REPORT

1365-1375 YONGE STREET

TORONTO, ON

PEDESTRIAN WIND STUDY
RWDI # 2304289
May 29, 2023

SUBMITTED TO

Yonge & Rosehill Inc.

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EXECUTIVE SUMMARY

RWDI was retained to conduct a pedestrian wind assessment for the proposed 1365-1375 Yonge Street development in Toronto, ON. The assessment was based on the wind-tunnel testing conducted for the proposed site under the Existing and Proposed configurations, in accordance with the requirements in the *Pedestrian Level Wind Study Terms of Reference Guide* (the Guide) published by the City of Toronto in June 2022. The results were analysed using wind records from Toronto Pearson International Airport and evaluated against the Wind Criteria for Pedestrian Comfort and Safety specified in the Guide. The predicted wind conditions are presented in Figures 1A through 5B, and Table 1, and are summarized as follows:

- Wind conditions on and around the existing site are comfortable for pedestrian use throughout the year.
- With the addition of the proposed project, wind speeds at most grade level locations on and around the site are expected to remain comfortable for pedestrian use. Higher wind speeds that are uncomfortable are expected at the southwest tower corner and to the south of the site during the spring, fall and winter.
- Wind speeds suitable for patron use are anticipated on the Level 2 and Level 3 amenity areas throughout the year. On the roof level, higher-than-desired wind speeds are anticipated at all locations throughout the year.
- Wind speeds that meet the safety criterion are anticipated at all locations assessed in the Existing configuration. Wind conditions in the Proposed configuration are predicted to meet the safety criterion at most areas assessed, except for grade-level locations near the southwest tower corner and to the south of the site as well as areas on the rooftop amenity.

Please note that after wind tunnel testing was completed, RWDI received updated design drawings. Updates included slight massing changes and the addition of a wide canopy which is beneficial from a wind mitigation perspective and will reduce wind speeds near the southwest corner and to the south of the site. Please see more details in Section 3.3.

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1 INTRODUCTION

RWDI was retained to conduct a pedestrian wind assessment for the proposed 1365-1375 Yonge Street development in Toronto, ON. This report presents the project objectives, approach and the main results from RWDI's assessment and provides conceptual wind control measures, where necessary. Our Statement of Limitations as it pertains to this study can be found in Section 4 of this report.

1.1 Project Description

The proposed development site is located on the east side of Yonge Street between Rosehill Avenue to the south and Pleasant Boulevard to the north (Image 1). The proposed building consists of a 50-storey tower with outdoor amenities on Levels 2, 3 and the rooftop.

1.2 Objectives

The objectives of the study were to assess the effect of the proposed development on local conditions in pedestrian areas on and around the study site and provide recommendations for minimizing adverse effects, if needed. This quantitative assessment was based on wind speed measurements on a scale model of the project and its surroundings in one of RWDI's boundary-layer wind tunnels. These measurements were combined with the local wind records and compared to the City of Toronto Wind Criteria for Pedestrian Comfort and Safety. The assessment focused on critical pedestrian areas, including building entrances, public sidewalks and above-grade amenity areas.

Image 1: Aerial View of Existing Site and Surroundings (Photo Courtesy of Google™ Earth)

2 BACKGROUND AND APPROACH

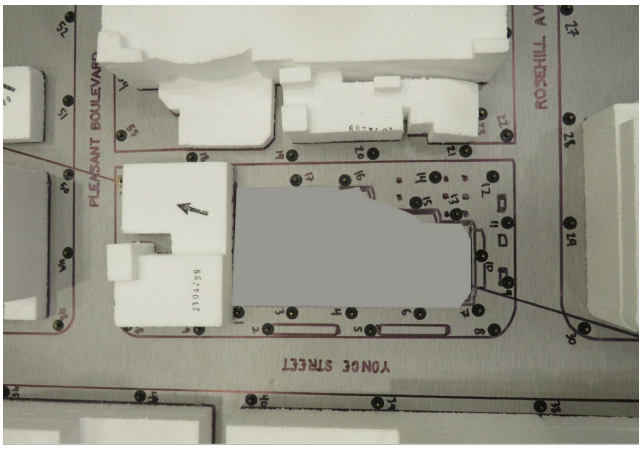
2.1 Wind Tunnel Study Model

To assess the wind environment around the proposed project, a 1:300 scale model of the project site and surroundings was constructed for the wind tunnel tests of the following configurations:

A - Existing: Existing site with existing surroundings (Image 2A), and,

B - Proposed: Proposed project with existing surroundings (Image 2B).

The wind tunnel model included all relevant surrounding buildings and topography within an approximate 360 m radius around the study site. The wind and turbulence profiles in the atmospheric boundary layer beyond the modelled area were also simulated in RWDI's wind tunnel. The wind tunnel model was instrumented with 64 specially designed wind speed sensors to measure mean and gust speeds at a full-scale height of approximately 1.5 m above local grade in pedestrian areas throughout the study site. The placement of wind measurement locations was based on our experience and understanding of the pedestrian usage for the site and reviewed by the City of Toronto. Wind speeds were measured for 36 directions in 10-degree increments. The measurements at each sensor location were recorded in the form of ratios of local mean and gust speeds to the mean wind speed at a reference height above the model.



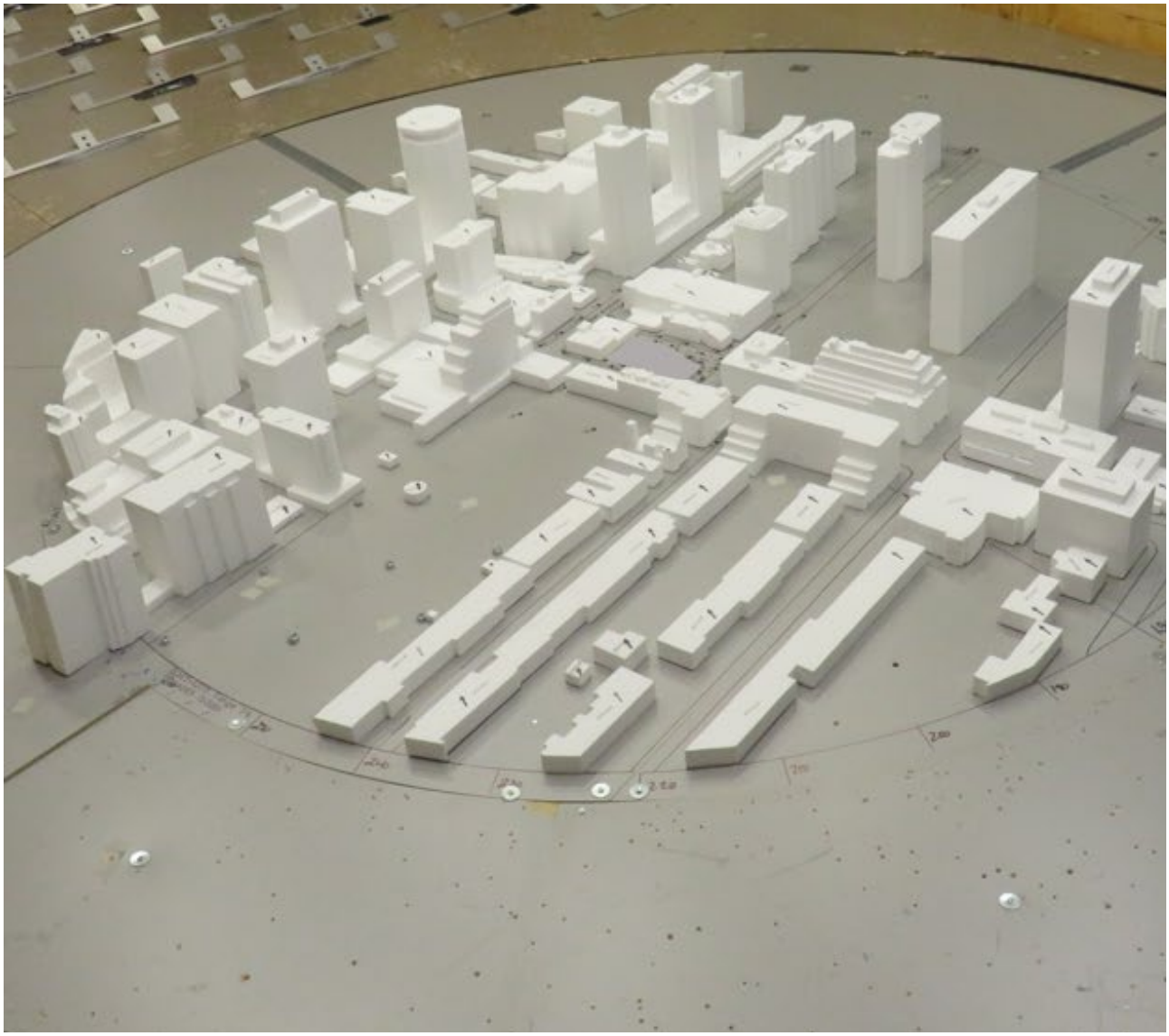


Image 2A: Wind Tunnel Study Model – Existing Configuration

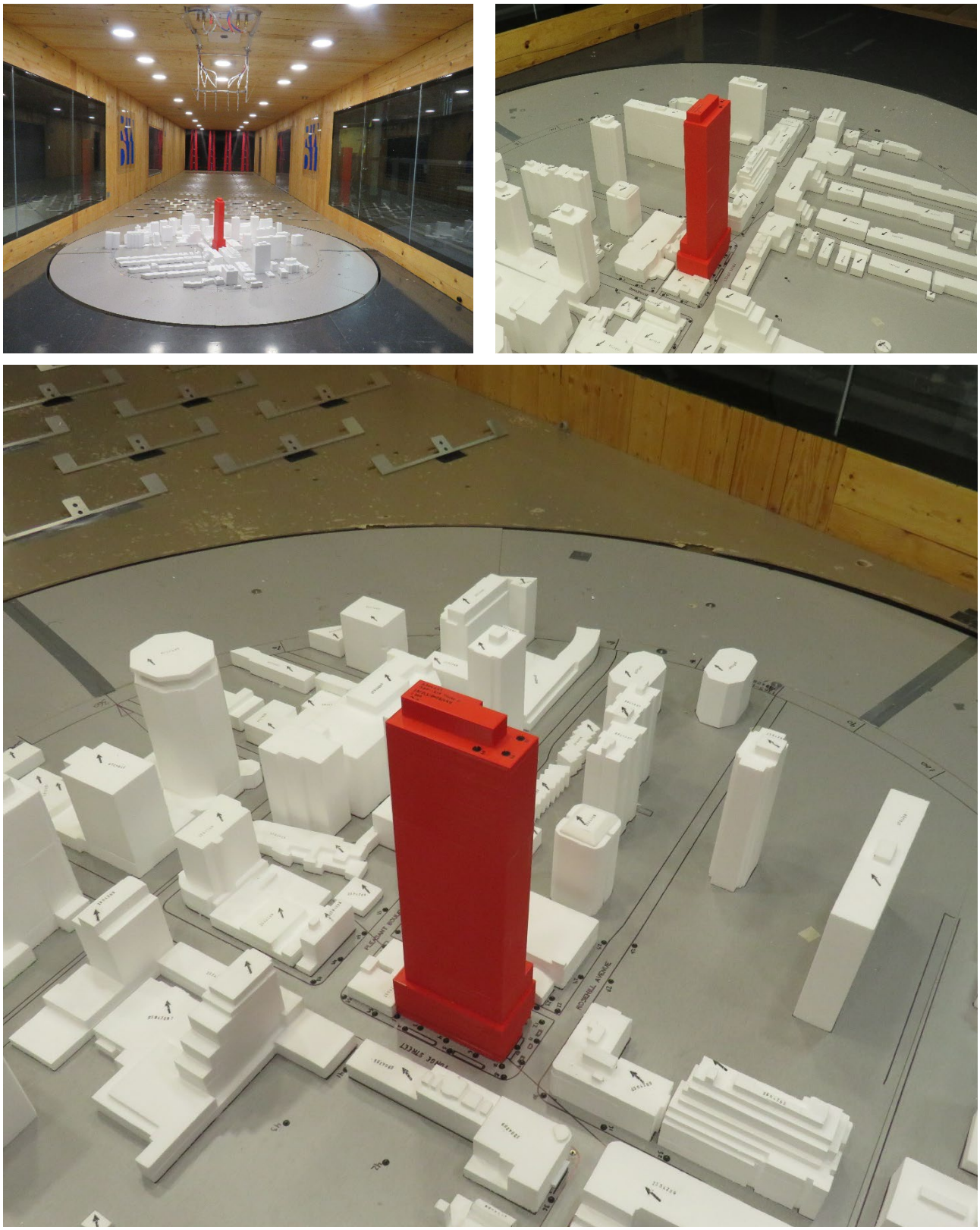
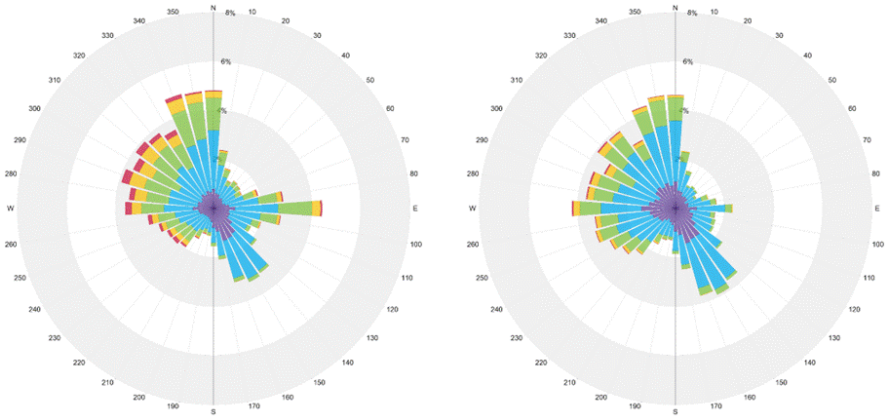


Image 2B: Wind Tunnel Study Model – Proposed Configuration

2.2 Wind Climate Data

Wind statistics recorded at the Toronto Pearson International Airport between 1990 and 2020, inclusive, were analyzed for four seasonal periods as required by the City of Toronto – spring (March to May), summer (June to August), fall (September to November) and winter (December to February). Image 3 graphically depicts the seasonal directional distributions of wind frequencies and speeds. Winds from the southwest and northwest quadrants are predominant throughout the year as indicated by the wind roses, with additional winds from the east in spring. Secondary winds are observed from the southeast quadrant, especially in spring and summer. Strong winds of a mean speed greater than 30 km/h measured at the airport (at an anemometer height of 10 m) occur primarily from the westerly directions and are most common in the winter, followed by spring, fall and summer in decreasing order of frequency.

