REPORT

388 CONCESSION STREET

HAMILTON, ONTARIO

PEDESTRIAN WIND COMFORT ASSESSMENT

PROJECT #2600772
November 12, 2025

SUBMITTED TO

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1. INTRODUCTION

Rowan Williams Davies & Irwin Inc. (RWDI) was retained to conduct a pedestrian wind assessment for the proposed project at 388 Concession Street in Hamilton, Ontario. The objective of this assessment is to provide an evaluation of the potential wind impact of the proposed development in support of the Site Plan Control Application (SPA).

The project site is located southeast of the intersection of Concession Street and East 15th Street, surrounded by low-rise suburban neighbourhoods (Image 1). A few mid-rise buildings exist west of the site.

The project is a residential development that will be a 10 storeys building with 150 - 175 units. Key areas of interest for this assessment include the main entrances to the building and public sidewalks and properties near the project site (Image 3).

Image 1: Aerial view of the existing site and surroundings
Source: Google Maps

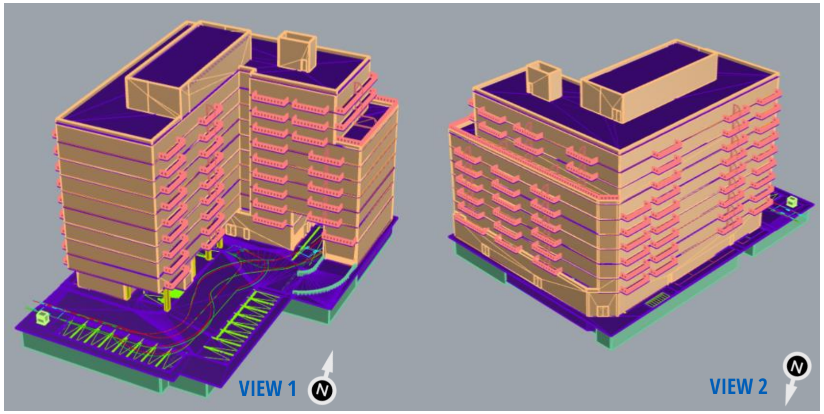


Image 2: Conceptual Massing of the Proposed Project

1. INTRODUCTION

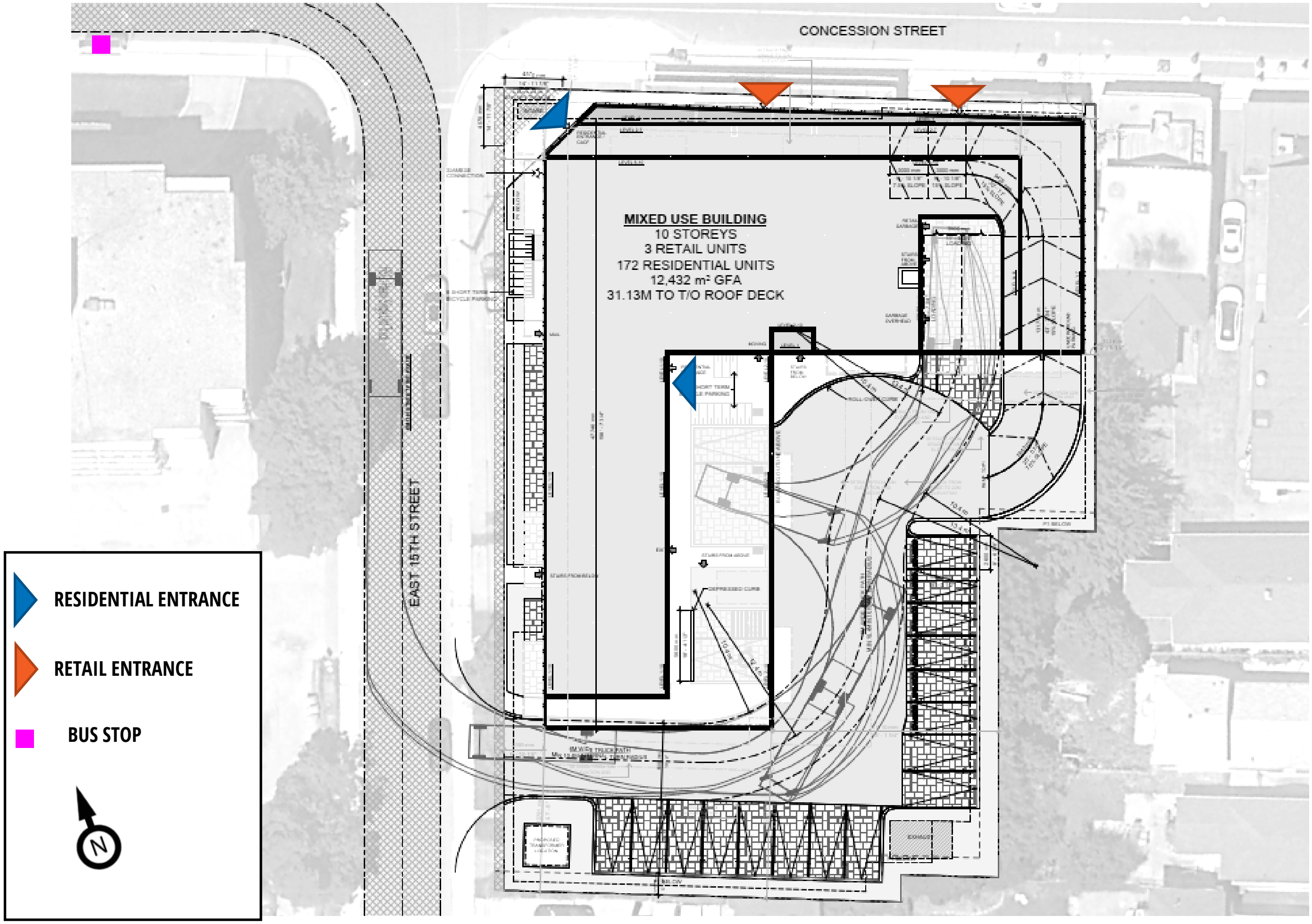


Image 3: Site Plan identifying Key Areas of Interest

2. METHODOLOGY

2.1 Objective

The objective of this assessment is to provide an evaluation of the potential impact of the proposed development on wind conditions in pedestrian areas on and around it based on Computational Fluid Dynamics (CFD) modelling. The assessment is based on the following:

