEDESTRIAN LEVEL WIND ASSESSMENT		DESCRIPTION FIGURE 3: LEVEL 3 OUTDOOR AMENITY AREA WITH REFERENCE MARKERS
SCALE	1:200 (APPROX.)	DRAWING NO.	GWE18-214-DTPLW-3
DATE	FEBRUARY 7, 2019	DRAWN BY	B.J.



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PROJECT	193-201 CHURCH STREET, TORONTO QUALITATIVE PEDESTRIAN LEVEL WIND ASSESSMENT		DESCRIPTION FIGURE 4: LEVEL 4 OUTDOOR AMENITY AREA WITH REFERENCE MARKERS
SCALE	1:200 (APPROX.)	DRAWING NO.	GWE18-214-DTPLW-4
DATE	FEBRUARY 7, 2019	DRAWN BY	B.J.