

Wind Analysis

Terms of Reference

1. Description

A Wind Analysis is a planning submission requirement, which provides a visual model and a written evaluation of how a proposed development will impact pedestrian-level wind conditions.

2. When Required

Wind Analysis studies are particularly important where a proposed development is adjacent to existing or planned low-rise development, open spaces, water bodies and large public amenity areas. The requirement for and scope of a Wind Analysis will be determined at the formal pre-consultation meeting. There are two types of Wind Analysis studies and they will be triggered based on the following types of applications:

Type 1: Applications seeking an increase in height and / or massing which is either: a tall building(s), 10 storeys or more; or a proposed building that is more than twice the height of adjacent existing buildings and is greater than five storeys.

<p>Zoning Bylaw Amendment Application</p>	<p>Type 1: Preliminary Wind Analysis: will include wind tunnel tests or computational fluid dynamics testing to evaluate the proposed height and massing. The test will identify which areas of the site meet the City’s wind Evaluation Criteria (as outlined in Section 5 below) and which areas do not. In preparation of the analysis, refer to Contents for Wind Analysis (as outlined in Section 3 below).</p>
<p>Site Plan Control Application</p>	<p>Type 1: Secondary Wind Analysis: where a Preliminary Wind Analysis was submitted which exceeded the evaluation criteria or if design changes have occurred since the original submission, a Secondary Wind Analysis will be required with the Site Plan Control application. Where this applies, there are two types of Secondary Wind Analysis studies:</p> <ul style="list-style-type: none"> • Desktop Assessment – this applies if the design changes are minor (e.g. elimination or addition of site design measures, reduction in height, etc). • Wind Tunnel Tests or Computational Fluid Dynamics – this applies if the design changes are significant (e.g. increase in height, removal of a podium, building orientation change, etc).

	<p>In both cases, the analysis will require an overview of the final mitigation measures, which may require confirmation through the submission of a revised landscape plan, site plan and/or building elevations. A condition of site plan approval will be placed to ensure that the recommendations of the Secondary Wind Analysis are fully implemented, prior to the City releasing any securities.</p>
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Type 2: Tall building applications which have not sought an increase in height or massing, and are: on the outer edge of a tall building area; or are taller than the existing development; or are immediately adjacent to a large public amenity area (e.g. park, open space, body of water, etc).

<p>Site Plan Control Application</p>	<p>Type 2: Wind Analysis: will include a pedestrian level Wind Analysis to evaluate the building design. Detailed elements, such as anticipated building orientation, building and site design features, transitions and step backs will need to be incorporated into the evaluation. This test will identify which areas of the site meet the City’s wind Evaluation Criteria (as outlined in Section 5 below) and which areas do not. In preparation of the analysis, refer to the below Contents for Wind Analysis (as outlined in Section 3 below).</p>
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3. Contents

A Wind Analysis will contain and/or address the below contents for Wind Analysis studies and Analysis Criteria. Failure to satisfy these components, may result in the application being considered incomplete.

Prior to the Application Submission:

- Where a wind tunnel test is to be completed, provide an image displaying the proposed test locations, to the file planner, for approval prior to the simulation (see Figures 2 and 3).

Example Pedestrian and Amenity Area Test Locations:

- Major building entrances
- Sidewalks (adjacent to the proposed building)
- Parking lots (adjacent to the proposed building)
- Public amenity spaces (e.g. parks, plazas, courtyards, trails, public pools, restaurant patios etc)
- Private amenity spaces (e.g. roof top patio’s, green roofs, private pools)



The Application Submission:

- State the: type of application, municipal address and the company who has prepared the analysis.

Existing Context:

- Indicate the meteorological data used to confirm the wind conditions.
- Provide images which display the prevailing wind directions inset within the current site conditions for each required test date. Highlight the location of the proposed site (see Figure 3).

Effects of the Proposal:

- Provide an image which displays the existing and proposed pedestrian and amenity area(s) within the proposed development and immediate adjacent area(s). For wind tests only, inset within this image show where the final test locations were chosen (see Figure 2 and 3).
- Where a wind tunnel test was completed, provide the numerical findings at each sensor location on each test date. This will display the resulting wind conditions at each test location (e.g. prevailing wind directions and speeds) as a result of the proposed development.

Explanation:

- Provide a written summary of the wind impacts, which include the locations of the impact and type of wind sensitive use where the impact occurs for each test date.
- Detail the proposed mitigation measures included in the development proposal (if applicable).