- A review of the regional long-term meteorological data from Hamilton International Airport;
- 3D model of the proposed project received on October 21, 2025;
- The use of *Orbital Stack*, an in-house CFD tool;
- RWDI's engineering judgment, experience, and expert knowledge of wind flows around buildings[1-3]; and,
- The RWDI wind comfort and safety criteria.

Note that other microclimate issues such as those relating to cladding and structural wind loads, door operability, air quality, snow impact, noise, vibration, etc. are not part of the scope of this assessment

2.2 CFD for Wind Simulation

CFD is a numerical technique that can be used for simulating wind flows in complex environments. For this analysis, CFD techniques were used to generate a virtual wind tunnel where flows around the site and its surroundings were simulated in full scale. The computational domain that covered the site and its surroundings was divided into millions of small cells where calculations were performed, yielding a prediction of wind conditions across the entire study domain. CFD excels as a tool for wind modelling, presenting early design advice, comparing different design and site scenarios, resolving complex flow physics, and helping diagnose problematic wind conditions.

While the computational modelling method used in the current assessment does not explicitly simulate the transient behaviour of turbulent wind, its effects were estimated based on other calculated quantities. RWDI has found this approach to be appropriate for the assessment of typical wind comfort conditions. Wind safety issues, which relate to transient, higher-speed gusts, are discussed qualitatively, based on the CFD predictions and our extensive wind-tunnel experience for similar projects.

In order to quantify the transient behaviour of wind and refine any conceptual mitigation measures, a more detailed assessment would be required using either boundary-layer wind tunnel or transient computational modelling.

2.3 Simulation Model

CFD simulations were completed for two scenarios:

- Existing: Existing site and surroundings, and
- Proposed: Proposed development with the existing surroundings.

The computer model of the proposed building is shown in Image 4, and the Existing and Proposed configurations with the proximity model are shown in Images 5a and 5b, respectively. The 3D models were simplified to include only the necessary building and terrain details that would affect the local wind flows in the area and around the site. Landscaping and other smaller architectural and accessory features were not included in the computer model in order to provide more conservative wind conditions (as is the norm for this level of assessment).

The wind approaching the modelled area were simulated for 16 directions (starting at 0°, at 22.5° increments around the compass), accounting for the effects of the atmospheric boundary layer and terrain impacts. Wind data were obtained in the form of ratios of wind speeds at approximately 1.5m above concerned levels, to the mean wind speed at a reference height. The data was then combined with meteorological records obtained from Hamilton International Airport to determine the wind speeds and frequencies in the simulated areas.

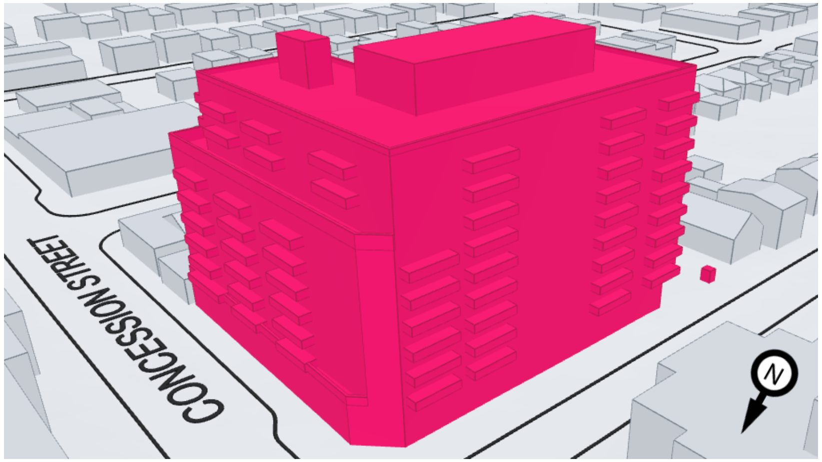


Image 4: Computer model of the proposed project

Image 5a: Computer model of the existing site and extended surroundings

2. METHODOLOGY

Image 5b: Computer model of the proposed project and extended surroundings

2. METHODOLOGY

2.4 Meteorological Data

Long-term wind data recorded at Hamilton International Airport between 1994 and 2024, inclusive, were analyzed for the summer (May to October) and winter (November to April)) months. Image 6 graphically depicts the directional distributions of wind frequencies and speeds for these periods.

For both the summer and winter seasons, winds from the southwesterly and northeasterly directions are predominant, as shown in Image 6. Strong winds of a mean speed greater than 30 km/h measured at the airport (at an anemometer height of 10m) are more frequent in the winter (red and yellow bands in Image 6). These winds potentially could be the source of uncomfortable or severe wind conditions, depending on the site exposure and development design.

Wind statistics were combined with the simulated data to predict the wind conditions at the project site and assessed against the wind criteria for pedestrian comfort.