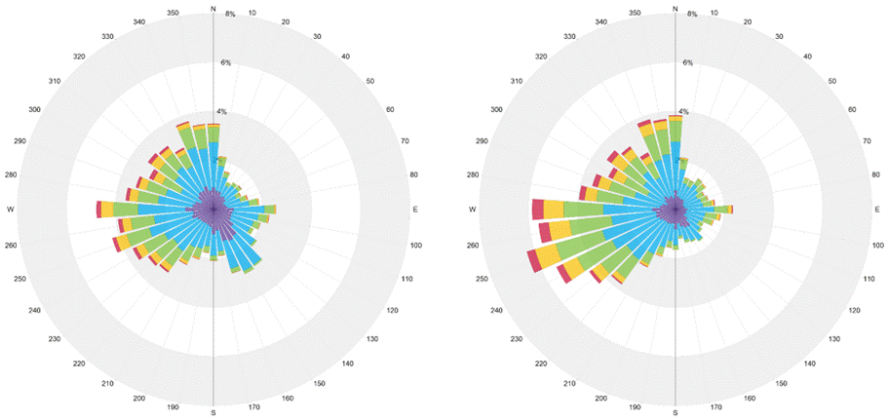
Wind statistics were combined with the wind tunnel data to predict the frequency of occurrence of full-scale wind speeds. The full-scale predictions were then compared with the wind criteria for pedestrian comfort and safety.



Spring (March – May)

Summer (June – August)

Wind Speed (km/h)	Probability (%) Spring	Summer
Calm	4.4	5.2
1-10	24.6	31.3
11-20	39.9	44.4
21-30	21.2	15.5
31-40	7.0	3.1
>40	2.9	0.5



Fall (September – November)

Winter (December – February)

Wind Speed (km/h)	Probability (%) Fall	Winter
Calm	4.9	3.5
1-10	29.3	21.2
11-20	41.3	40.1
21-30	17.3	23.4
31-40	5.3	8.5
>40	1.8	3.2

Image 3: Directional Distribution of Winds Approaching Toronto Pearson International Airport (1990 – 2020)

2.3 Wind Criteria for Pedestrian Comfort and Safety

The criteria specified in the *Pedestrian Level Wind Study Terms of Reference Guide (June 2022)* prepared by the city of Toronto are used in the current study and are presented below. The criteria consider pedestrian comfort (pertaining to common wind speeds conducive to different levels of human activity) and safety (pertaining to infrequent but strong gusts that could affect a person's footing).

COMFORT CATEGORY	GEM SPEED (km/h)	DESCRIPTION	AREA OF APPLICATION
Sitting	**≤ 10** at least 80% of the time	Light breezes desired for outdoor seating areas where one can read a paper without having it blown away.	Park benches, restaurant and café seating, balconies, amenity terraces, children's areas, etc. intended for relaxed, and usually seated activities.
Standing	**≤ 15** at least 80% of the time	Gentle breezes suitable for passive pedestrian activities where a breeze may be tolerated	Areas where seated activities are not expected but would be used for passive activities such as bus-stops, dog areas and main entrances.
Walking	**≤ 20** at least 80% of the time	Relatively high speeds that can be tolerated during intentional walking, running and other active movements.	Sidewalks, parking lots, alleyways and areas where pedestrian activity is primarily for walking.
Uncomfortable	**> 20** more than 20% of the time	Strong winds, considered a nuisance for most activities.	Not acceptable in areas with pedestrian access.

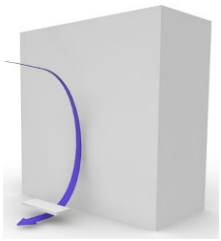
NOTES:
1) Gust Equivalent Mean (GEM) speed = maximum of either mean speed or gust speed/1.85.
2) Gust speed has been estimated as mean speed + (3 x RMS speed).
3) Comfort calculations are applied to each season and based on wind events recorded between 6:00 and 23:00 daily.
4) Wind speeds lower than 5 km/h for majority of the time (e.g., 80%) have the potential to create low air circulation. Potential problems related to low air flow are buildup of vehicle and/or building exhaust, and in full exposure to sun, low air flow can lead to issues related to thermal comfort.

SAFETY CRITERION	GUST SPEED (km/h)	DESCRIPTION	AREA OF APPLICATION
Exceeded	> 90 At least 0.1 % of the time annually (9 hours in a year)	Excessive gust speeds that can adversely affect a pedestrian's balance and footing. Wind mitigation is typically required.	Not acceptable in any area of interest

NOTES:
5) Safety calculations are applied to an annual period and based on wind events recorded for 24 hours a day

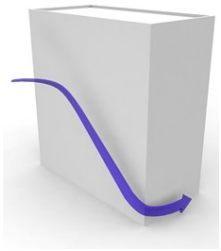
2.4 General Wind Flow Mechanisms

In our discussion of wind conditions, reference is made to the following wind flow mechanisms (Image 4):



DOWNWASHING

Tall buildings tend to intercept the stronger winds at higher elevations and redirect them to the ground level. This is often the main cause for wind accelerations around large buildings at the pedestrian level.



CORNER ACCELERATION

When wind moves around the buildings, a localized increase in the wind activity or corner acceleration can be expected around the exposed building corners at pedestrian level. The effect is intensified when the wind approaches at an oblique angle to a tall façade and are deflected down and around the exposed corners.

Image 4: General Wind Flow Mechanisms

If these building/wind combinations occur for prevailing winds, there is a greater potential for increased wind activity. Design details such as setting back a tall tower from the edges of a podium, deep canopies close to ground level, wind screens, tall trees with dense landscaping, etc. (Image 5) can help reduce wind speeds. The choice and effectiveness of these measures would depend on the exposure and orientation of the site with respect to the prevailing wind directions and the size and massing of the proposed buildings.

Podium/tower setback, canopy, chamfered corner and landscaping (left to right)

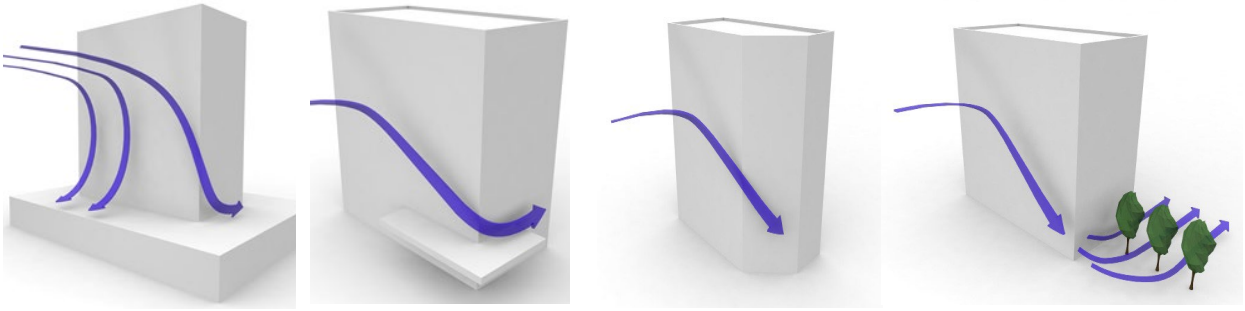


Image 5: Common Wind Control Strategies

3 RESULTS AND DISCUSSION

The predicted wind conditions are shown on site plans in Figures 1A through 5B located in the "Figures" section of this report and the associated wind speeds are presented in Table 1, located in the "Tables" section of this report.

Wind conditions comfortable for walking are appropriate for sidewalks and walkways as pedestrians will be active and less likely to remain in one area for prolonged periods of time. Lower wind speeds conducive to standing are preferred at main entrances where pedestrians are apt to linger. Wind speeds comfortable for sitting or standing are preferred for areas intended for passive activities, such as outdoor amenities.

The following is a detailed discussion of the suitability of the predicted wind conditions for the anticipated pedestrian use of each area of interest.

3.1 Existing Configuration

Wind speeds on and around the existing site are generally comfortable for sitting or standing, throughout the year (Figures 1A, 2A, 3A and 4A). These conditions are appropriate for the intended use of various pedestrian areas.

Wind speeds meet the pedestrian safety criterion at all locations assessed on and around the existing site (Figure 5A).

3.2 Proposed Configuration

3.2.1 Grade Level (Locations 1 to 59)

The addition of the proposed project to the site is expected to cause higher wind speeds, compared to the Existing configuration. These elevated wind conditions are due to the height of the proposed tower within the low to mid-rise surroundings and the orientation of the tower with larger façades facing the predominant winds. As a results, downwashing of the prevailing winds off the tall façades and acceleration around the southwest and southeast corners will create high wind activity at grade level (see Image 4). The proposed tower is flanked by the neighbouring low building on the north, which is positive and helps eliminated the corner acceleration impact around the northern tower corners.

Wind conditions on and around the site are predicted to be comfortable for sitting, standing or walking in the summer (Figures 2B). In the spring, fall and winter, wind speeds are expected to be comfortable for standing or walking at most areas, with elevated wind speeds and uncomfortable conditions around the southwest tower corner and along the sidewalks of Rosehill Avenue to the south of site (Figures 1B, 3B and 4B).

The main entrance is located near Locations 13 in Figures 1B, 2B, 3B and 4B. Wind conditions at this entrance are predicted to be comfortable for sitting throughout the year, which is suitable for an entrance location.

Wind speeds that meet the safety criterion are anticipated at all grade level locations assessed, except for areas near the southwest building corner and to the south along Rosehill Avenue (see Locations 6, 7, 9, 11, 12, 22, 28 and 29 in Figure 5B).

To mitigate the wind impact of the proposed development, a combination of large and small-scale solutions should be considered. Building massing changes in the form of larger tower setbacks along the west and south façades, large-scale façade articulations at the southwest corner, and wide canopies along the west and south façades wrapping around the southwest corner would be the most effective approach to reduce the wind impact of the project (see Image 5). In addition, dense coniferous landscaping and porous wind screens are measures to be considered at the concerned corners and along the south sidewalks in order to diffuse the energy of the accelerating winds. Examples of these wind control strategies are shown in Image 6. Further wind-tunnel testing is recommended at a later design stage to evaluate the effectiveness of any selected wind control measures.

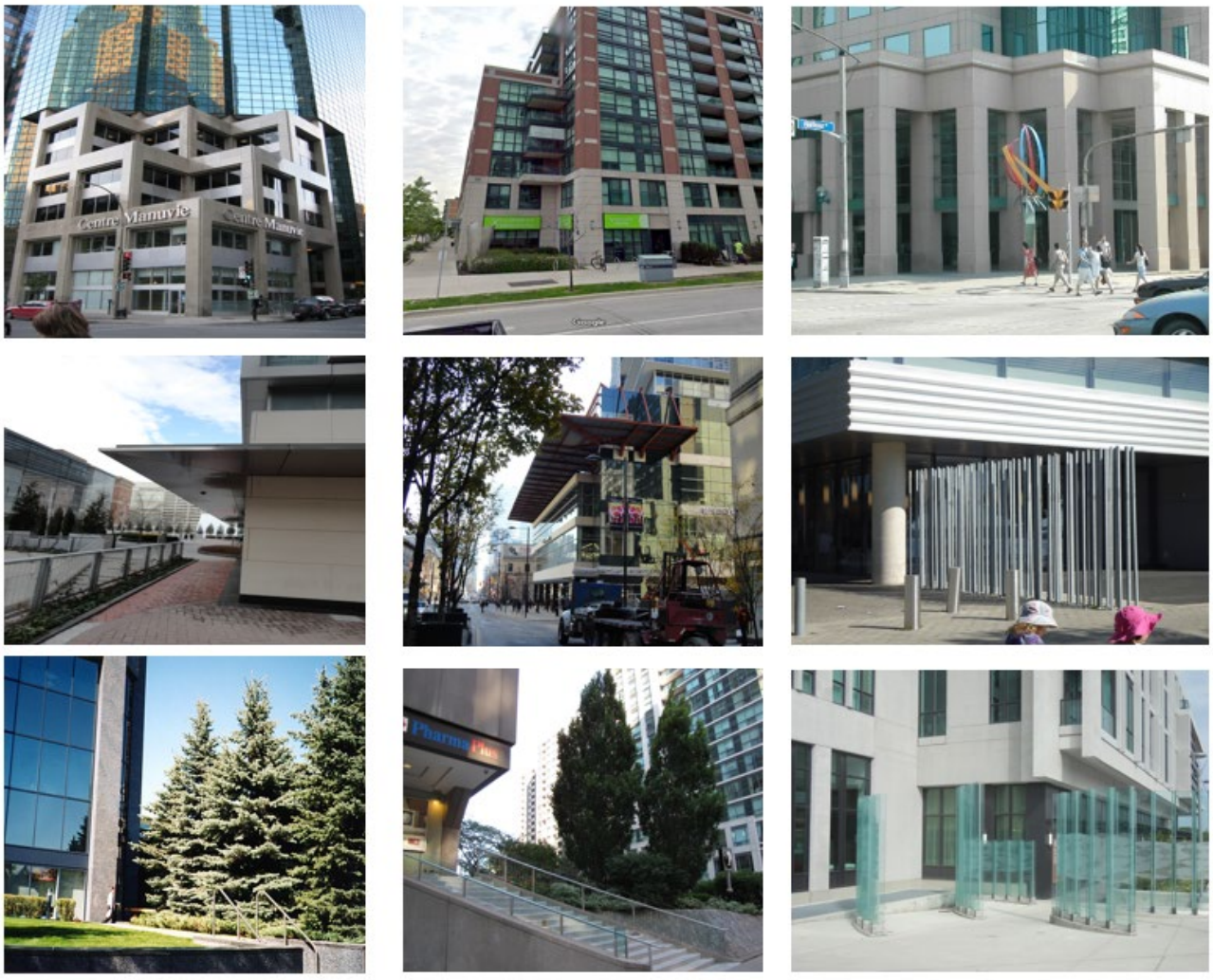


Image 6: Wind control strategies at grade level

3.2.2 Above-Grade (Locations 60 to 64)

It is generally desirable for wind conditions on outdoor amenities intended for passive activities to be comfortable for sitting or standing more than 80% of the time in the summer and fall. During the spring and winter, these areas would not be used frequently and, thus, increased wind activity would be considered acceptable.

