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November 18, 2019

Mr. Ronald Hong
TRG Casablanca Inc.
2100 Old Lakeshore Road
Burlington, Ontario L7R 1A3

c/o Mr. Jacob Dosman
Weston Consulting
Jdosman@westonconsulting.com

Re: Preliminary Pedestrian Wind Assessment
Casablanca Development
4 Windward Drive
Grimsby, Ontario
RWDI Project #1800708

Dear Gentlemen:

Rowan Williams Davies & Irwin Inc. (RWDI) has prepared has completed our preliminary wind assessment for the proposed Casablanca Development at 4 Windward Drive in Grimsby, Ontario. This wind assessment was completed in support of the Official Plan Amendment (OPA) and Zoning By-law Amendment (ZBA) applications for this project.

This preliminary assessment on pedestrian wind conditions is a qualitative review of the local wind climate and the design information received by RWDI as of October 30, 2019, combined with our experience of wind-tunnel testing for similar projects.

Wind-tunnel testing will be required in support of the Site Plan Approval (SPA) application, which will provide a quantitative evaluation of the wind flows around the proposed development.

BUILDING AND SITE INFORMATION

The project site is bordered by Winston Road, North Service Road and Windward Drive in Grimsby, Ontario (see Image 1). There is an existing hotel on the site that will be demolished. The immediate surrounding area is primarily low-rise suburban single and multi-family residential dwellings, with open fields, roadways and Niagara Escarpment to the south, and Lake Ontario approximately 250 metres to the north.

The project consists of 12- and 19-storey towers atop 3- and 4- story podiums (see Image 2). The 19-story tower will be Phase 1. This assessment is of the full build with both phases in place. Pedestrian areas on and around the development include building entrances, grade level outdoor amenity space and patios, outdoor terraces at most levels, rooftop terraces, walkways, and a parking lot.

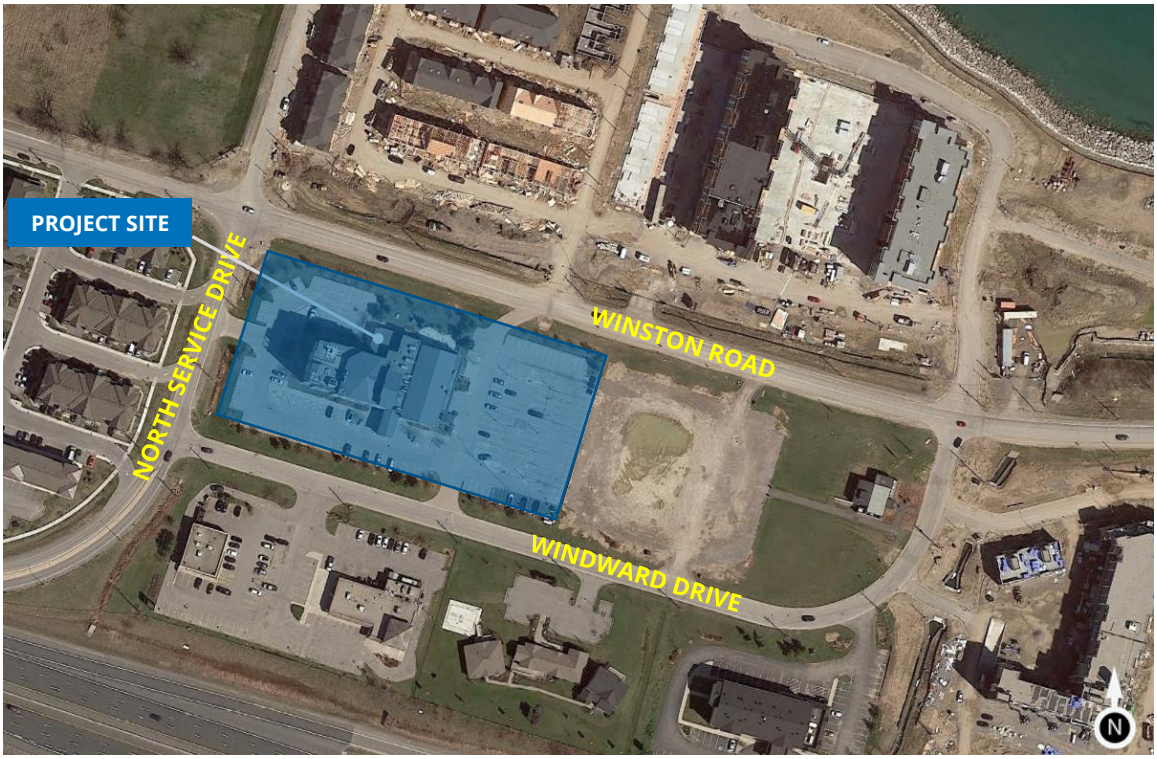

Image 1: Aerial View of the Site and Surroundings (Google™ Earth)