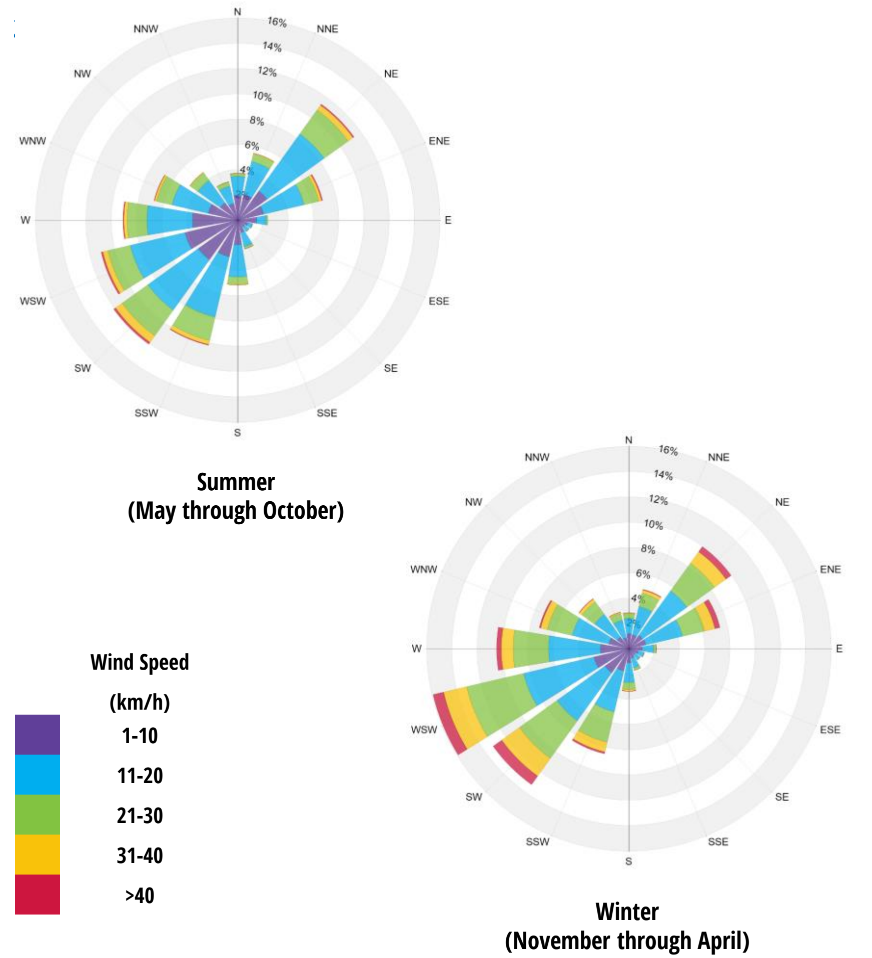


Image 6: Directional distribution of wind approaching Hamilton International Airport (1994 to 2024)

3. WIND CRITERIA

The RWDI pedestrian wind criteria are used in the current study; the criteria presented in the table below, addresses pedestrian safety and comfort. These criteria have been developed by RWDI through research and consulting practice since 1974. They have also been widely accepted by municipal authorities, building designers and the city planning community.

3.1 Pedestrian Comfort

Pedestrian comfort is associated with common wind speeds conducive to different levels of human activity. Wind conditions are considered suitable for sitting, standing, strolling or walking if the associated mean wind speeds (see table) are expected for at least four out of five days (80% of the time). The assessment considers winds occurring between 6 AM and midnight. Limited usage of outdoor spaces is anticipated in the excluded period. Speeds that exceed the criterion for Walking are categorized Uncomfortable. These criteria for wind forces represent average wind tolerance. They are sometimes subjective and regional differences in wind climate and thermal conditions as well as variations in age, health, clothing, etc. can also affect people's perception of the wind climate.

Comfort Category	GEM Speed (km/h)	Description (Based on seasonal compliance of 80%)
Sitting	≤ 10	Calm or light breezes desired for outdoor seating areas where one can read a paper without having it blown away
Standing	≤ 14	Gentle breezes suitable for main building entrances, bus stops, and other places where pedestrians may linger.
Strolling	≤ 17	Moderate winds appropriate for window shopping and strolling along a downtown street, plaza or park .
Walking	≤ 20	Relatively high speeds that can be tolerated if one's objective is to walk, run or cycle without lingering.
Uncomfortable	> 20	Strong winds considered a nuisance for all pedestrian activities. Wind mitigation is typically recommended.

3.2 Pedestrian Safety

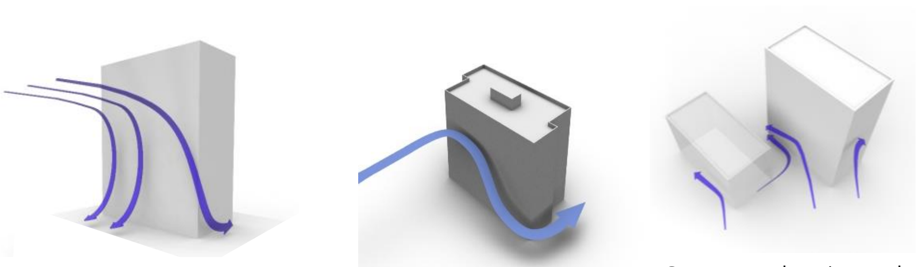
Pedestrian safety is associated with excessive Gust Speeds that can adversely affect a person's balance and footing. These are usually infrequent events but deserve special attention due to the potential impact on pedestrian safety.