Wind conditions comfortable for sitting or standing are predicted on the Level 2 kids play area and the Level 3 dog play area throughout the year (See Locations 60 and 61 in Figures 1B, 2B, 3B and 4B, respectively), which is suitable for the intended use. On the rooftop amenity, higher-than-desired and uncomfortable wind speeds are predicted at all locations throughout the year with is due to the exposure to the uninterrupted strong winds at higher elevations (See Locations 62 through 64 Figures 1B, 2B, 3B and 4B, respectively).

Wind speeds that meet the safety criterion are anticipated at Level 2 and Level 3 amenities; however, wind speeds at the rooftop amenity space are expected to exceed the safety criterion at all locations (Figure 5B).

To address the higher winds on the rooftop amenity, the design team may consider minimum 2 m tall parapets along the amenity perimeter as well as landscaping and hardscaping elements which can be placed around designated seating and gathering spaces to further reduce wind speeds and create sheltered zones. These elements may take the form of porous or impermeable screens, partitions, landscaping, and trellises/canopies. RWDI can provide further guidance on the placement of wind control measures and additional wind-tunnel testing can be conducted at a later design stage to improve wind conditions to appropriate levels. Examples of the use of these wind control measures are shown in Image 7 below.

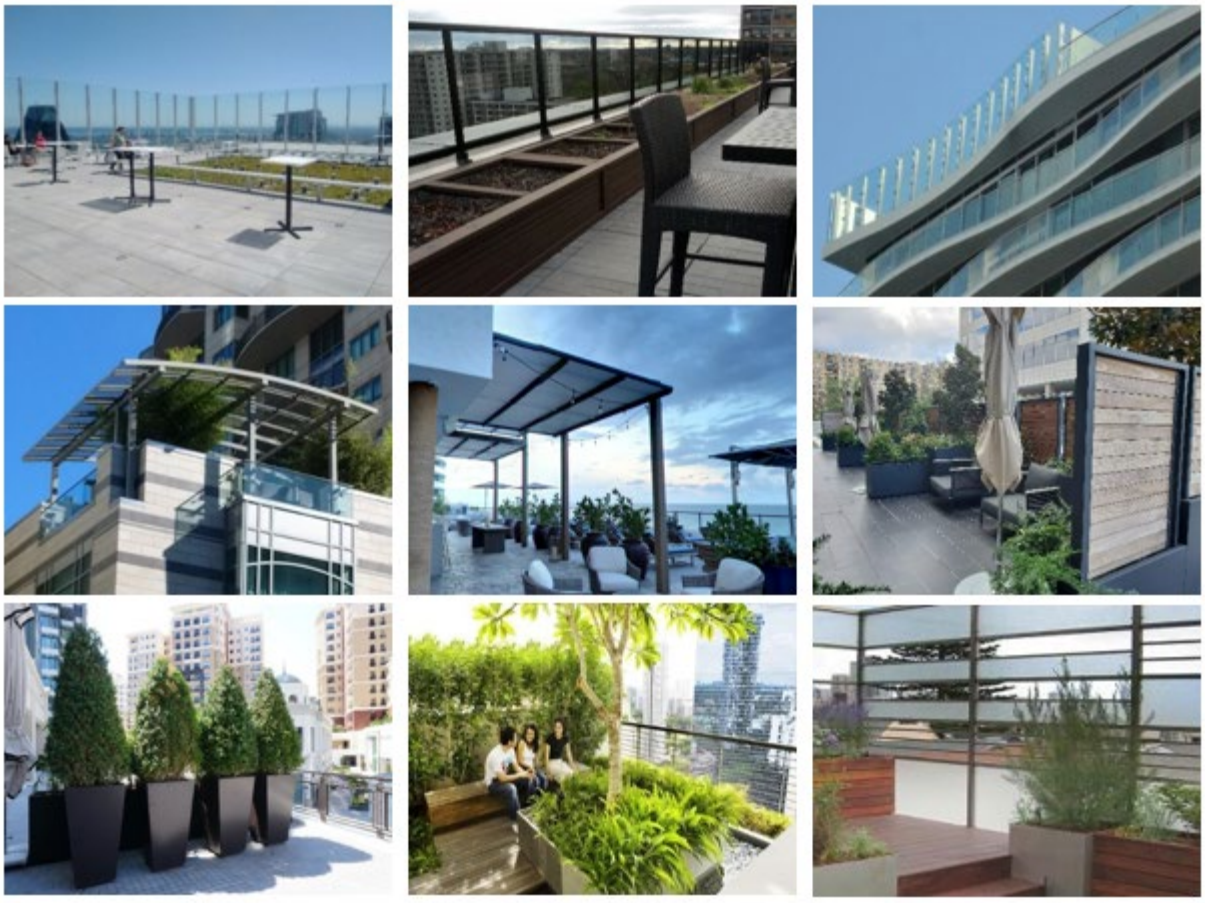


Image 7: Wind control strategies applicable to the above-grade amenity areas

3.3 Updated Design

After wind tunnel testing was completed, RWDI received updated design drawings on May 25, 2023. Design changes include slight massing changes and the addition of 3-metre-wide canopies along the west and south façades, wrapped around the southwest corner (see the proposed canopy in Image 8). Slight massing changes will not have a significant impact on the results of this report. The addition of the wide canopy is beneficial from a wind mitigation perspective and will help deflect the downwashing winds away from the ground level thus reducing wind speeds near the southwest corner and to the south of the site. The canopy should be solid or no more than 30% porous and should be placed at maximum one-storey height.

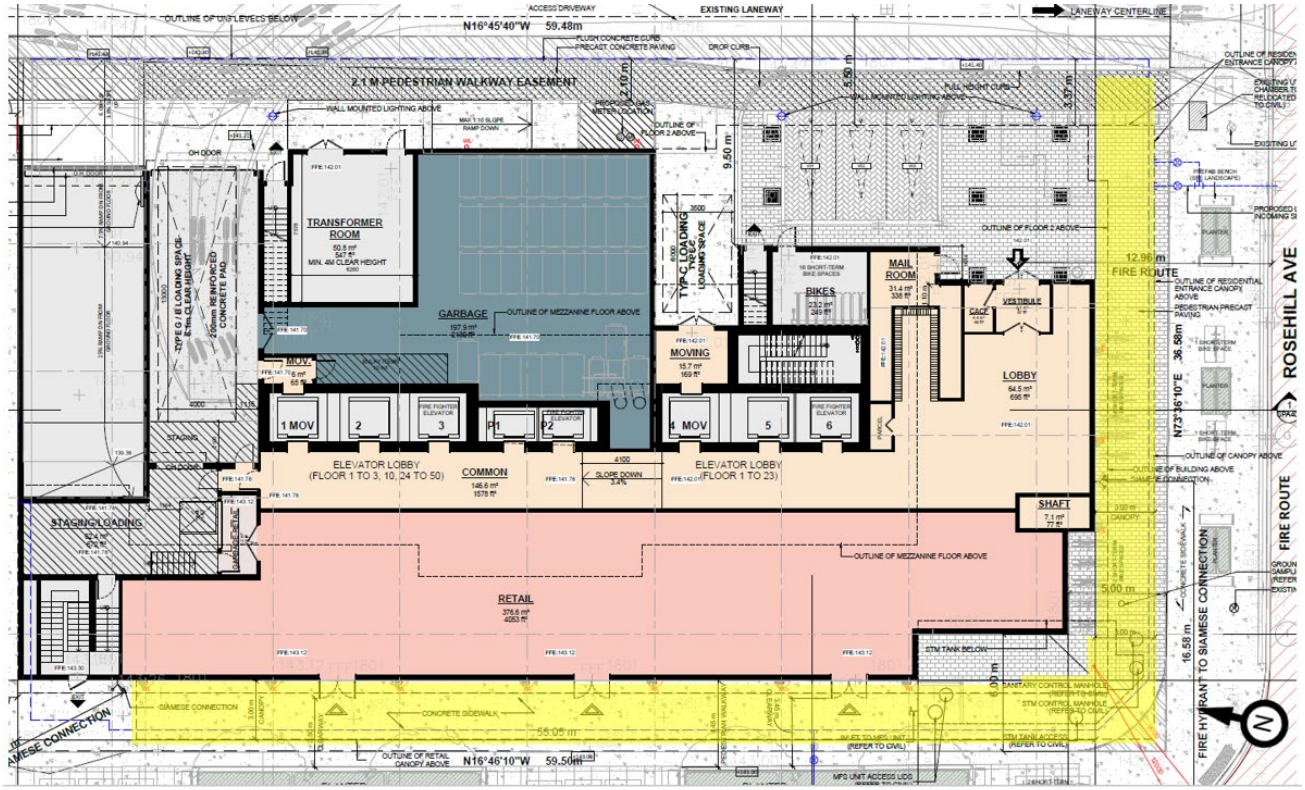


Image 8: Proposed 3m wide canopy highlighted in yellow.

4 STATEMENT OF LIMITATIONS

Limitations

This report was prepared by Rowan Williams Davies & Irwin, Inc. ("RWDI") for Yonge & Rosehill Inc. ("Client"). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein ("Project"). The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared.

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.

Design Assumptions

RWDI confirms that the pedestrian wind assessment (the "**Assessment**") discussed herein was performed by RWDI in accordance with generally accepted professional standards at the time when the Assessment was performed and in the location of the Project. No other representations, warranties, or guarantees are made with respect to the accuracy or completeness of the information, findings, recommendations, or conclusions contained in this Report. This report is not a legal opinion regarding compliance with applicable laws.

The findings and recommendations set out in this report are based on the following information disclosed to RWDI. Drawings and information listed below were received from Turner Fleischer and used to construct the scale model of the proposed 1365-1375 Yonge Street development **("Project Data**")

File Name	File Type	Date Received (dd/mm/yyyy)
14056P01_2023-03-30_Wind Study	SketchUp	30/03/2023
14056P01_2023-03-29_Arch Set	PDF	30/03/2023

The recommendations and conclusions are based on the assumption that the Project Data and Climate Data are accurate and complete. RWDI assumes no responsibility for any inaccuracy or deficiency in information it has received from others. In addition, the recommendations and conclusions in this report are partially based on historical data and can be affected by a number of external factors, including but not limited to Project design,

quality of materials and construction, site conditions, meteorological events, and climate change. As such, the conclusions and recommendations contained in this report do not list every possible outcome.

The opinions in this report can only be relied upon to the extent that the Project Data and Project Specific Conditions have not changed. Any change in the Project Data or Project Specific Conditions not reflected in this report can impact and/or alter the recommendations and conclusions in this report. Therefore, it is incumbent upon the Client and/or any other third party reviewing the recommendations and conclusions in this report to contact RWDI in the event of any change in the Project Data and Project Specific Conditions in order to determine whether any such change(s) may impact the assumptions upon which the recommendations and conclusions were made.

