

PRELIMINARY REPORT
CHURCH STREET PLAZA

EVANSTON, IL

PEDESTRIAN WIND COMFORT ASSESSMENT - PRELIMINARY SUMMARY

PROJECT #2505414
SEPTEMBER 6, 2024



SUBMITTED TO

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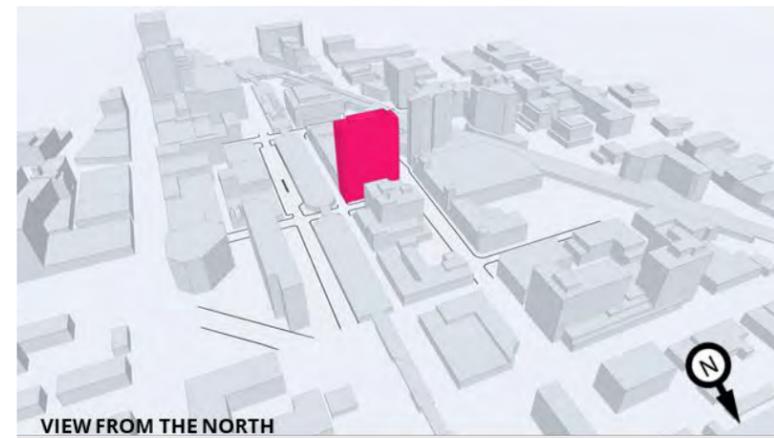
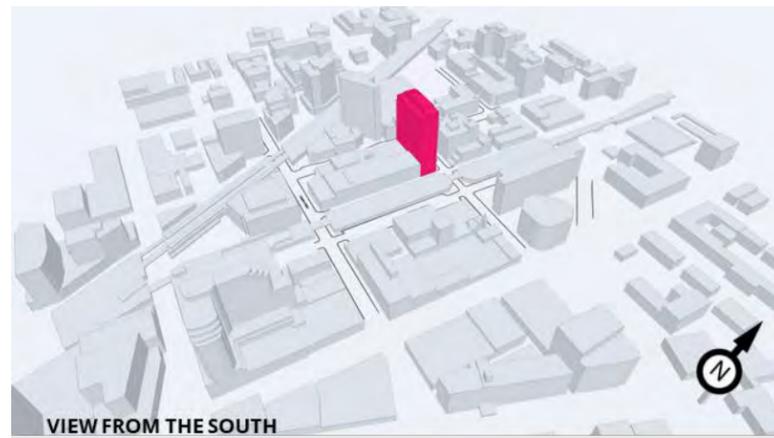
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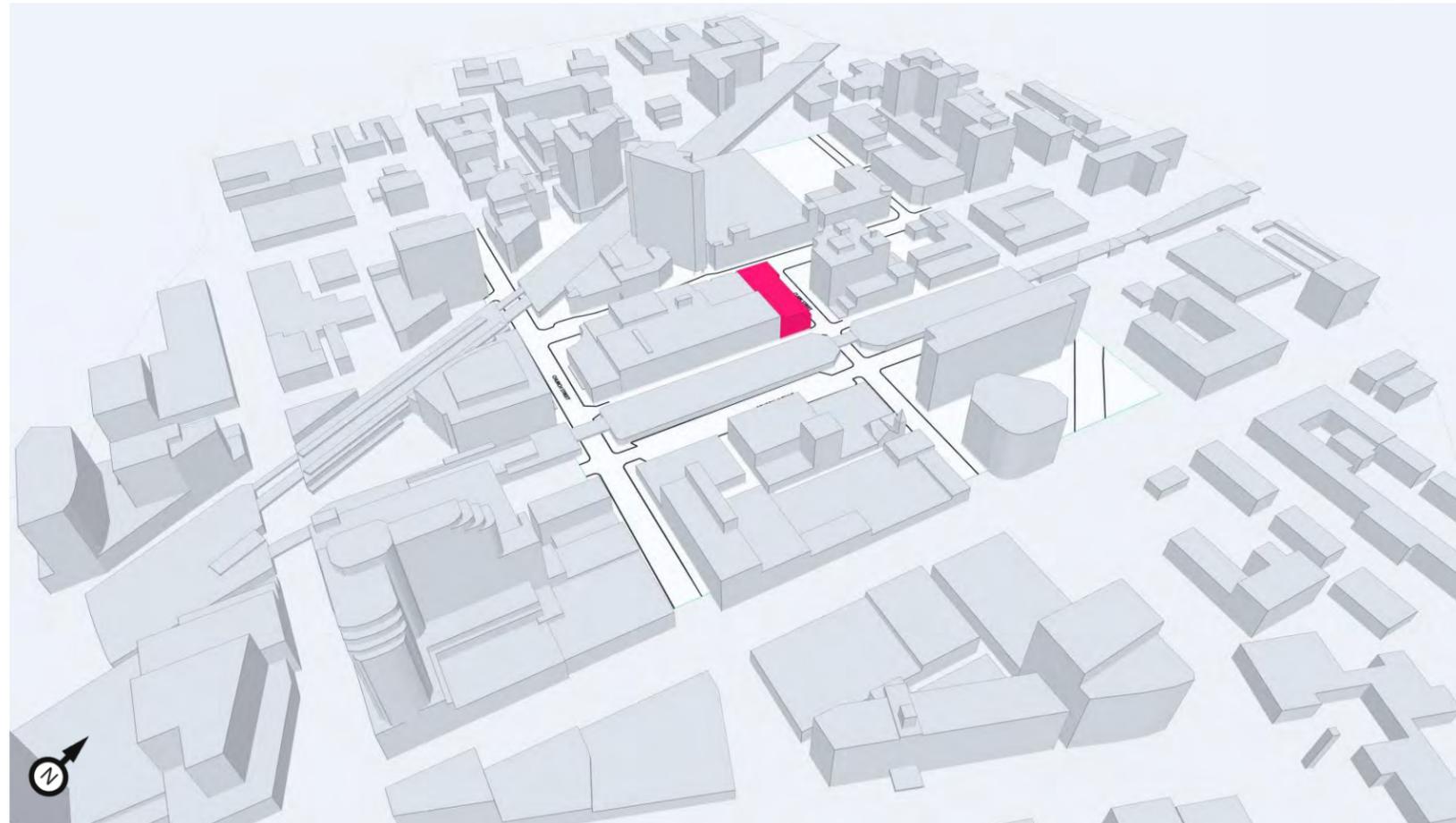
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SIMULATION MODEL