Safety Criterion	Gust Speed (km/h)	Description (Based on annual exceedance of 9 hrs or 0.1% of time)
Exceeded	> 90	Excessive gusts that can adversely affect one's balance and footing. Wind mitigation is typically required

4. RESULTS AND DISCUSSION

4.1 Wind Flow around Buildings

Wind generally tends to flow over buildings of uniform height, without disruption. Buildings that are taller than their surroundings tend to intercept and redirect winds around them. The mechanism in which winds are directed down the height of a building is called *Downwashing*. These flows subsequently move around exposed building corners, causing a localized increase in wind activity due to *Corner Acceleration*. Wind accelerations can also be caused by C*hannelling Effect* through the space between buildings. These flow patterns are illustrated in Image 7.



Downwashing

Corner Acceleration

Corner acceleration and channeling

Image 7: General wind flow patterns

4.2 Presentation of Results

The results of the assessment are presented and discussed in detail in Sections 4.3 and 4.4. Image 8 shows the predicted seasonal wind conditions at grade for the Existing and Proposed configurations. The graphical presentation is in the form of colour contours of wind speeds calculated based on the wind comfort criteria (Section 3.1), approximately 1.5 m above the concerned levels. The assessment against the safety criterion (Section 3.2) was conducted qualitatively based on the predicted wind conditions and our extensive experience with wind tunnel assessments. The discussion also includes recommendations for wind control, where necessary, to reduce the potential for high wind speeds for the design team's consideration.

Target Conditions

For the current development, wind speeds comfortable for walking or strolling are appropriate for sidewalks and walkways where pedestrians are likely to be active and moving intentionally. Lower wind speeds comfortable for standing are required for entrances, bus stops and areas where people are expected to wait and generally be engaged in passive activities. Calm speeds comfortable for sitting are ideal for seating areas.

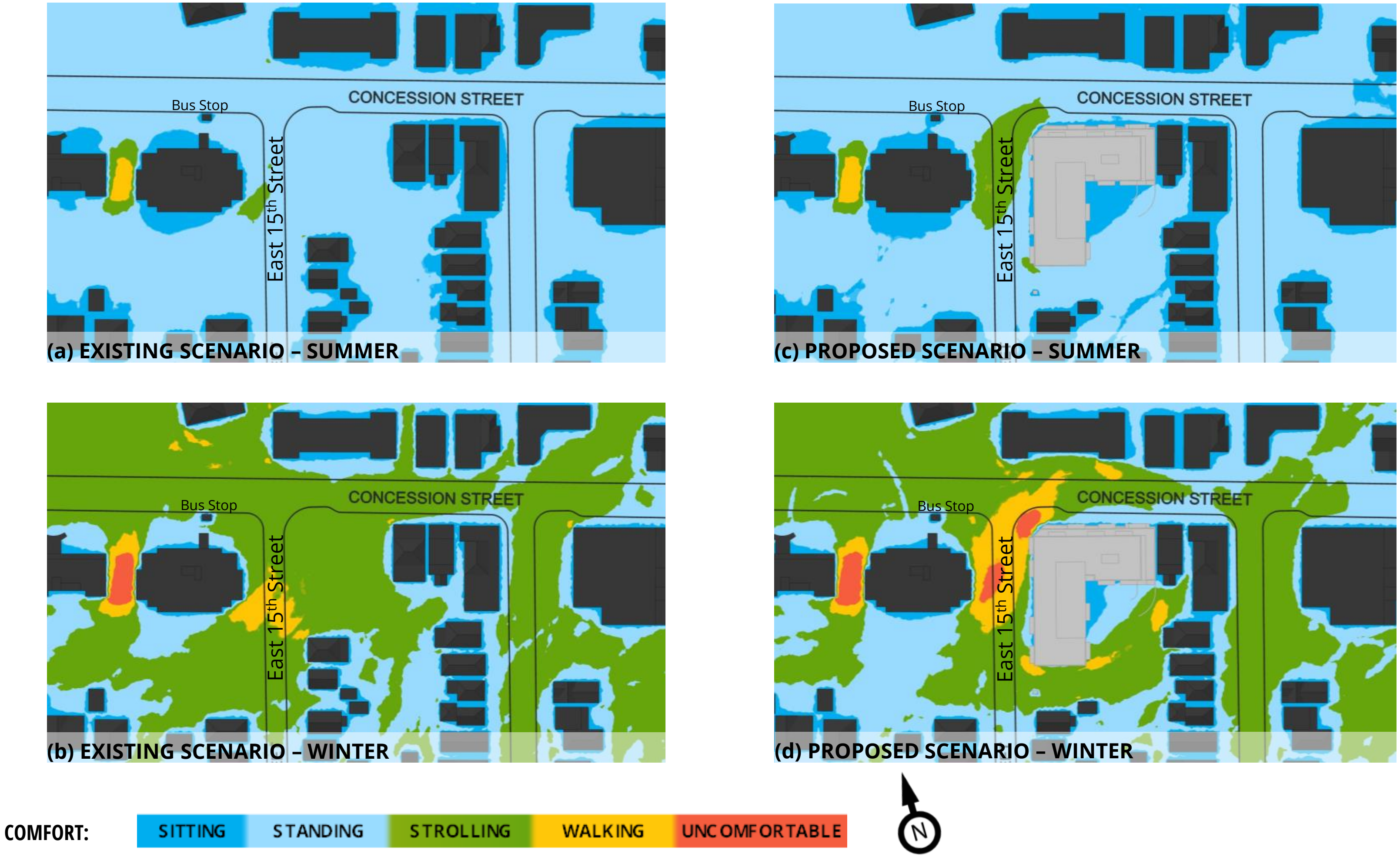
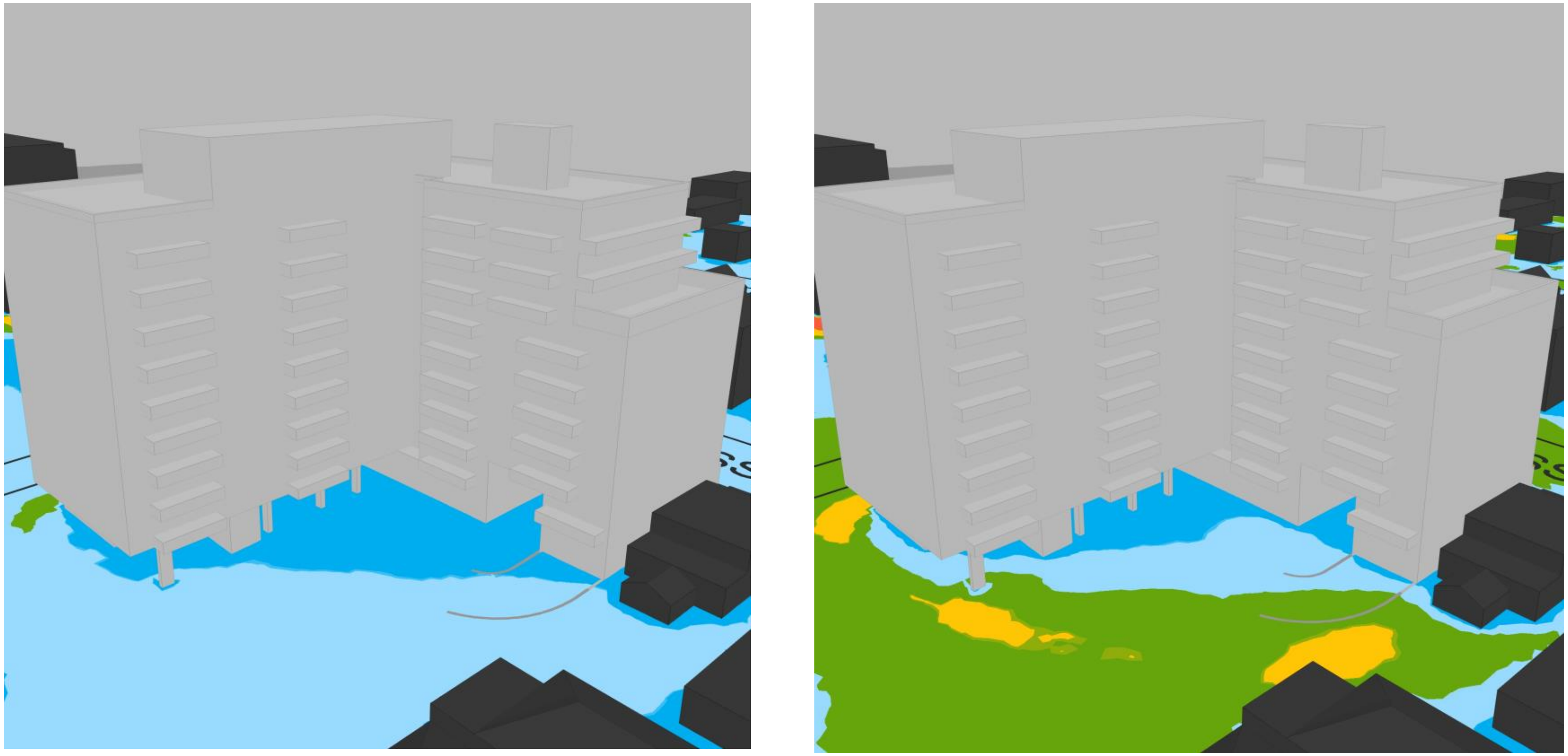