5 REFERENCES

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FIGURES

PLEASANT BOULEVARD

YONGE STREET

ROSEHILL AVENUE

BALMORAL AVENUE

LEGEND:

COMFORT CATEGORIES:

- Sitting
- Standing
- Walking
- Uncomfortable

SENSOR LOCATION:

- Grade Level

0 10 30m

Pedestrian Wind Comfort Conditions

Existing Configuration

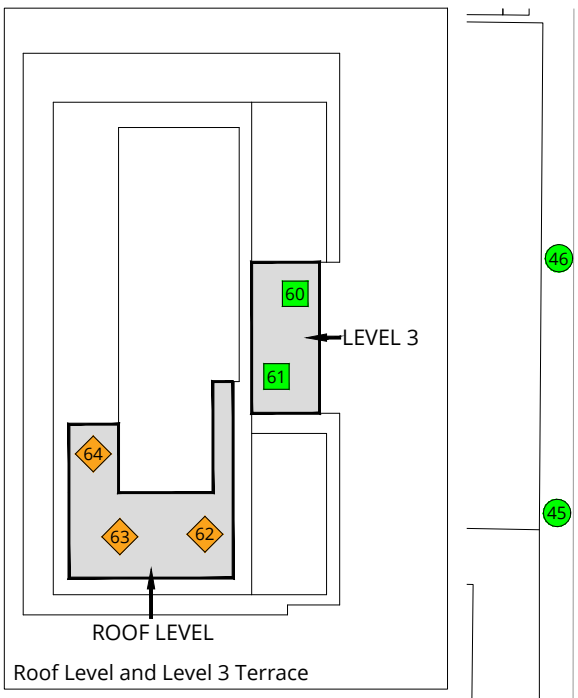
Spring (March to May, 6:00 to 23:00)

1365-1375 Yonge Street - Toronto, ON

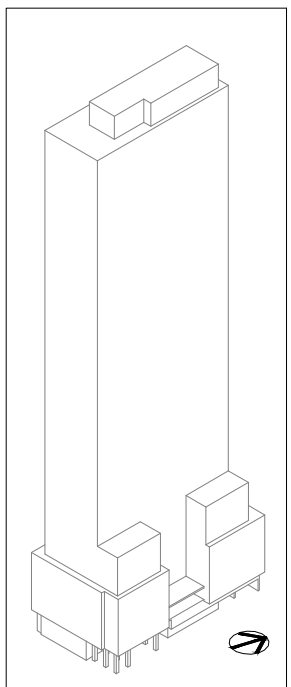
True North

Project #2304289

Drawn by:	GRE	Figure:	1A
Approx. Scale:	1:750		
Date Revised:	Apr. 25, 2023		

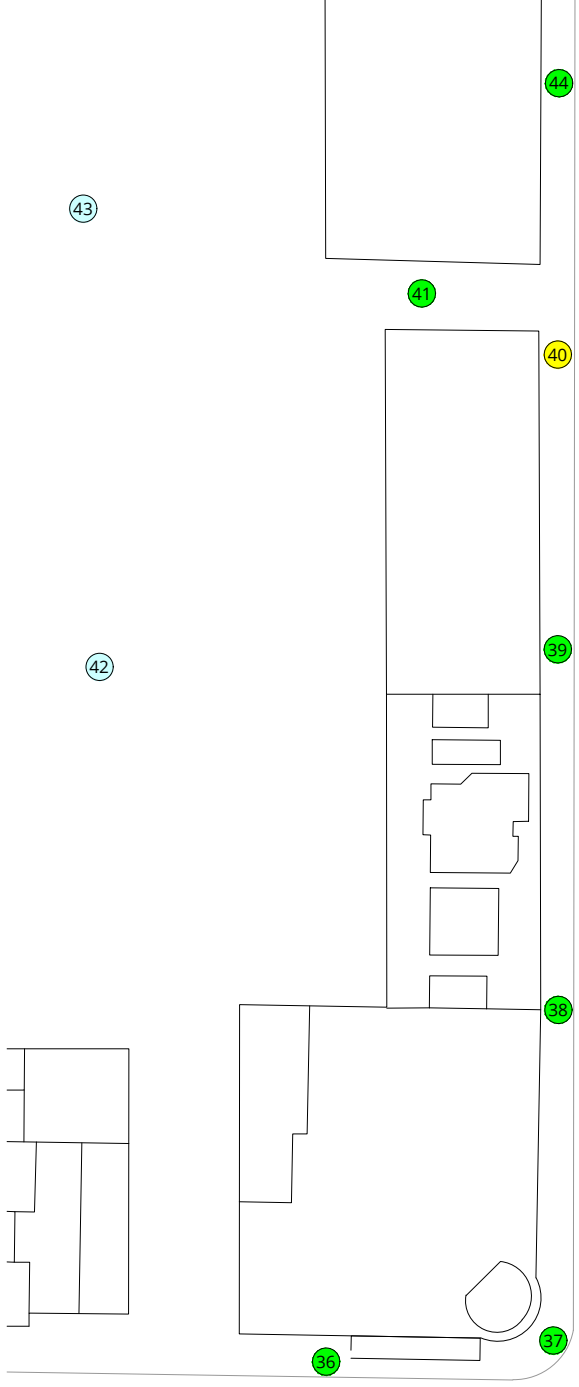


Roof Level and Level 3 Terrace

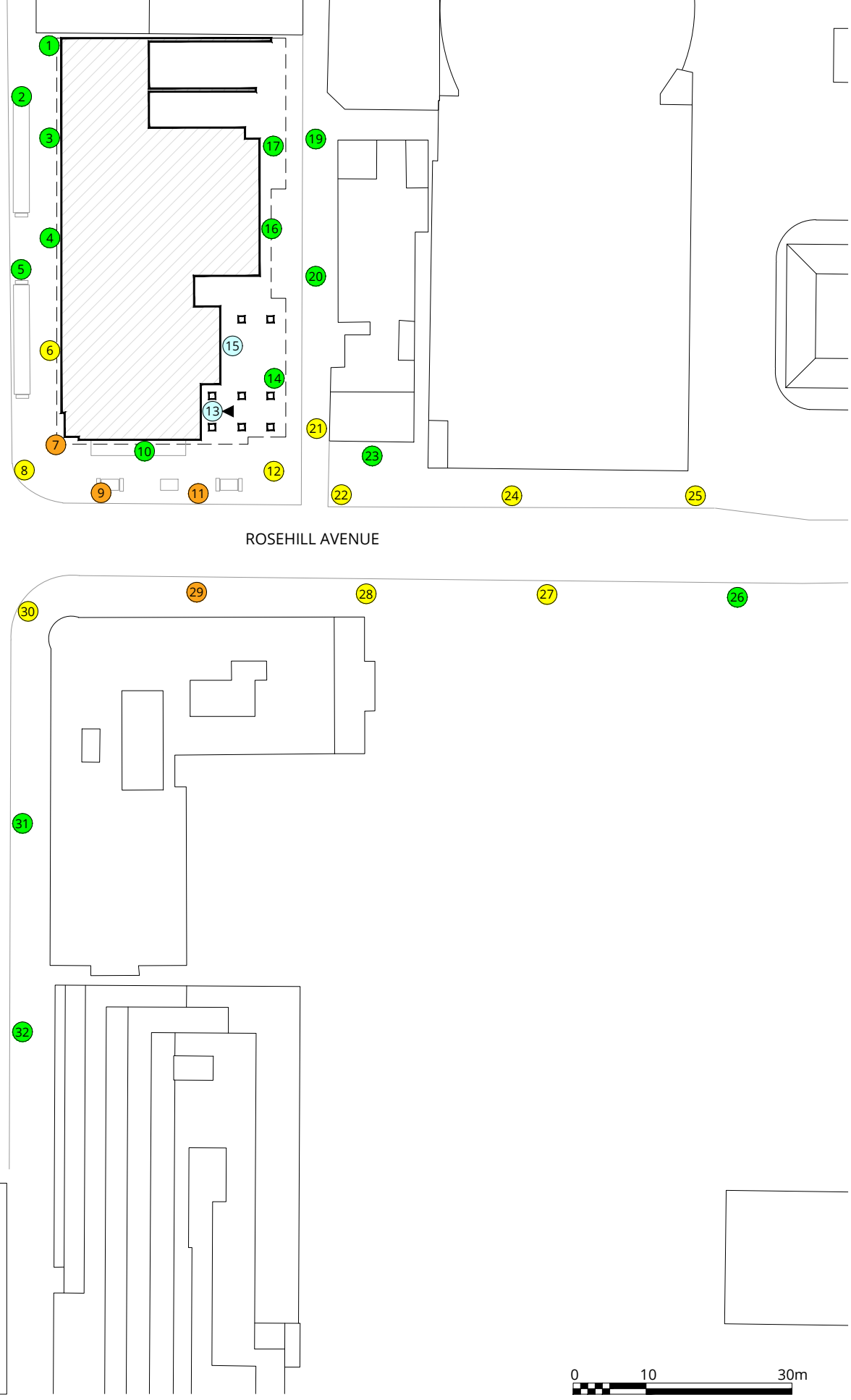


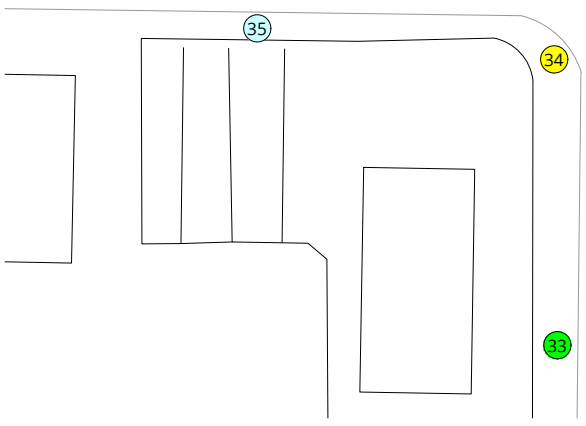
Isometric View of Building

PLEASANT BOULEVARD



BALMORAL AVENUE





LEGEND:

COMFORT CATEGORIES:

- Sitting
- Standing
- Walking
- Uncomfortable

SENSOR LOCATION:

- Grade Level
- Terrace Level
- Roof Level
- Building Above Removed for Clarity
- Main Entrance Location

0 10 30m

Pedestrian Wind Comfort Conditions

Proposed Configuration

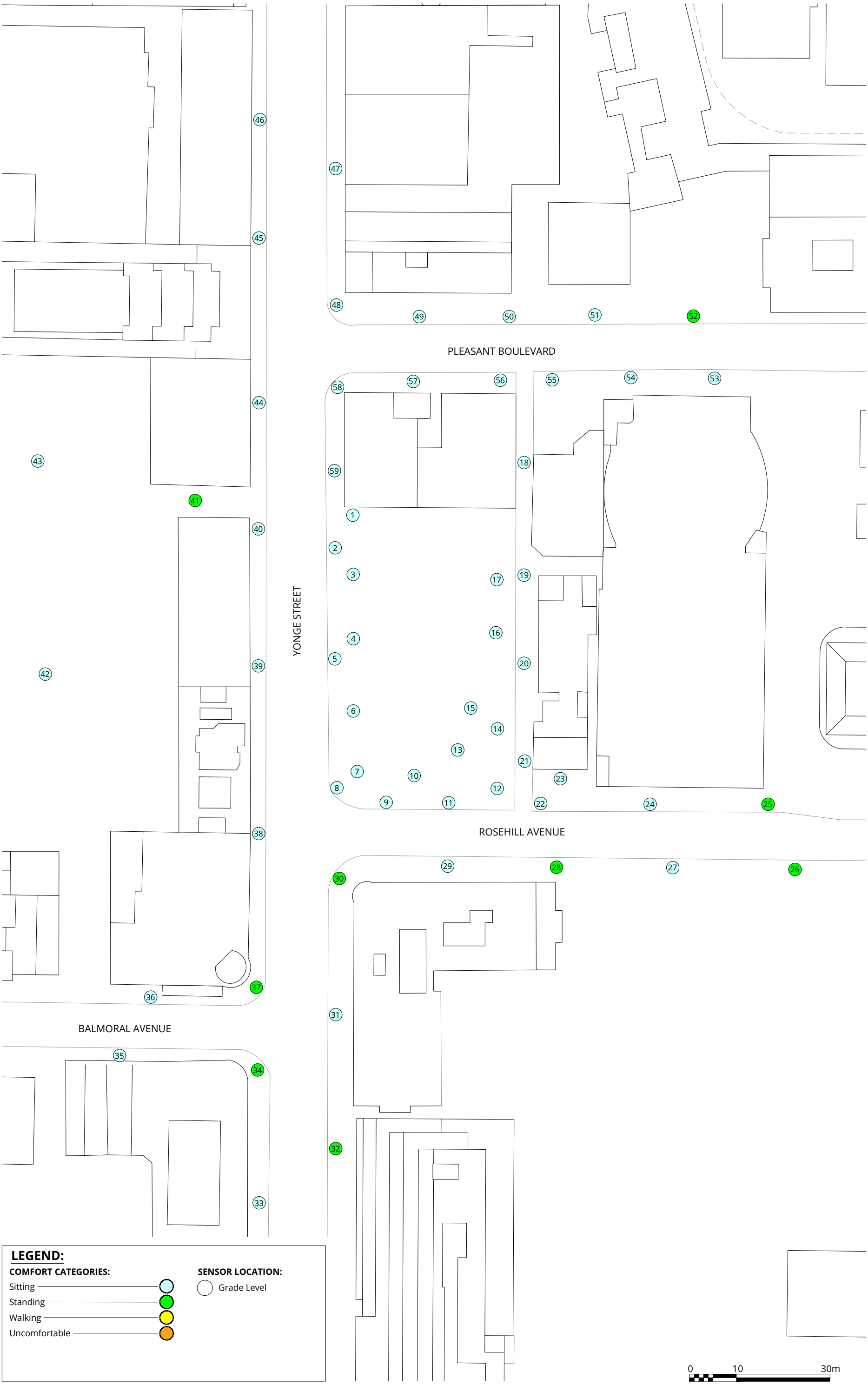
Spring (March to May, 6:00 to 23:00)

1365-1375 Yonge Street - Toronto, ON

True North

Project #2304289

Drawn by:	GRE	Figure:	1B
Approx. Scale:	1:750		
Date Revised:	Apr. 25, 2023		



LEGEND:

COMFORT CATEGORIES:

- Sitting
- Standing
- Walking
- Uncomfortable

SENSOR LOCATION:

- Grade Level

Pedestrian Wind Comfort Conditions

Existing Configuration

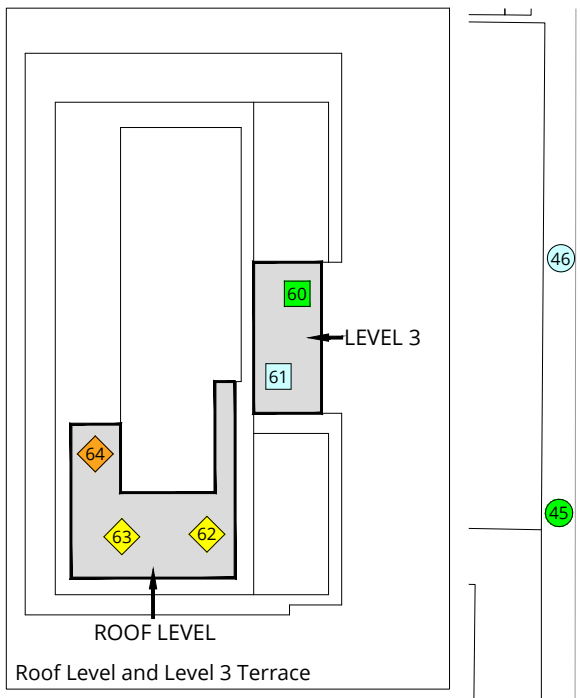
Summer (June to August, 6:00 to 23:00)