4. Analysis Criteria

The following wind analysis requirements outline the City's expectation for test dates and test locations.

Test Dates:

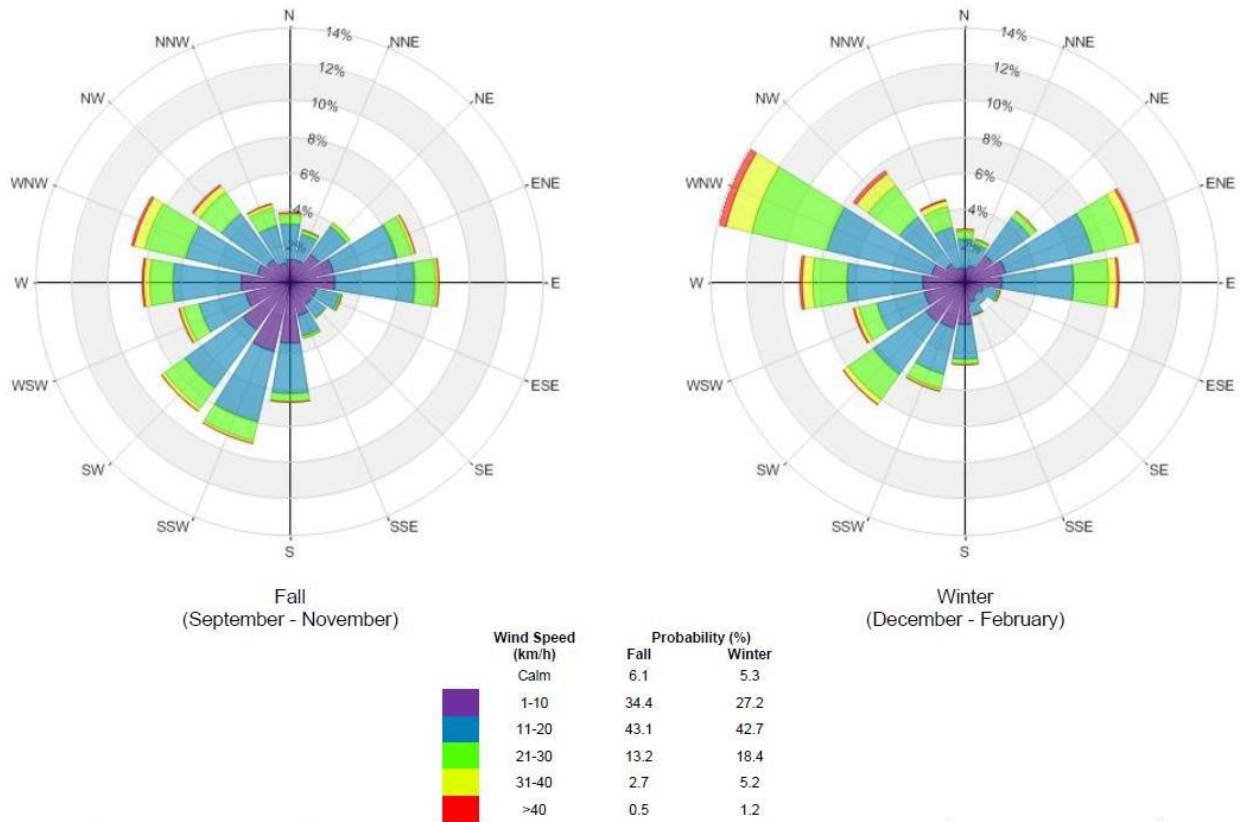
Consultants are required to use a minimum of 30 years of hourly wind data from the Ottawa International Airport on a four season basis (see Figure 1), as follows:

- Winter: December – February
- Spring: March – May
- Summer: June – August



- Fall: September – November

Figure 1 – Wind Data



Directional Distribution (%) of Winds (Blowing From) Ottawa Macdonald-Cartier International Airport (1961 - 2011)	Figure No. 2
	Date: August 27, 2013

5. Evaluation Criteria

The following Evaluation Criteria will be used to evaluate wind speeds from the proposed development:

Wind Comfort Criteria:

Both mean wind and wind gusts will be used to measure the comfort of the wind at identified locations. There are four measuring points to evaluate the comfort of the wind speed: sitting, standing, strolling and walking. These measuring points are to be evaluated at different locations / areas on the development site and immediate adjacent area to ensure that they meet the criteria. Should a proposed development not be able to meet the comfort evaluation criteria, mitigation measures (e.g. building

and / or site design measures) are required for Type 1 applications and strongly suggested for Type 2 applications (as detailed in Section 2 above).