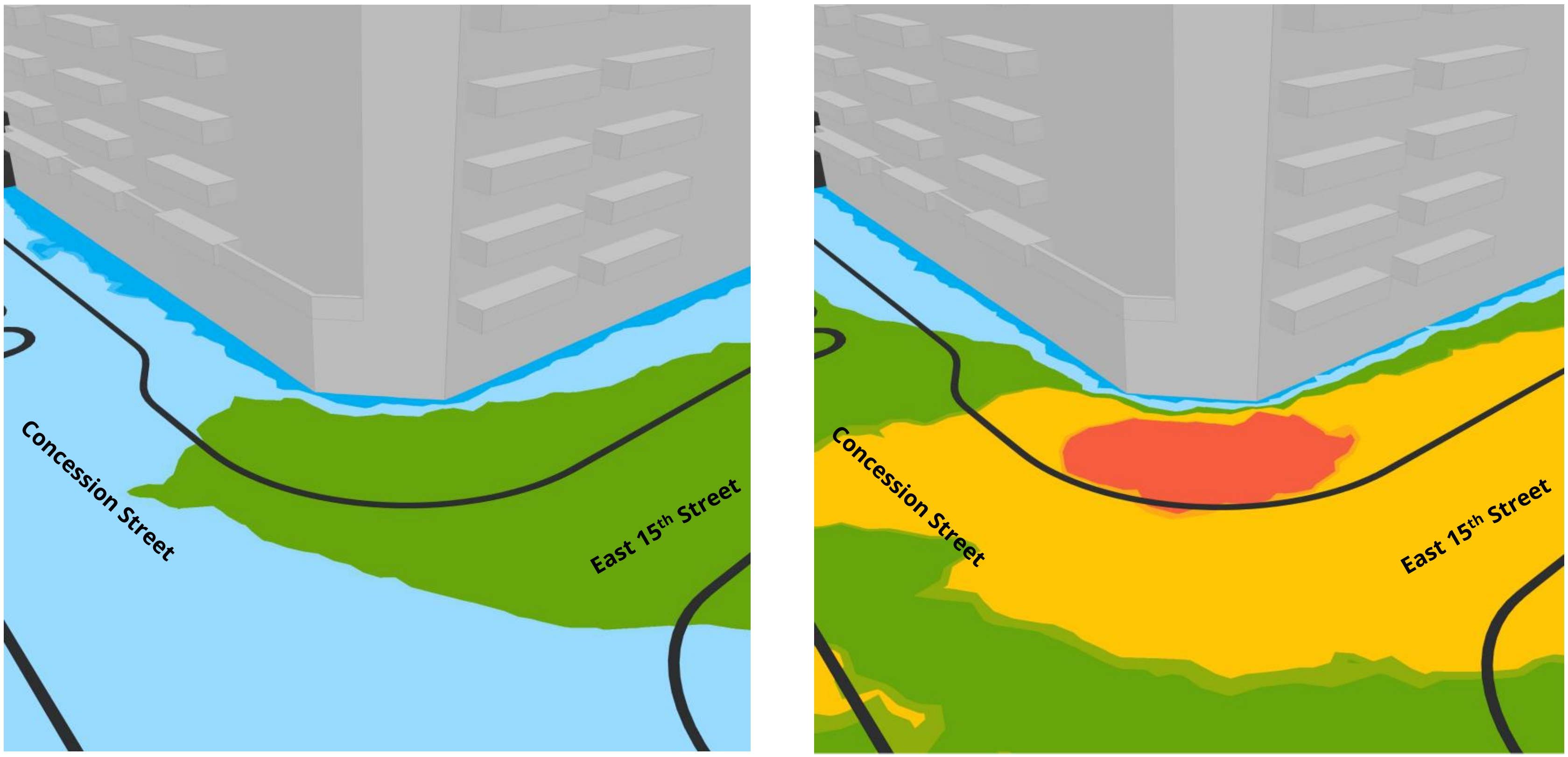
Image 8: Predicted wind conditions – Ground Level