Image 2: Winston Road View of the Proposed Development (looking southeast)

METEOROLOGICAL INFORMATION

Long-term wind statistics from Hamilton International Airport (1985 to 2015) are presented in the form of wind roses in Image 3. This is the closest weather station to the site with long-term, reliable meteorological data.

There are other nearby weather stations in the area, namely Burlington Pier and St Catharines Airport. They have a similar wind directionality to the wind data recorded at the Hamilton International Airport, but the data at Burlington Pier and St Catharines Airport is much less reliable than the Hamilton data.

The wind data in Image 3 indicates that winds from the southwest quadrant and northeast direction are most prevalent in both summer (May through October) and winter (November through April). Strong winds (yellow and red bands in Image 3) occur more frequently in winter than in summer and are the winds that are typically associated with uncomfortable or unsafe events.

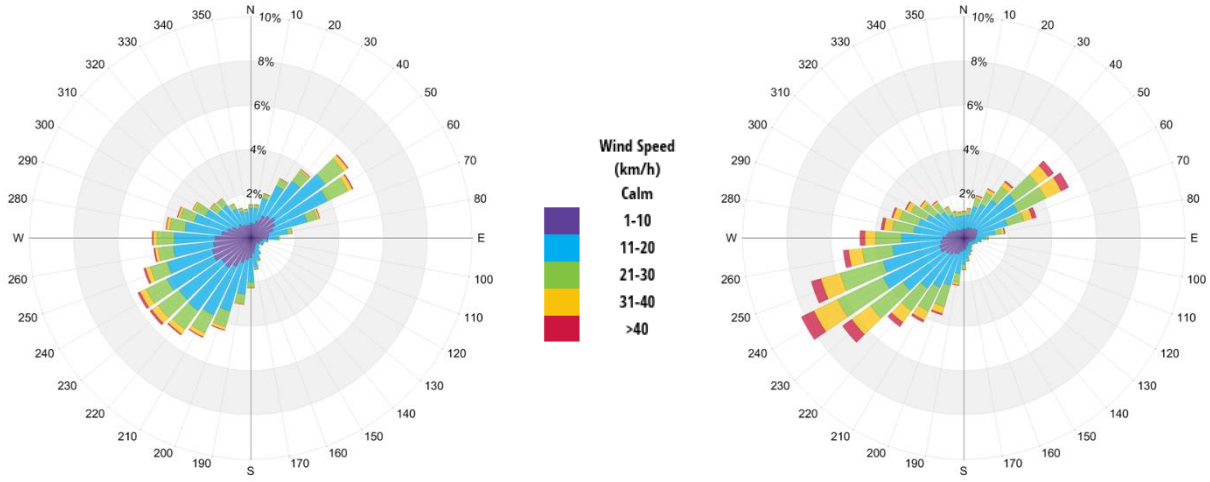

Image 3: Direction Distribution of Winds Recorded at Hamilton International Airport (1985 to 2015)

PEDESTRIAN WIND ASSESSMENT

To provide an opinion on the overall wind conditions expected on and around the proposed project, RWDI reviewed the long-term meteorological data for the area, drawings of the proposed project and information regarding the existing surroundings. These data, in conjunction with our experience in the area and our engineering judgment, allowed us to summarize the expected wind conditions at the project site. Our findings are summarized below.

Wind Flow Patterns

The proposed buildings will be notably taller than their surroundings and will be exposed to winds from the prevailing directions.

Taller buildings tend to intercept the stronger winds at higher elevations and redirect them to the ground. Such a *Downwashing* Flow (see Image 4a) is often the main cause for wind accelerations around large buildings at the pedestrian level.

Furthermore, when winds approach a large façade at an oblique angle and are deflected down, a localized increase in the wind activity or *Corner Acceleration* can be expected around the downwind building corner at grade level (see Image 4b).