1365-1375 Yonge Street - Toronto, ON

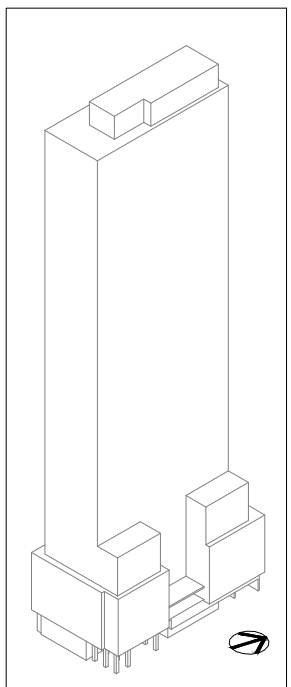
True North

Project #2304289

Drawn by:	GRE	Figure:	2A
Approx. Scale:	1:750		
Date Revised:	Apr. 25, 2023		

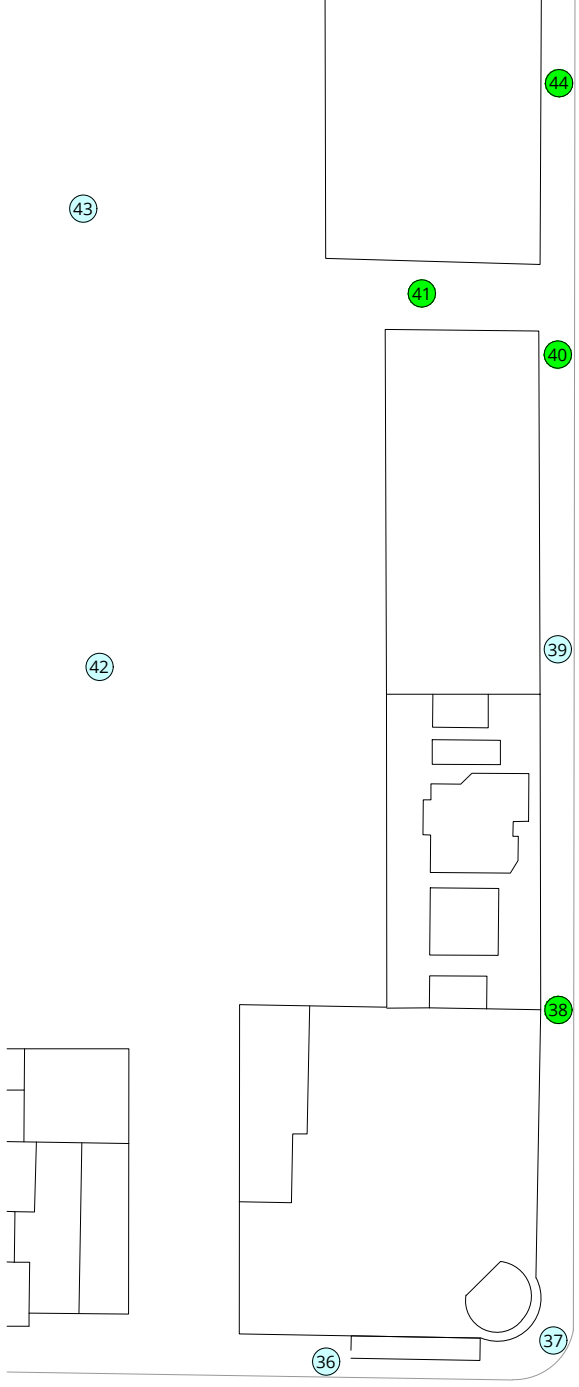


Roof Level and Level 3 Terrace

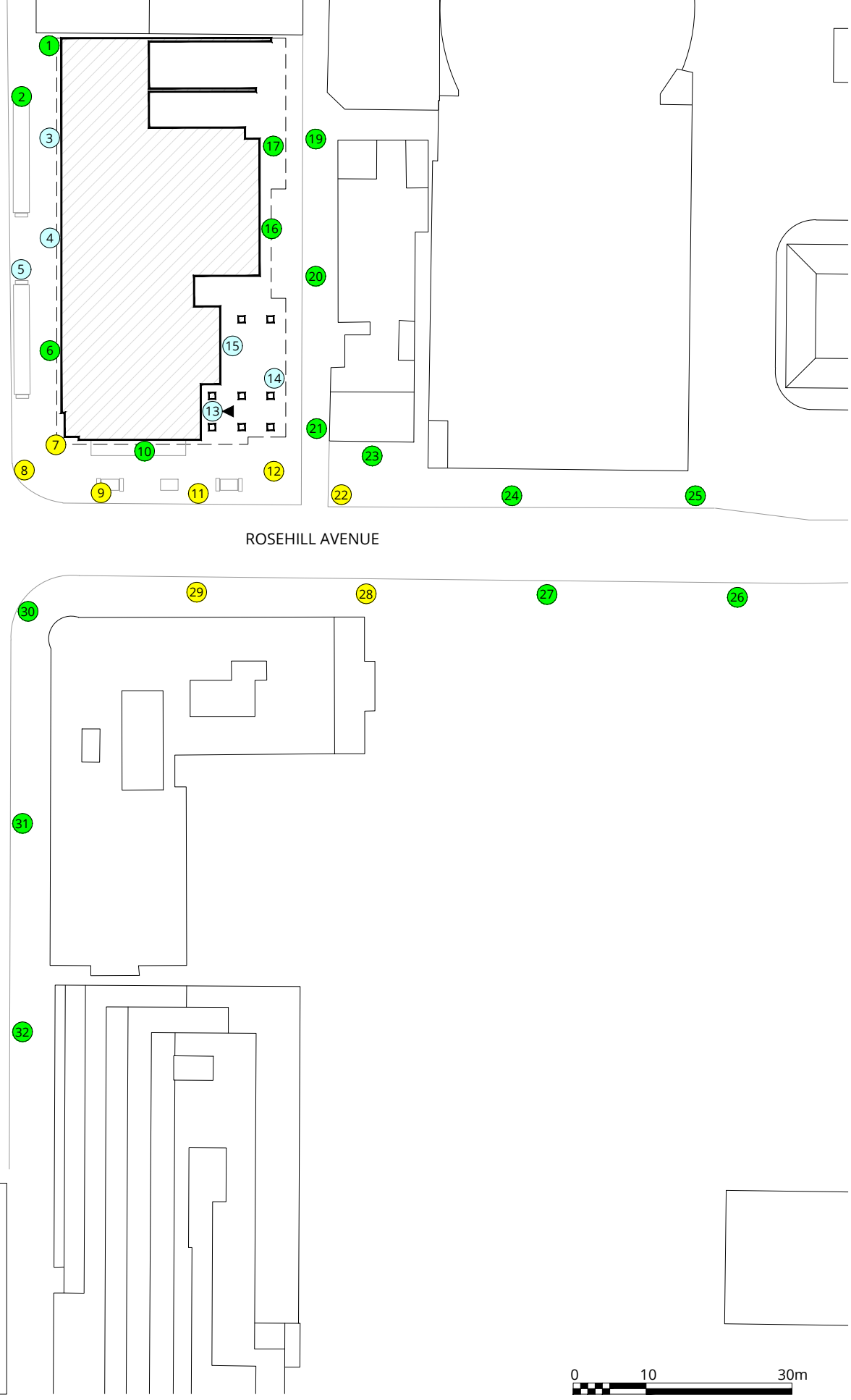


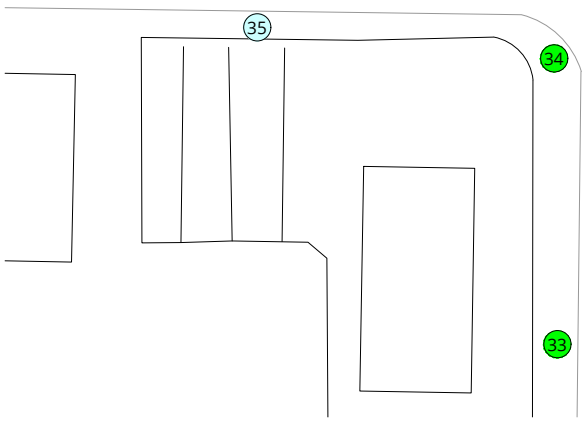
Isometric View of Building

PLEASANT BOULEVARD



BALMORAL AVENUE





LEGEND:

COMFORT CATEGORIES:

- Sitting
- Standing
- Walking
- Uncomfortable

SENSOR LOCATION:

- Grade Level
- Terrace Level
- Roof Level
- Building Above Removed for Clarity
- Main Entrance Location

0 10 30m

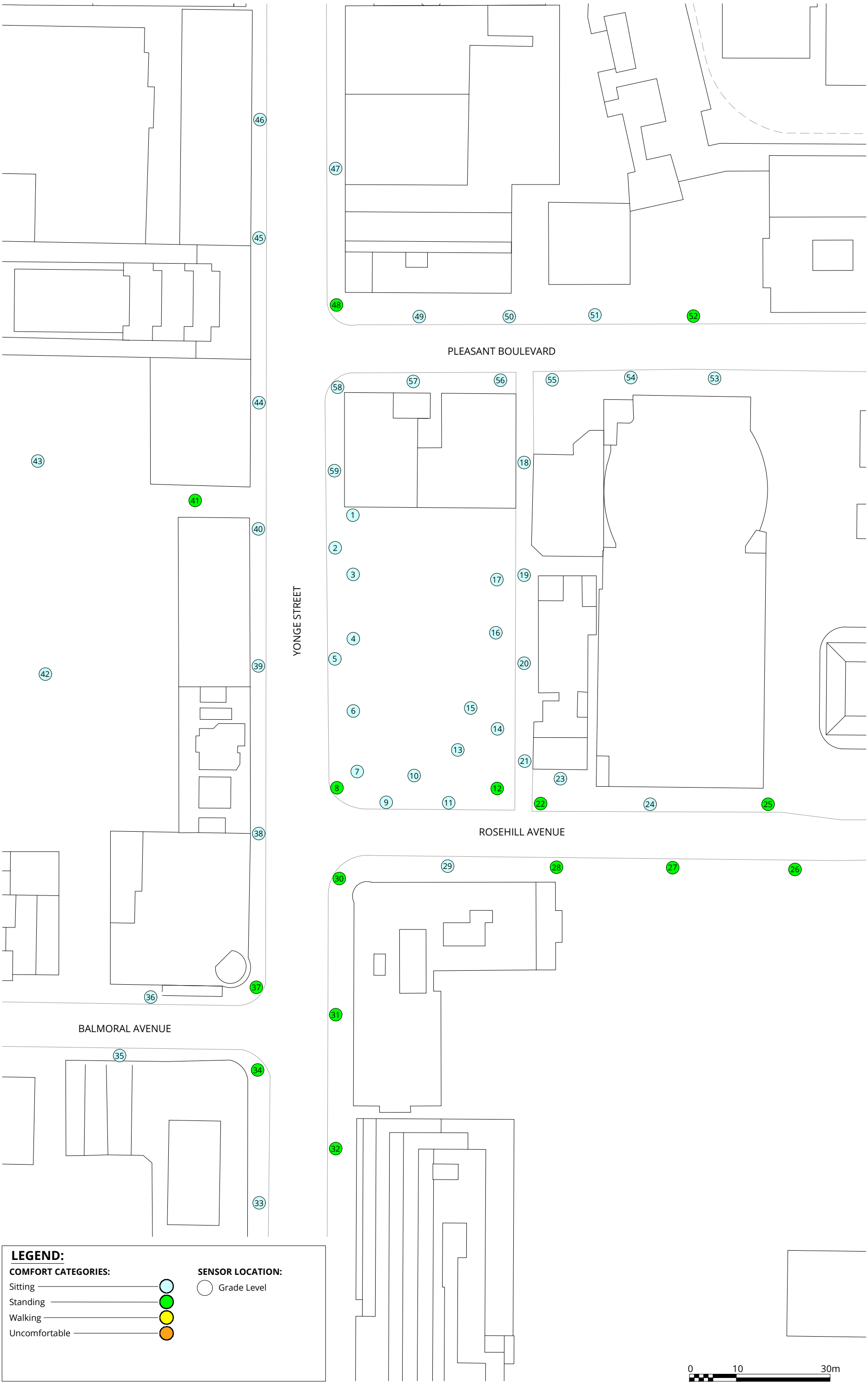
Pedestrian Wind Comfort Conditions
Proposed Configuration
Summer (June to August, 6:00 to 23:00)

1365-1375 Yonge Street - Toronto, ON

True North

Project #2304289

Drawn by:	GRE	Figure:	2B
Approx. Scale:	1:750		
Date Revised:	Apr. 25, 2023		



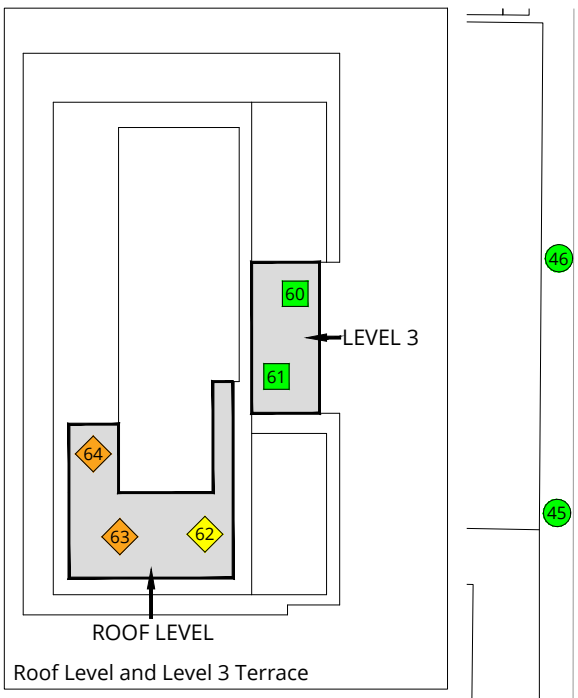
Pedestrian Wind Comfort Conditions
Existing Configuration
Fall (September to November, 6:00 to 23:00)