Computer model of the project site with surroundings

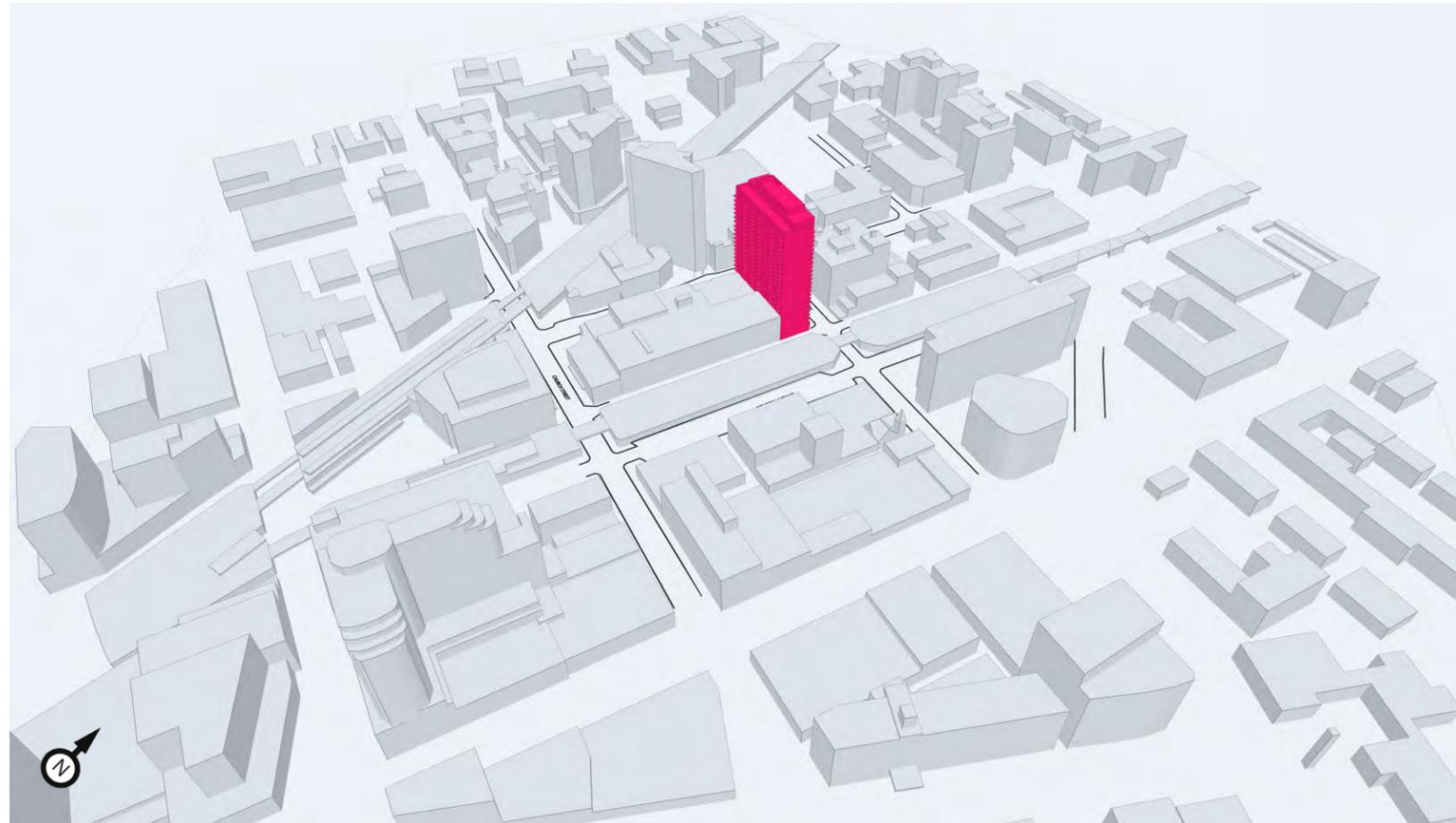
SIMULATION MODEL – EXISTING SCENARIO



Computer model of the existing site with surroundings

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SIMULATION