When two buildings are situated side by side, such as the two towers of the development, wind flow tends to accelerate through the space between the buildings due to *Channelling Effect* caused by the narrow gap (see Image 4c).

Design details like setting back a tall tower from the edges of a podium are positive design features for wind mitigation.

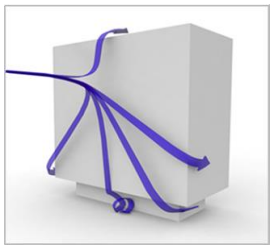

Image 4a: Downwashing Flow

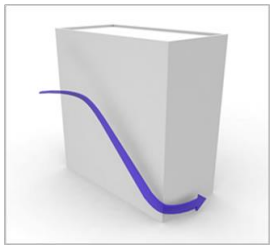

Image 4b: Corner Acceleration

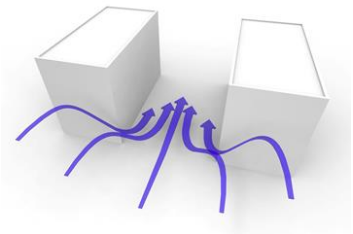

Image 4c: Channeling Effect

Entrances

The primary entrances to the residential / hotel towers are to be located in the gap between the two towers. Although this gap does not align directly with prevailing winds, there is a significant risk of winds channelling through there creating uncomfortable wind conditions at grade level (see Images 4c and 5). This condition will require some significant wind control including one or more of the following concepts:

- the inclusion of a tall 50% to 70% porous wind screen (see Image 5 for two possible locations and approximate size), and
- well-recessed entrances into their respective façades, and
- landscaping on either side of entrances to protect the doors from wind.

These wind control concepts are expected to significantly improve the conditions and would need to be wind tunnel tested to confirm the predicted conditions, their efficacy and refine their design.

A secondary entrance for the Phase 2 residential tower will be located in the 'V' of the podium facing northeast. In this case, northeast winds are likely to downwash off the tower toward grade level. Given that this entrance is well recessed, and it will be afforded protection by the cantilevered floorplate above, this entrance should be acceptable. These design features should be preserved.

Restaurant and retail entrances in Phase 1 are located along the west façade of the podium off the patio area. Conditions here are expected to be acceptable for entrances and would require some localized wind protection for areas where more passive activities are planned (i.e., outdoor patios / dining areas). These could be in the form of vertical wind screens and/or landscaping strategically placed to provide conditions comfortable for sitting.