1365-1375 Yonge Street - Toronto, ON

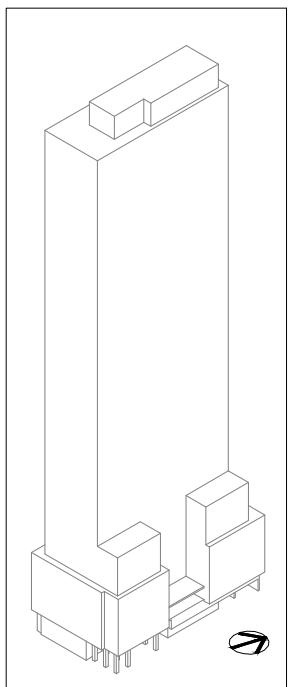
True North

Project #2304289

Drawn by:	GRE	Figure:	3A
Approx. Scale:	1:750		
Date Revised:	Apr. 25, 2023		

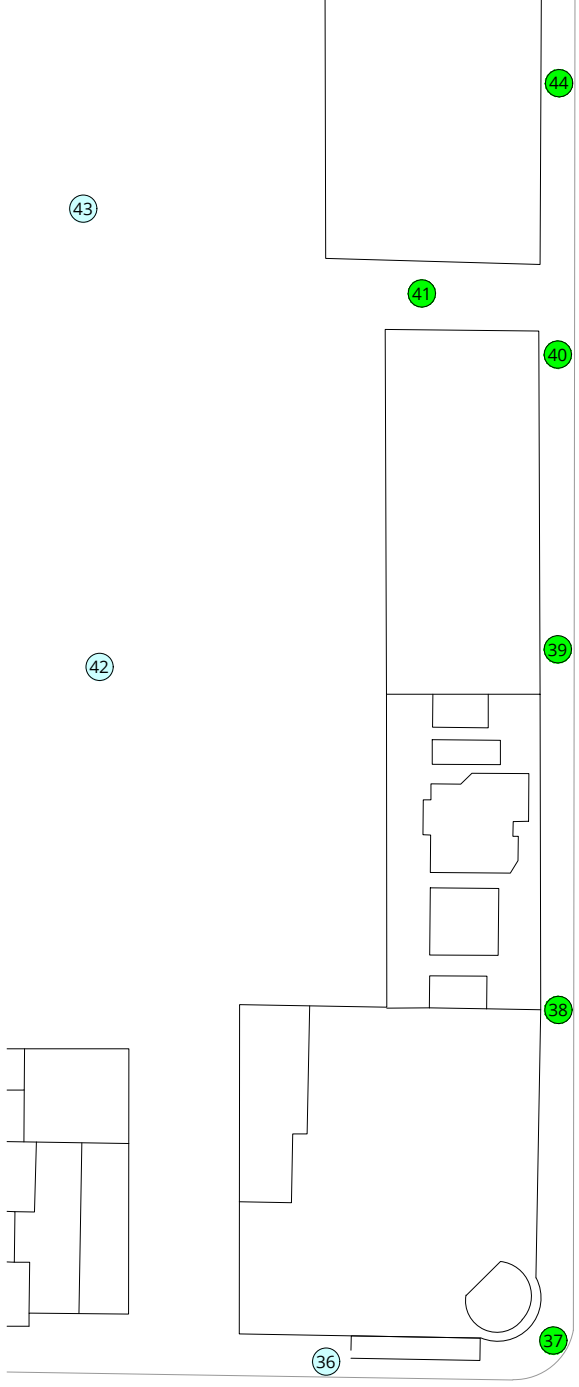


Roof Level and Level 3 Terrace

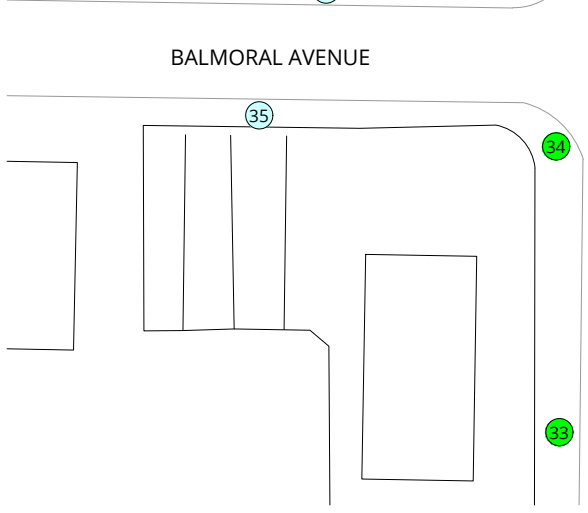


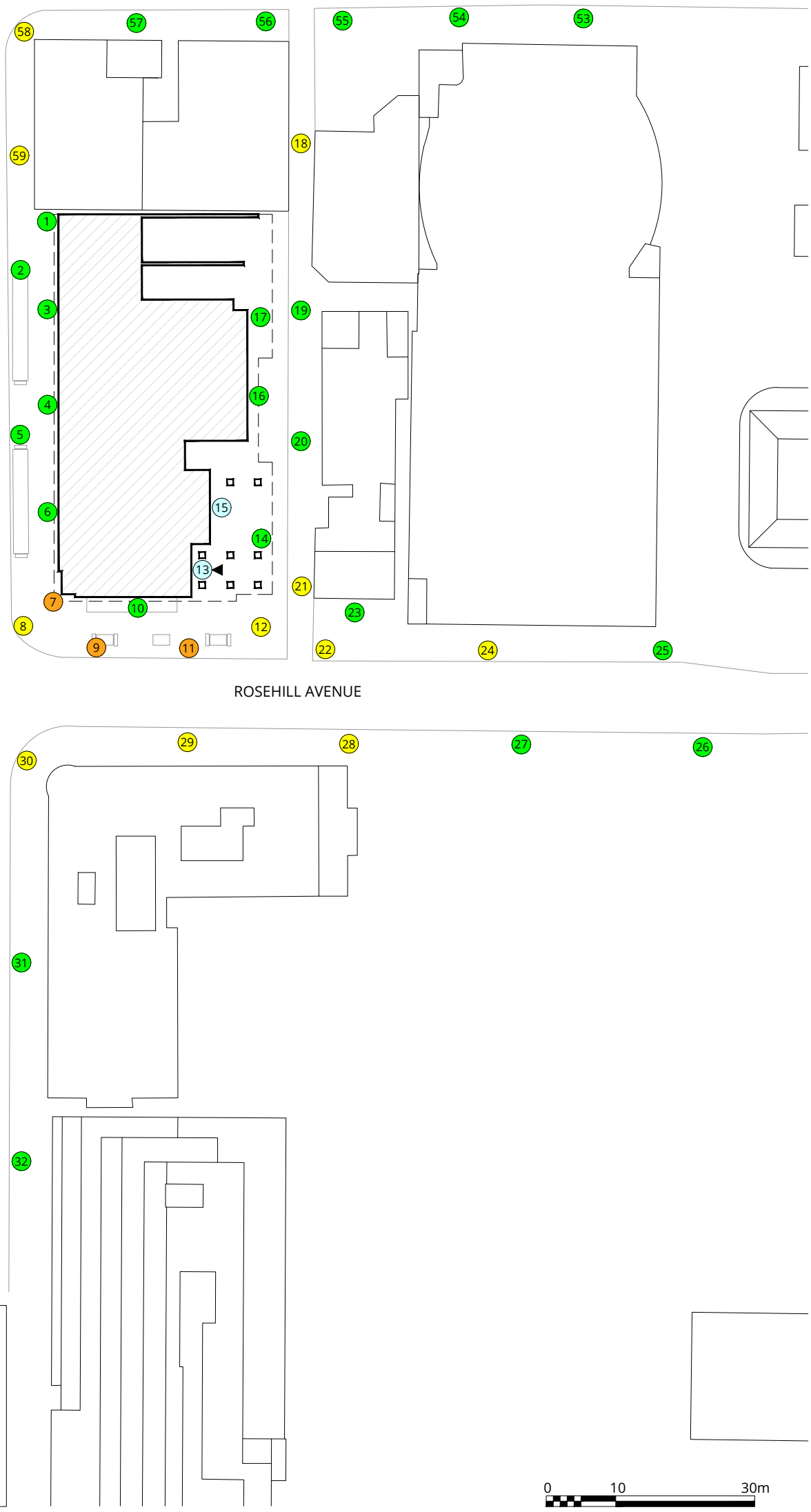
Isometric View of Building

PLEASANT BOULEVARD



BALMORAL AVENUE





LEGEND:

COMFORT CATEGORIES:

- Sitting
- Standing
- Walking
- Uncomfortable

SENSOR LOCATION:

- Grade Level
- Terrace Level
- Roof Level
- Building Above Removed for Clarity
- Main Entrance Location

0 10 30m

Pedestrian Wind Comfort Conditions

Proposed Configuration

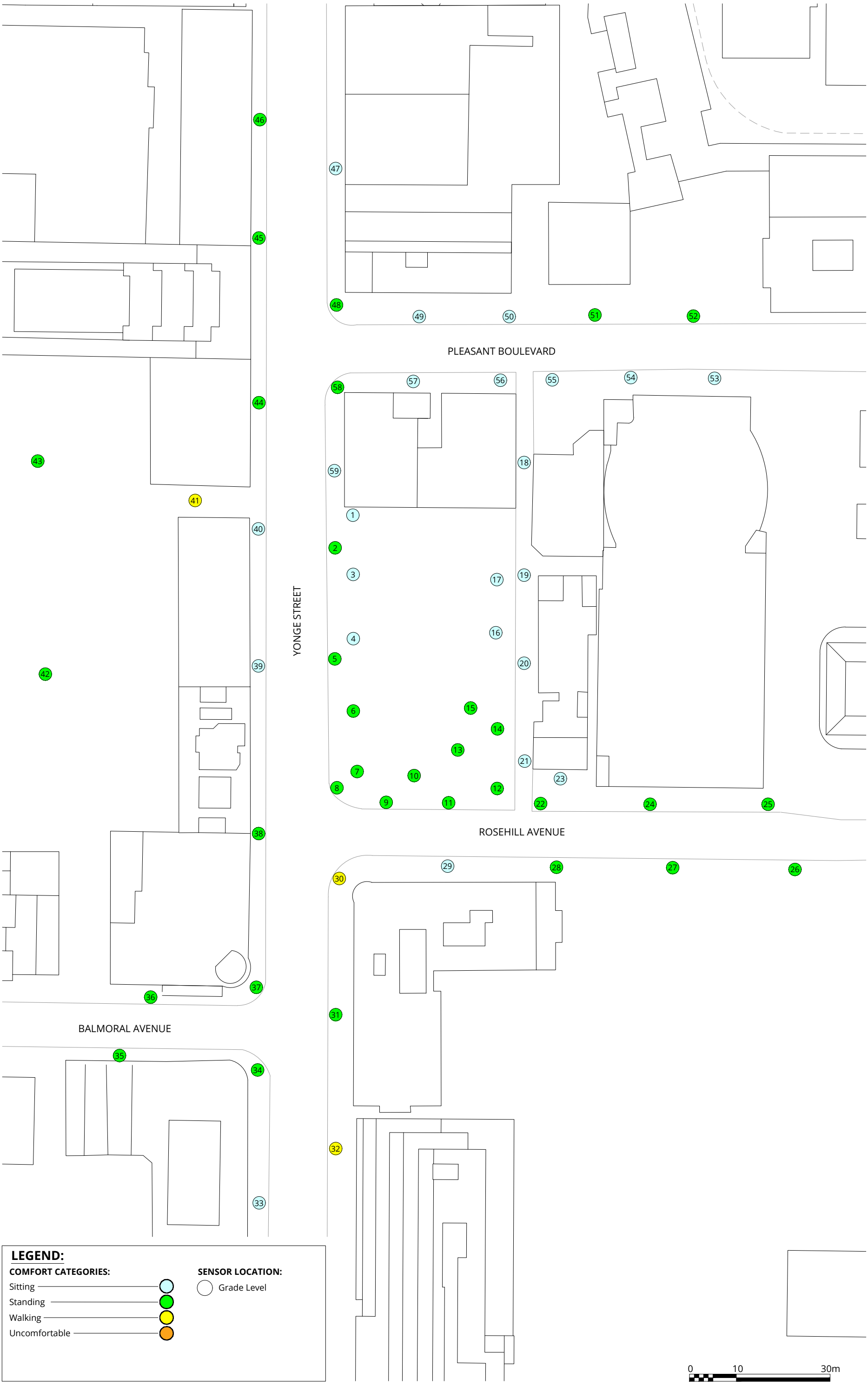
Fall (September to November, 6:00 to 23:00)

1365-1375 Yonge Street - Toronto, ON

True North

Project #2304289

Drawn by:	GRE	Figure:	3B
Approx. Scale:	1:750		
Date Revised:	Apr. 25, 2023		



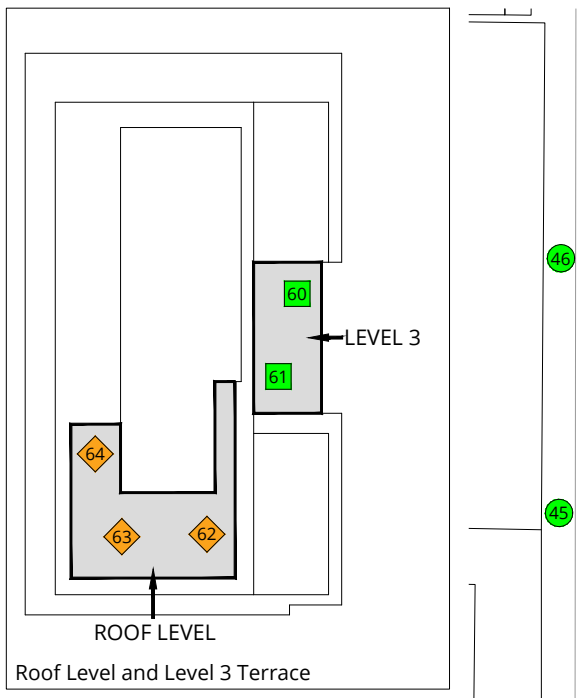
Pedestrian Wind Comfort Conditions
Existing Configuration
Winter (December to February, 6:00 to 23:00)