MODEL – PROPOSED SCENARIO



Computer model of the proposed high-rise with surroundings

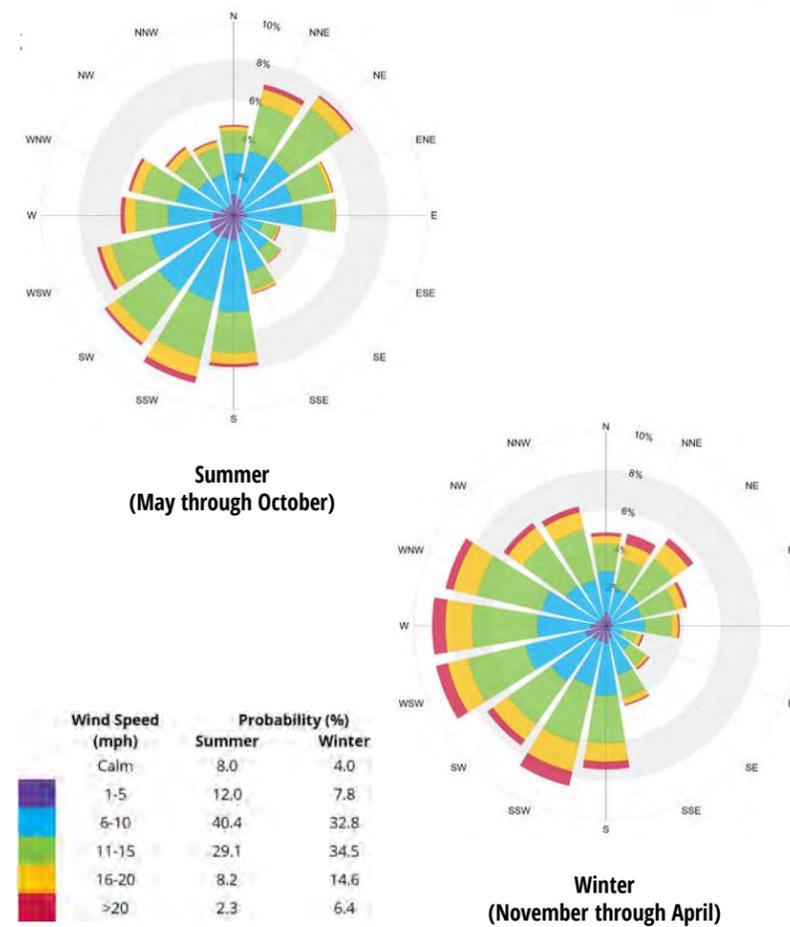
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METEOROLOGICAL DATA