(a) Summer (b) Winter

COMFORT: SITTING | STANDING | STROLLING | WALKING | UNCOMFORTABLE

Image 9: Predicted wind conditions – SE Entrance

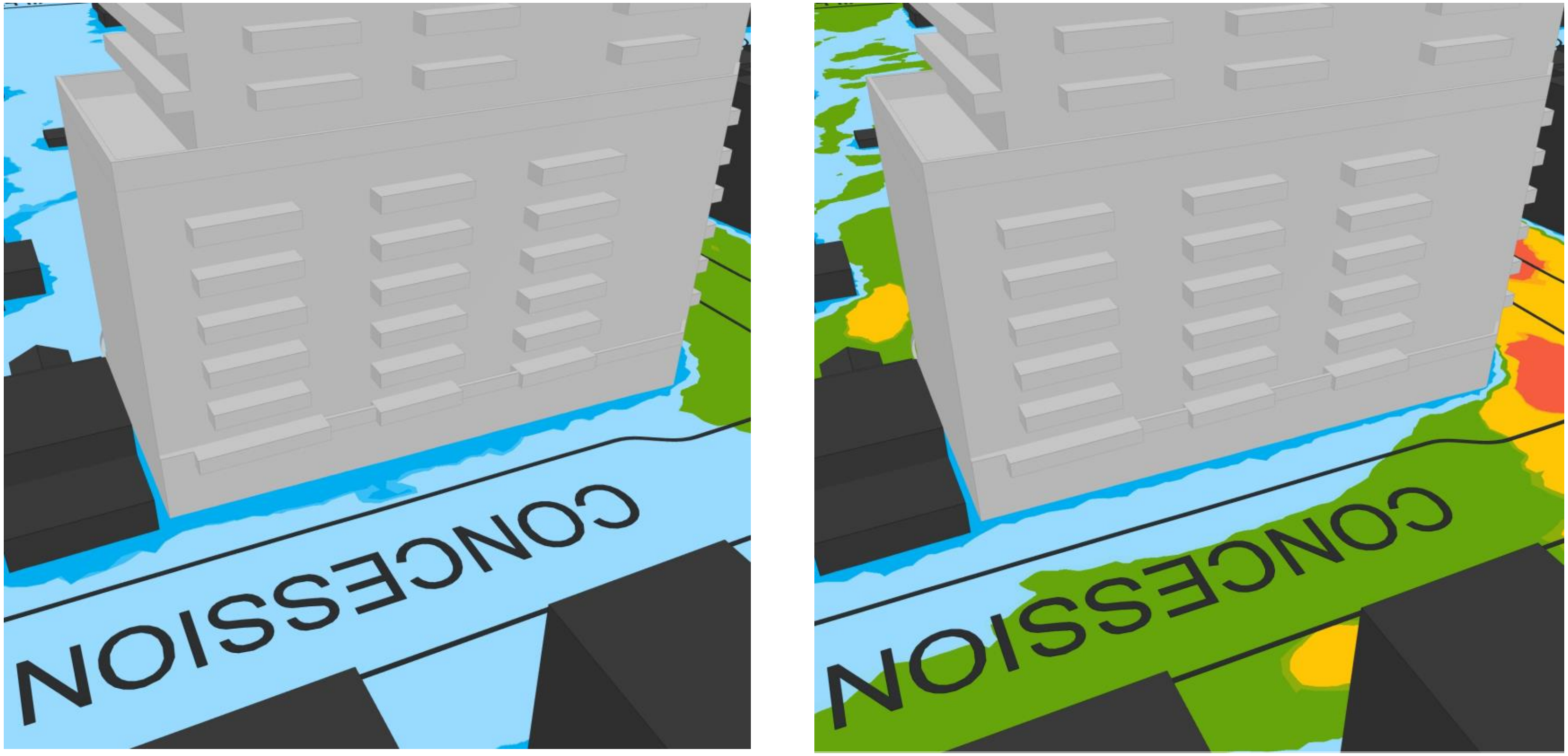


(a) Summer **(b) Winter**

COMFORT: SITTING | STANDING | STROLLING | WALKING | UNCOMFORTABLE

Image 10: Predicted wind conditions – NW Entrance

4. RESULTS AND DISCUSSION



(a) Summer

(b) Winter

COMFORT: SITTING | STANDING | STROLLING | WALKING | UNCOMFORTABLE

Image 11: Predicted wind conditions – Retail Entrance

4. RESULTS AND DISCUSSION

4.3 Existing Scenario

Wind conditions at all areas in the existing scenario are considered comfortable for standing or sitting in the summer (blue regions in Image 8a). Conditions are considered comfortable for strolling or standing in the winter (green regions in Image 8b). Higher wind speeds comfortable for walking in the summer, and rated uncomfortable in the winter, occur in the area between the mid-rise buildings located to the west of the site on Concession Street. Wind speeds comfortable for walking occur near the building across from the site on 15th Street. Wind speeds that meet the safety criterion are expected at all areas on and around the site.

4.4 Proposed Scenario

4.4.1 Sidewalks and Neighbouring Properties

The proposed project is taller than most surrounding buildings and the flow mechanisms described in Section 4.1 are expected to occur around it. An increase in wind speeds is expected on the adjacent streets, particularly around the west of the site and the corners of the proposed building. Positively, decreased wind speeds can be expected on the south side of the proposed building.

The wind speeds at most sidewalks and areas outside the property including the bus stop on Concession Street are expected to continue to be comfortable for standing in the summer, and for strolling or standing in the winter, similar to the existing scenario (Images 8c and 8d). These conditions are appropriate for sidewalk use.

Relatively higher wind speeds are expected around the northwest corner and on E 15th Street, with conditions comfortable for strolling in the summer and for walking in the winter. During the winter months, potentially uncomfortable conditions are expected occasionally at the northwest corner of the building massing, and on the west side of E 15th St (see orange regions in Image 8d). These high speeds can be attributed largely to winds approaching from the northeast, and secondary winds from the southwest that are downwashed and redirected around the corners of the building. The critical flow paths from the CFD simulations are presented in Image 12.

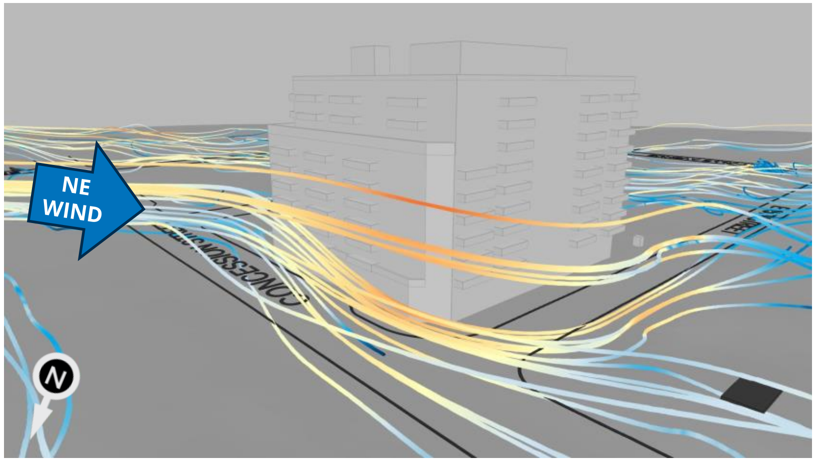


Image 12: Flow Paths From the CFD Simulations

4. RESULTS AND DISCUSSION

4.4.2 Building Entrances

The main entrance is on the east (leeward) side of the building and therefore sheltered from the prevailing winds. As a result, wind conditions will be comfortable for sitting or standing in the summer and winter (Images 9a and 9b).

Wind conditions near the outside of the northwest entrance are expected to be comfortable for strolling or standing during the summer, and for walking or strolling in the winter (Images 10a and 10b). These conditions are slightly higher than desired for an entrance. Examples of conceptual wind control strategies are shown in Image 13.

Retails entrances are located on the north side of the building along Concession Street. Wind conditions at retails entrances are predicted to be comfortable for sitting or standing through the year (Image 11). These conditions are appropriate for the intended usage.

4.4.3 Recommendations

To reduce wind speeds at the northwest corner, wind control measures should be targeted to disrupt wind flows from the northeast that flow vertically in the middle of the north façade, and horizontally closer to the corner itself. This can be achieved by using landscaping and architectural screens and canopies strategically on the north and west sides of the building (see examples in Image 13). We understand that the design team is revising the design to incorporate wind control measures. RWDI will continue to work with the team to develop appropriate measures and provide further guidance as the design process progresses.