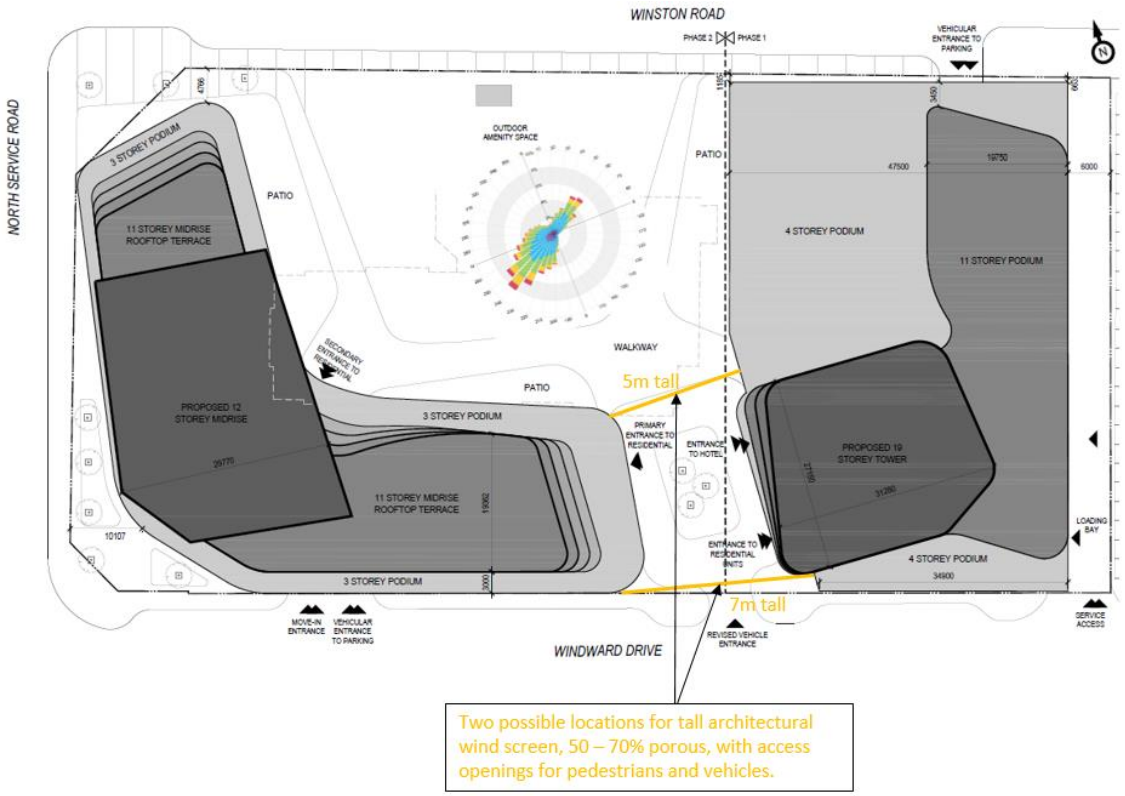

Image 5: Proposed Site Plan Showing Entrance Locations and Wind Control Concept

Walkways and Building Perimeter

The strong prevailing winds that will downwash off the tower façades are expected to accelerate around the northwest and southeast building corners. Accelerated wind speeds and uncomfortable conditions during winter are expected near these corner areas. We recommend discouraging pedestrian activities near these building corners or considering appropriate wind control strategies (e.g., building canopies and/or local wind screens and/or a landscape plan that takes into account winds in important pedestrian areas).

The outdoor amenity space is currently located at the north side of the property well away from the towers, which would likely avoid significant wind accelerations. Conditions here are expected to be generally acceptable. If there is a desire to provide localized areas of greater comfort, then strategically located wind control (e.g., vertical wind screens and/or landscaping) should be considered.

The patios along the northeast edge of the Phase 2 tower will be subject to downwashing northeasterly winds. To mitigate any negative effects from these winds, overhead canopies and/or free standing trellises supplemented with landscaping should be used to provide overhead wind protection.

Elevated Terraces and Rooftop Terraces

Wind speeds on the tower terraces should generally be acceptable at lower levels and will become less comfortable with increased height. The most vulnerable will be those located in the gap between the Phase 1 and 2 towers and those closest to the northwest and southeast corners of the towers.

The Level 4 podium on Phase 1 is expected to have acceptable wind conditions on its northern half (i.e., closer to Winston Road). As one approaches the tower toward the south end of this terrace, winds will become less comfortable. These conditions may require consideration for the proposed programming on the terrace and/or the inclusion of wind control strategies such as tall vertical wind screens and landscaping. The Level 4 terrace on the south side of the Phase 1 tower is expected to have acceptable wind conditions.

The rooftop terraces on Phase 2 will both be exposed to winds accelerating off the tower façade. These could be significant and would require consideration in the programming and/or significant wind control strategies.

For larger outdoor terraces, the notion of incorporating wind protection to achieve good comfort over the entire area is often difficult. A preferred approach is to strategically install wind protection to provide localized areas of improved comfort for passive pedestrian activities.

Winter wind conditions on elevated terraces are expected to be uncomfortable or even unsafe in some locations. For this reason, access to the elevated terraces should be prohibited during the winter. If access is desired, then more extensive wind mitigation would be required.

CONCLUSIONS

The proposed development includes several positive design features for wind control (e.g., the large podium, tower setbacks and recessed entrances). Thus, suitable wind conditions are generally expected along the walkways, ground-level outdoor amenity space and the Phase 1 Level 4 terrace on the south side of the tower.

Strong winds are expected through the gap between the two phases and at the northwest and southeast corners of the towers, and the elevated terraces. These could be uncomfortable and potentially unsafe in the winter. Conceptual wind control strategies have been recommended.

Given the scale of this project, exposure of the site and proximity to the lake, wind tunnel testing of a scale model is recommended. This should be done as soon as possible in an effort to confirm and quantify the conditions predicted here and allow enough time to develop/refine wind control strategies prior to the SPA submission.

CLOSING

We trust this satisfies your requirements for the project. Should you have any questions or require additional information, please do not hesitate to contact us.

Yours very truly,

ROWAN WILLIAMS DAVIES & IRWIN Inc.

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FK/smd