1365-1375 Yonge Street - Toronto, ON

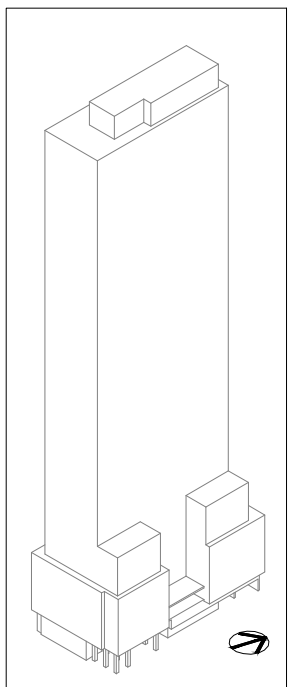
True North

Project #2304289

Drawn by:	GRE	Figure:	4A
Approx. Scale:	1:750		
Date Revised:	Apr. 25, 2023		

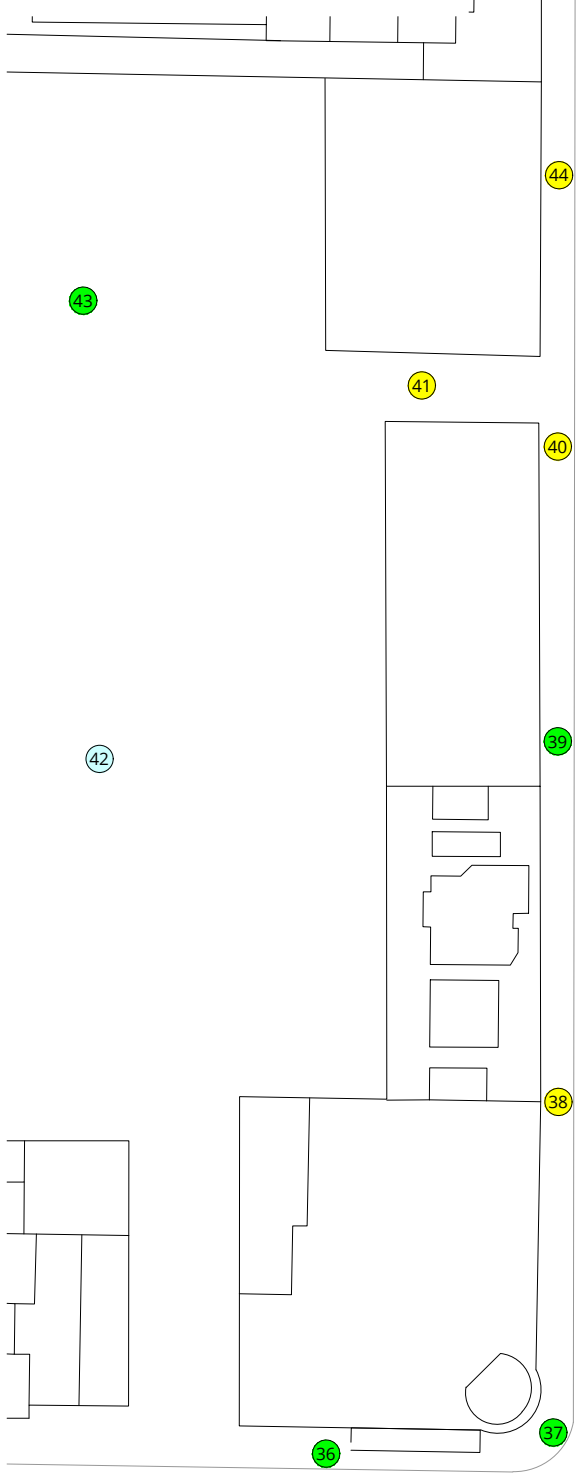


Roof Level and Level 3 Terrace



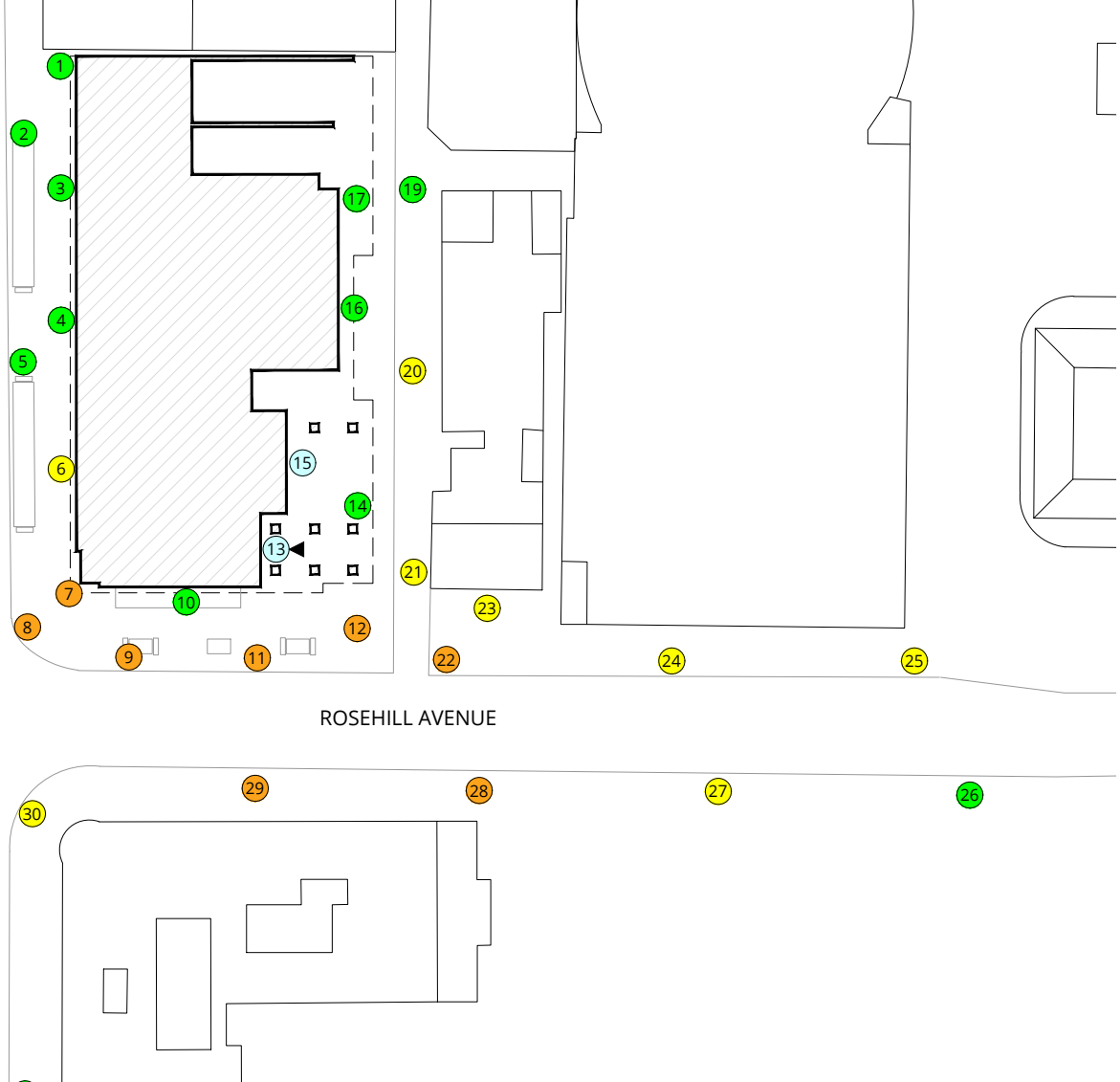
Isometric View of Building

PLEASANT BOULEVARD

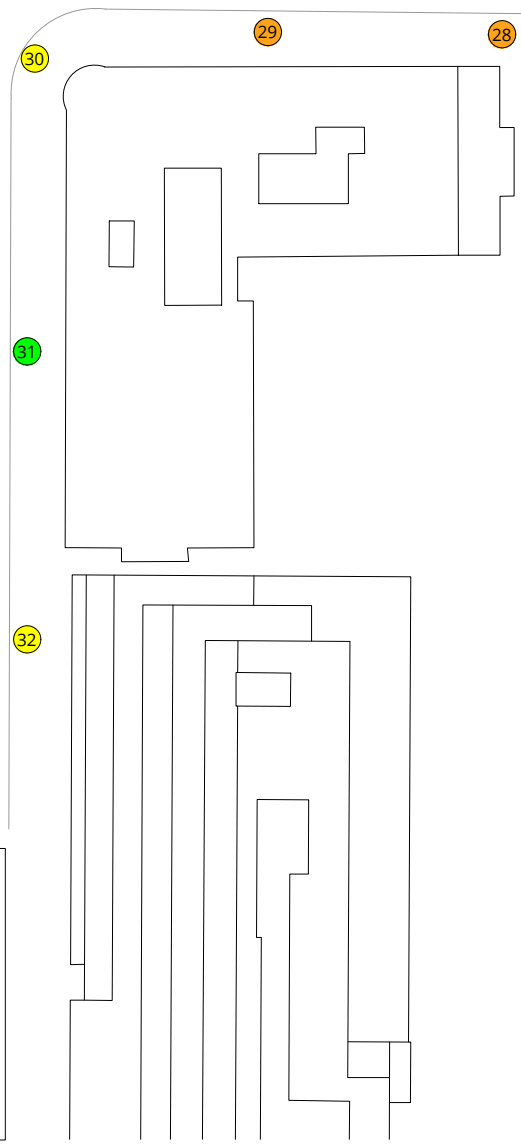


BALMORAL AVENUE

YONGE STREET



ROSEHILL AVENUE



LEGEND:

COMFORT CATEGORIES:

- Sitting
- Standing
- Walking
- Uncomfortable

SENSOR LOCATION:

- Grade Level
- Terrace Level
- Roof Level
- Building Above Removed for Clarity
- Main Entrance Location

0 10 30m

Pedestrian Wind Comfort Conditions

Proposed Configuration

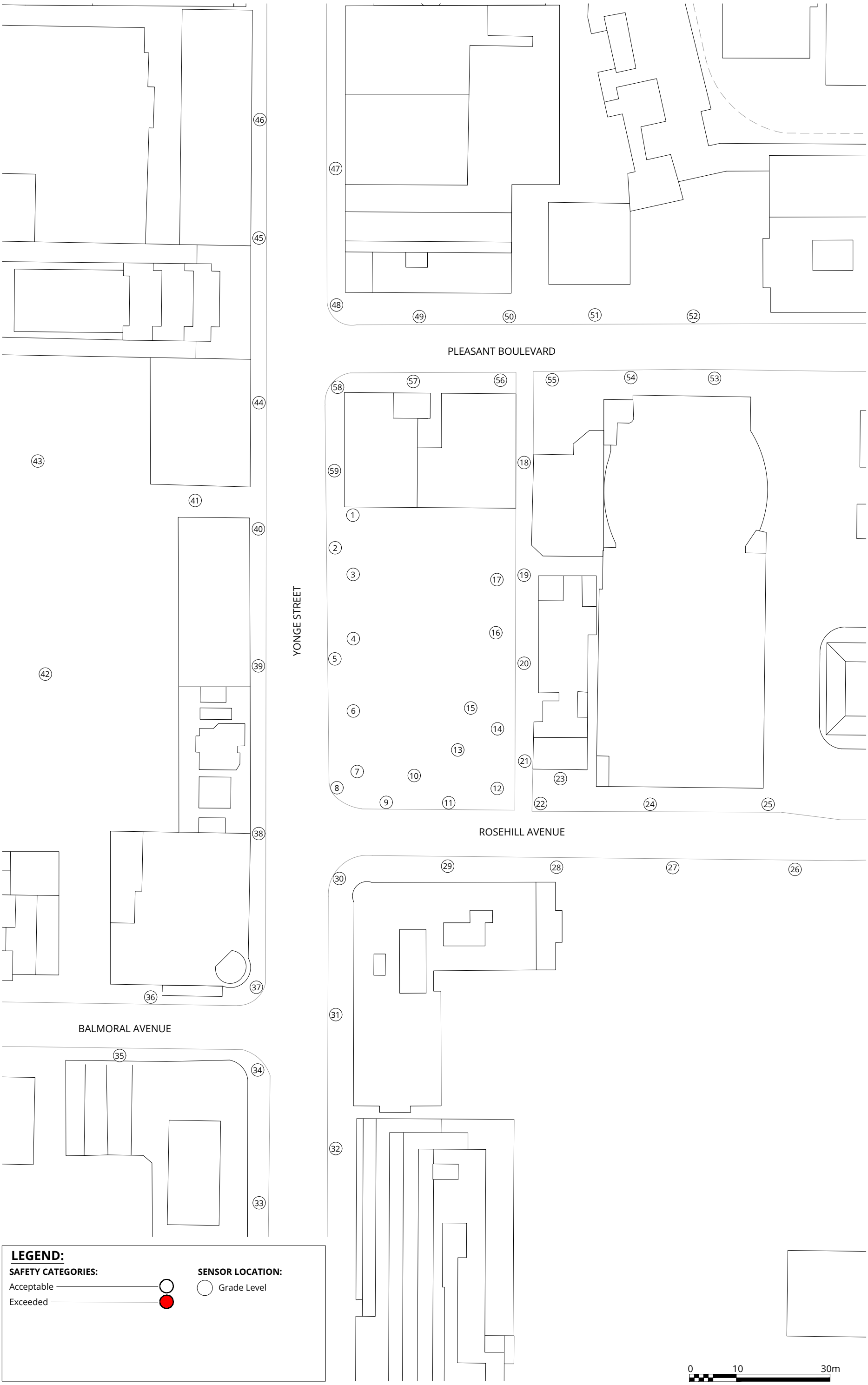
Winter (December to February, 6:00 to 23:00)