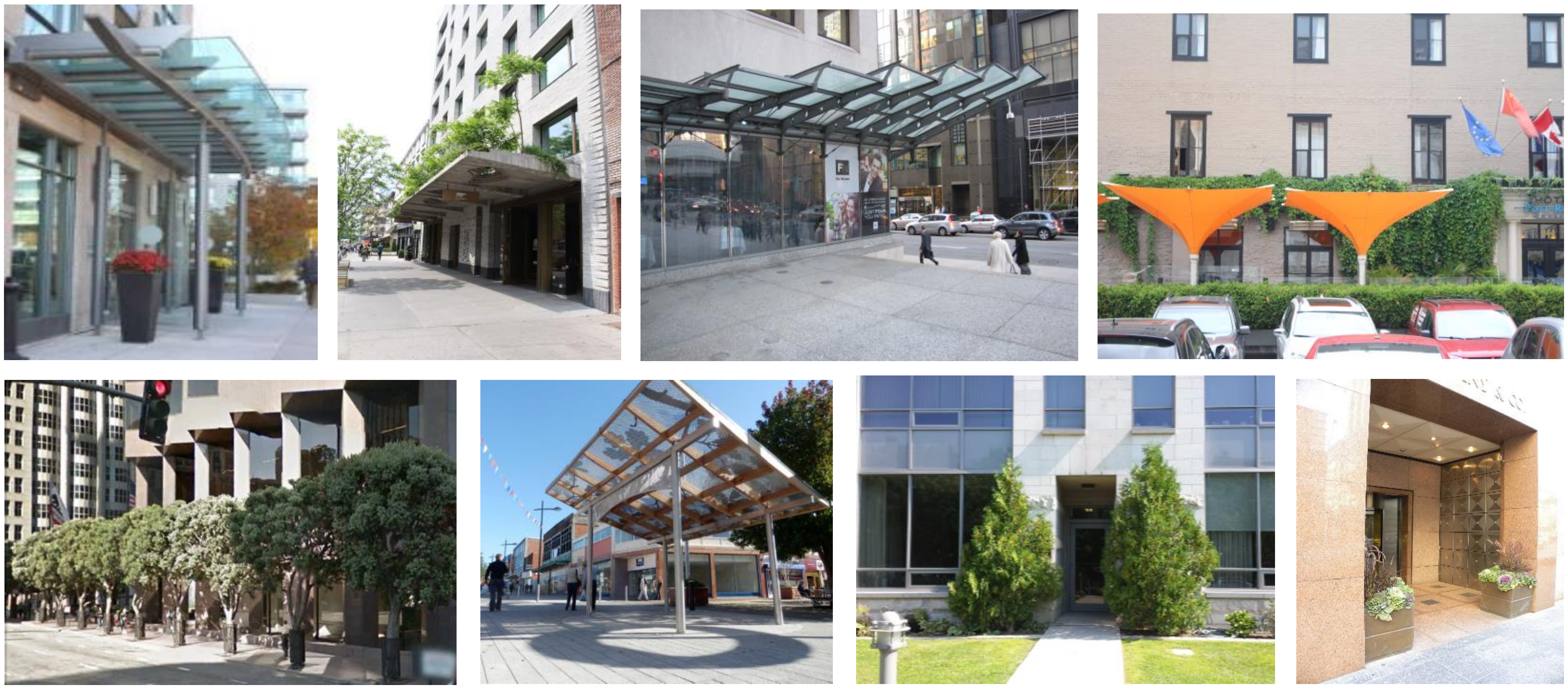


Image 13: Examples of conceptual wind control features

5. SUMMARY

RWDI was retained to provide an assessment of the potential pedestrian level wind impact of the proposed project at 388 Concession Street in Hamilton, Ontario. Our assessment was based on computational modelling, simulation and analysis of wind conditions for the proposed development design, in conjunction with the local wind climate data and the RWDI wind criteria for pedestrian comfort and safety. Our findings are summarized as follows:

- Wind conditions on and around the existing site are predicted to be appropriate for pedestrian usage.
- An increase in wind speeds is expected on the streets adjacent to the site with the addition of the proposed buildings.
- Wind conditions in most areas including the main eastern entrance, retail entrances, the nearest bus stop, and most side walks, are expected to be appropriate for the intended usage.
- Potentially uncomfortable wind speeds are expected at localized areas at the northwest of the site and on the west side of E 15th St. in the winter. Conceptual wind control strategies have been provided.

RWDI is continuing to work with the design team to guide the selection and placement of wind control features, to achieve appropriate levels of wind comfort based on the programming of the various outdoor spaces.

6. DESIGN ASSUMPTIONS

The findings/recommendations in this report are based on the building geometry communicated to RWDI in October 2025, listed below. Should the details of the proposed design and/or geometry of the building change significantly, results may vary.

File Name	File Type	Date Received (mm/dd/yyyy)
124032 - 388 Concession Apartment Building Hamilton - R25 - 2025-10-16_mwoodcock7TBRG - 3D View - {3D - ccosta@chamberlainipd-com}	DWG	10/21/2025
124032 - 388 Concession (2025-10-20)	PDE	10/21/2025

Changes to the Design or Environment

It should be noted that wind comfort is subjective and can be sensitive to changes in building design and operation that are possible during the life of a building. In the event of changes to the design, construction, or operation of the building in the future, RWDI could provide an assessment of their impact on the discussions included in this report. It is the responsibility of others to contact RWDI to initiate this process.

7. STATEMENT OF LIMITATIONS

This report was prepared by Rowan Williams Davies & Irwin Inc. for Tibro Group ("Client"). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein and authorized scope. The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared. Because the contents of this report may not reflect the final design of the Project or subsequent changes made after the date of this report, RWDI recommends that it be retained by Client to verify that the results and recommendations provided in this report have been correctly interpreted in the final design of the Project.

The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this report carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.

7. REFERENCES

1. H. Wu, C.J. Williams, H.A. Baker and W.F. Waechter (2004), “Knowledge-based Desk-Top Analysis of Pedestrian Wind Conditions”, *ASCE Structure Congress 2004,* Nashville, Tennessee.

2. H. Wu and F. Kriksic (2012). “Designing for Pedestrian Comfort in Response to Local Climate”, *Journal of Wind Engineering and Industrial Aerodynamics*, vol.104-106, pp.397-407.

3. C.J. Williams, H. Wu, W.F. Waechter and H.A. Baker (1999), “Experience with Remedial Solutions to Control Pedestrian Wind Problems”, *10th International Conference on Wind Engineering*, Copenhagen, Denmark.