Category	Speed (km/hr)	Where Applicable
Sitting	≤ 10	Outdoor public and private amenity spaces (e.g. restaurant patio's and seating areas)
Standing	≤ 14	Major building entrances and bus stops
Strolling	≤ 17	Sidewalks association with a mainstreet, plazas and parks
Walking	≤ 20	Sidewalks other than those associated with a mainstreet, bicycle paths and parking lots
Uncomfortable	≥ 20	Winds of this magnitude are considered a nuisance for most activities and wind mitigation measures are recommended.

NOTE: The speeds are based on a seasonal 20% exceedance factor (between 6:00am-11:00pm). In other words the criterion has been met if the wind speeds occur at least 80% of the time or four out of five days.

Wind Safety Criteria:

Wind gusts will be used to measure the safety of the wind on all test locations. Should a proposed development not be able to meet the wind safety criteria, appropriate mitigation measures (e.g. redesign of the site, reduction in height, etc.) will be required to eliminate the safety issue.

Category	Speed (km/hr)	Where Applicable
Exceeded	≥ 90	At any test location, wind speeds of this magnitude are considered a safety hazard and wind mitigation is required.

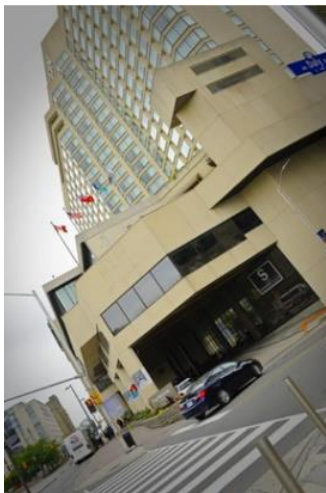
NOTE: The speeds are based on an annual exceedance of 9 hours or 0.1% of the time for a 24 hour day.

6. Mitigation Measures

Building design measures can help to reduce the wind conditions that may be downwashed from buildings which are taller in height. Site design measures can help to reduce the wind conditions present at the pedestrian realm. The type and location of the mitigation measure will be determined through consultation with the development proponent and the file planner.

Building Design Measures:

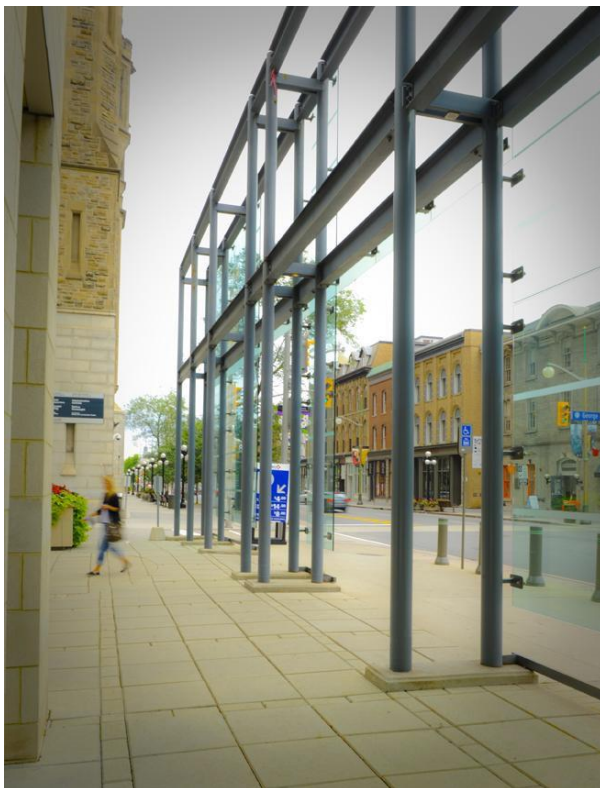
- Podiums
- Balconies or terraces
- Stepped or transitioned building
- Canopies
- Parapet walls and wind screens
- Curved or stepped corners
- Entrances are away from corners
- Recess the entrance from the building façade and/or vestibules
- Overhangs



Mitigation Measures Continued

Site Design Measures:

- Coniferous tree plantings near the corners of the buildings
- Landscape berms
- Large rocks
- Fences and retaining walls
- Tall obstacles (e.g. public art) at building corners in pedestrian realm
- Privacy walls and tall trellises



7. Roles and Responsibilities / Qualifications

A wind analysis must be prepared, signed and stamped by an engineer who specializes in pedestrian level wind evaluation. Where a wind analysis is prepared by a company which do not have extensive experience in pedestrian level wind evaluation, an independent peer review may be required at the expense of the proponent.