In order to assess pedestrian wind comfort condition, the local wind statistic records are combined with CFD modeling results. We have reviewed the climate data for Chicago O'Hare International Airport, Chicago Palwaukee Executive Airport and Waukegan Regional Airport. The data from the various stations show similar directionality and wind intensity. The data from Chicago O'Hare International Airport has been used in this assessment as the station provides the most complete records. As presented in the wind roses, winds from the south through northwest and northeast directions are predominant during both the summer and winter. In the winter, winds are also frequent from the northwest. Strong winds of a mean speed greater than 20 mph, measured at the airport at an anemometer height of 33 ft, occur more often during the winter than the summer season (red bands in the image). These winds potentially could be the source of uncomfortable or severe wind conditions, depending on the site exposure and orientation of the proposed buildings.

Wind statistics were scaled and adjusted for the assessment in order to account for the effect of the site location and built terrain around the project site. The data was then combined with the CFD simulations of wind flows around the project to predict the wind conditions at the project site and assessed against the RWDI wind criteria for pedestrian comfort.

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Directional distribution of winds approaching Chicago O'Hare International Airport (1993 to 2023)

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.

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 (mph) | Description (Based on seasonal compliance of 80%) |
|------------------|-----------------|---|
| Sitting | ≤ 6 | Calm or light breezes desired for outdoor seating areas where one can read a paper without having it blown away |
| Standing | ≤ 8 | Gentle breezes suitable for main building entrances, bus stops, and other places where pedestrians may linger |
| Strolling | ≤ 10 | Moderate winds appropriate for window shopping and strolling along a downtown street, plaza or park |
| Walking | ≤ 12 | Relatively high speeds that can be tolerated if one's objective is to walk, run or cycle without lingering |
| Uncomfortable | > 12 | Strong winds considered a nuisance for all pedestrian activities. Wind mitigation is typically recommended |

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 (mph) | Description (Based on annual exceedance of 9 hrs or 0.1% of time) |
|------------------|------------------|--|
| Exceeded | > 56 | Excessive gusts that can adversely affect one's balance and footing. Wind mitigation is typically required |

RESULTS

Existing Scenario:



(a) Summer

(b) Winter

COMFORT: SITTING STANDING STROLLING WALKING UNCOMFORTABLE

Predicted wind conditions - GROUND LEVEL - EXISTING SCENARIO

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RESULTS

Proposed Scenario:



(a) Summer

(b) Winter

COMFORT: SITTING STANDING STROLLING WALKING UNCOMFORTABLE

Predicted wind conditions - GROUND LEVEL - PROPOSED SCENARIO

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SUMMARY



RWDI was retained to provide an assessment of the potential pedestrian level wind impact of the proposed project at Church Street Plaza in Evanston, Illinois. Our assessment was based on computational modeling, 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:

- The proposed building is taller than most building in the surroundings to the northeast, northwest and southwest – these are the predominant wind directions.
- The new building will redirect wind around it and to ground level. Much of the downwash on the south side would be disrupted by the low roof of the existing building.
- Wind approaching from the northeast would be diverted downward on the north side of the building and accelerate around the southwest corner of the site as the wind flows downwashed by the tower take the path of least resistance around it.
- The wind flows around the tower would be similar to the flows around other tall buildings in the area – note the green and yellow zones in the result figures pertaining to the Proposed Scenario.
- Wind conditions at ground level are expected to be appropriate for the sidewalk use. Compared to the existing scenario, increased wind activity is expected on Maple Avenue, however, these conditions may be acceptable as they are predicted to meet the walking criteria.
- The addition of landscaping, such as street trees, will help reduce wind speeds at the street level in the summer when the trees are in full leaf.

STATEMENT OF LIMITATIONS



This report was prepared by Rowan Williams Davies & Irwin Inc. for ANTUNOVICH ASSOCIATES (“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.