8. Submission Requirements

- Electronic copy of the Wind Analysis to be supplied in Adobe .PDF format (unlocked and flattened).
- A digital rendering (Sketch- up, AutoCAD, etc) of the proposed building(s) would also be preferred for submission; otherwise height schedules as outlined in the Shadow Analysis Terms of Reference is acceptable.



Figure 2 – Test Locations

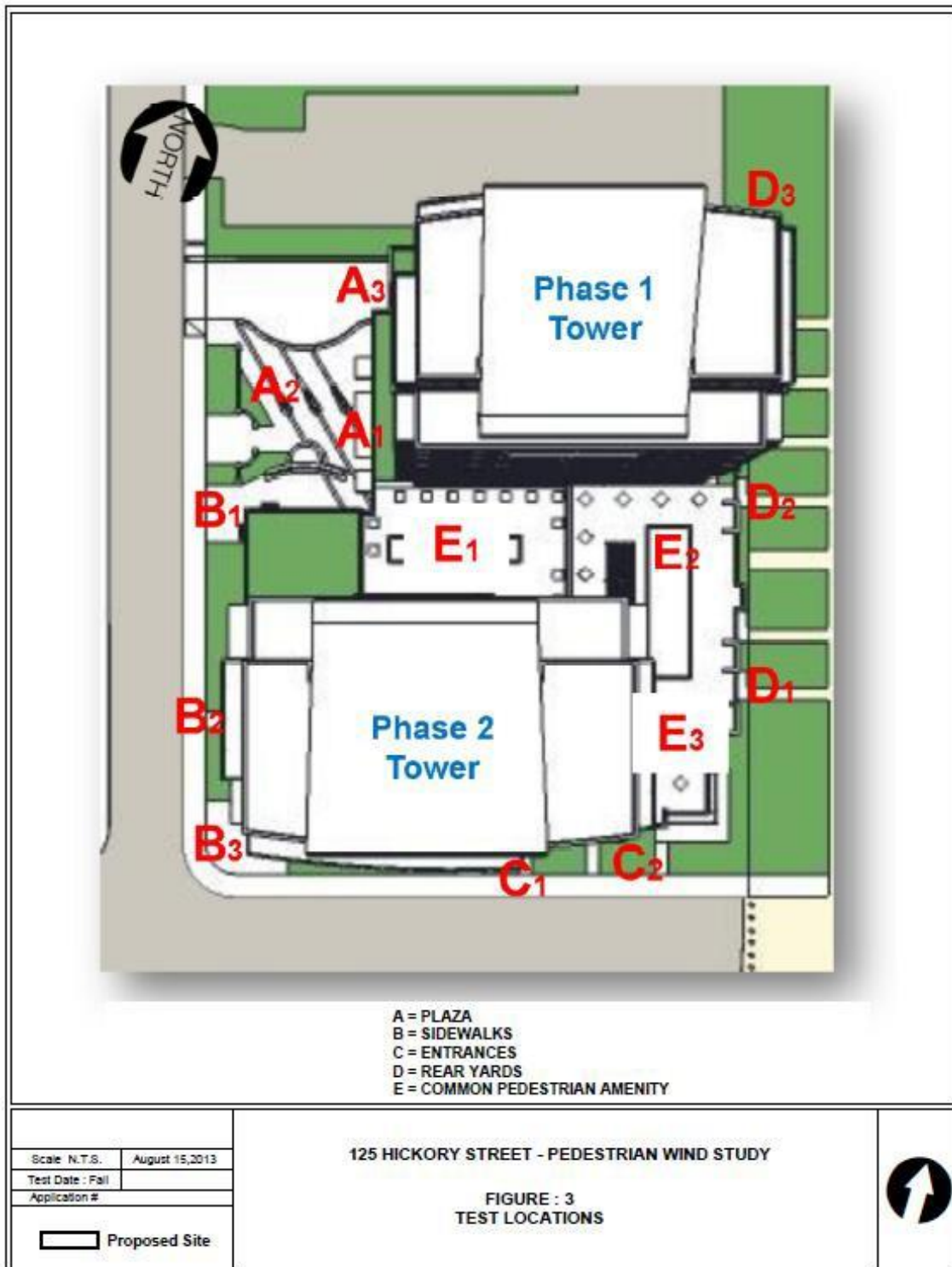


Figure 3 –Surrounding Amenities Test Locations