1365-1375 Yonge Street - Toronto, ON

True North

Project #2304289

Drawn by:	GRE	Figure:	4B
Approx. Scale:	1:750		
Date Revised:	Apr. 25, 2023		



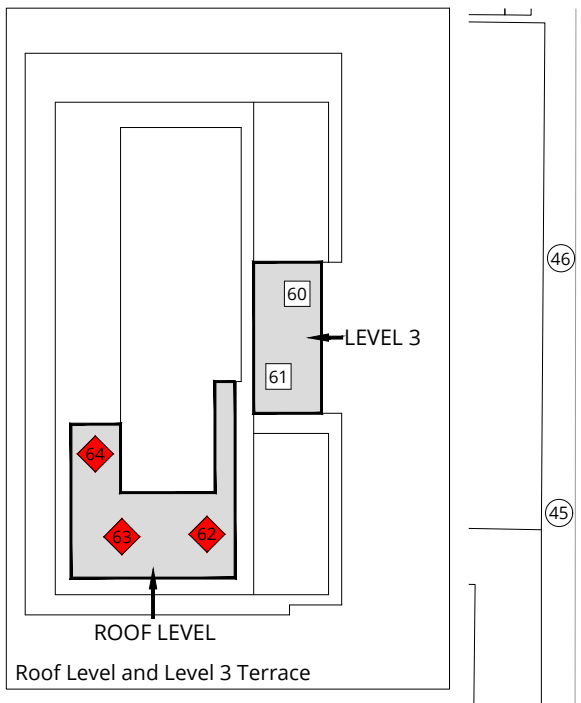
Pedestrian Wind Safety Conditions
Existing Configuration
Annual (January to December, 0:00 to 23:00)

1365-1375 Yonge Street - Toronto, ON

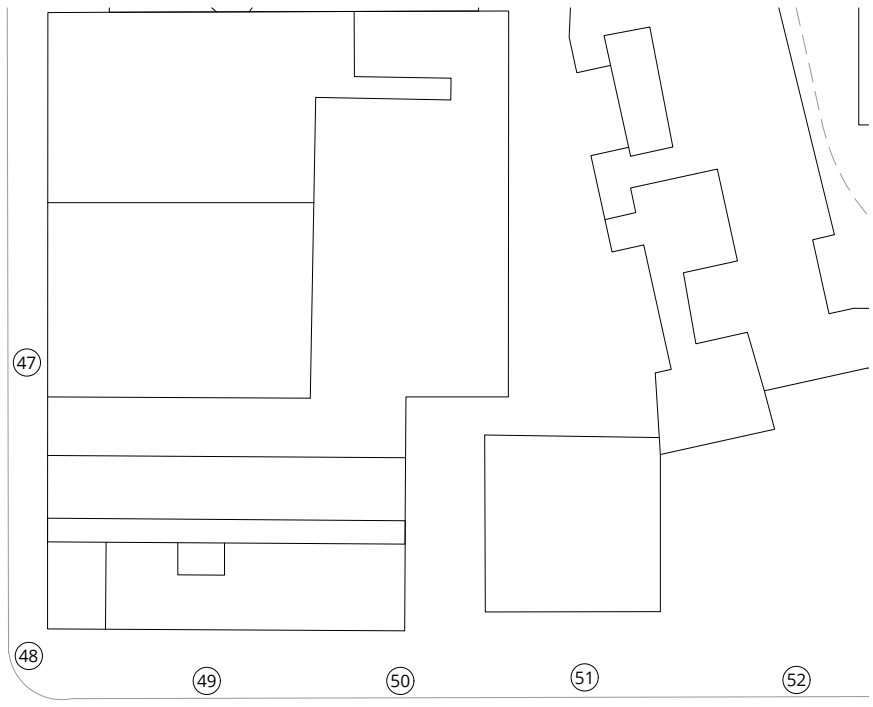
True North

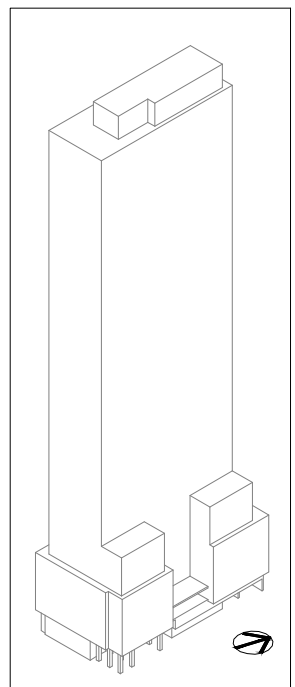
Project #2304289

Drawn by:	GRE	Figure:	5A
Approx. Scale:	1:750		
Date Revised:	Apr. 25, 2023		



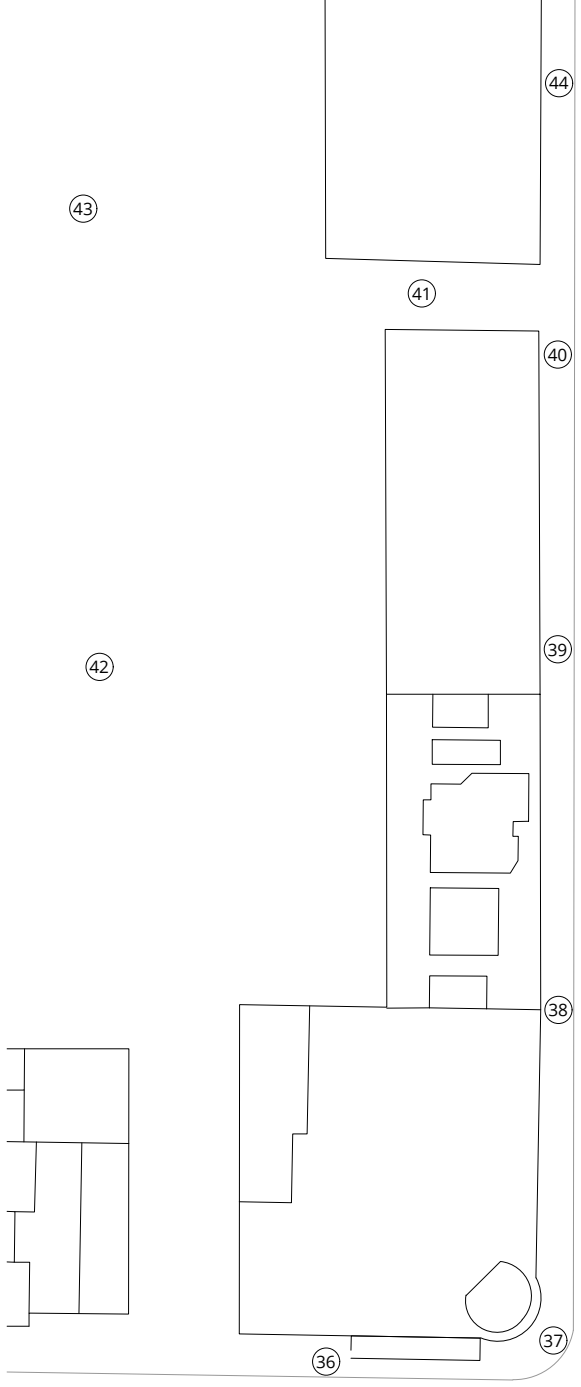
Roof Level and Level 3 Terrace



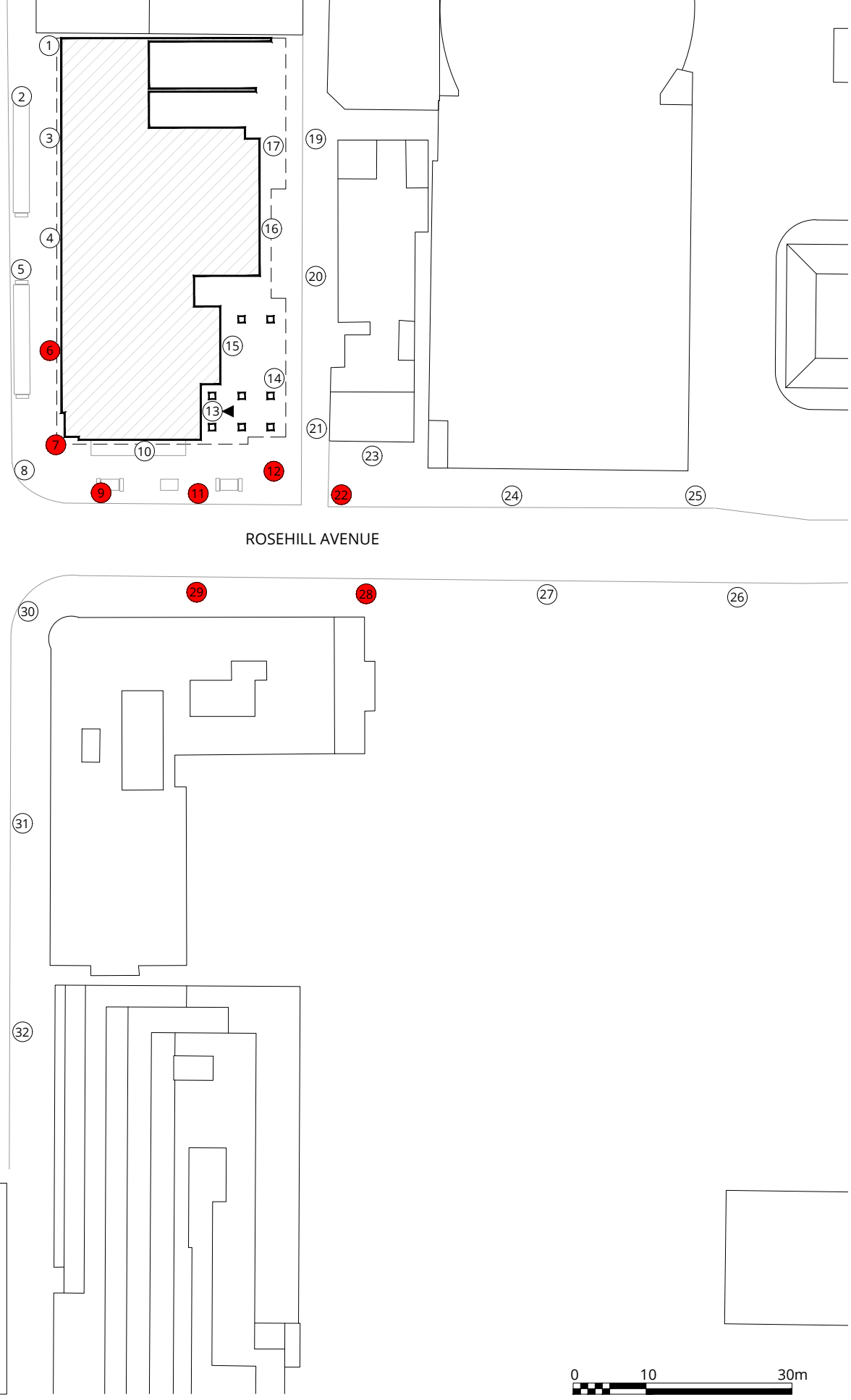


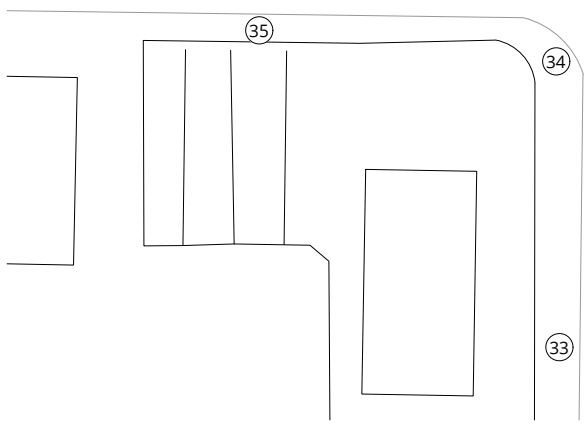
Isometric View of Building

PLEASANT BOULEVARD



BALMORAL AVENUE





LEGEND:

SAFETY CATEGORIES:

- Acceptable
- Exceeded

SENSOR LOCATION:

- Grade Level
- Terrace Level
- Roof Level
- Building Above Removed for Clarity
- Main Entrance Location

0 10 30m

Pedestrian Wind Safety Conditions

Proposed Configuration

Annual (January to December, 0:00 to 23:00)

1365-1375 Yonge Street - Toronto, ON

True North

Project #2304289

Drawn by:	GRE	Figure:	5B
Approx. Scale:	1:750		
Date Revised:	Apr. 25, 2023		

TABLES

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort								Wind Safety	
		Spring		Summer		Fall		Winter		Annual	
		Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating
1	Existing	7	Sitting	6	Sitting	6	Sitting	7	Sitting	31	Pass
	Proposed	15	Standing	11	Standing	12	Standing	14	Standing	75	Pass
2	Existing	10	Sitting	9	Sitting	9	Sitting	11	Standing	43	Pass
	Proposed	15	Standing	12	Standing	13	Standing	15	Standing	63	Pass
3	Existing	9	Sitting	8	Sitting	8	Sitting	9	Sitting	41	Pass
	Proposed	13	Standing	10	Sitting	12	Standing	14	Standing	58	Pass
4	Existing	10	Sitting	8	Sitting	9	Sitting	10	Sitting	48	Pass
	Proposed	13	Standing	10	Sitting	11	Standing	13	Standing	56	Pass
5	Existing	10	Sitting	9	Sitting	9	Sitting	11	Standing	45	Pass
	Proposed	12	Standing	10	Sitting	11	Standing	12	Standing	58	Pass
6	Existing	10	Sitting	8	Sitting	9	Sitting	11	Standing	47	Pass
	Proposed	17	Walking	13	Standing	15	Standing	17	Walking	92	Exceeded
7	Existing	10	Sitting	9	Sitting	10	Sitting	12	Standing	54	Pass
	Proposed	22	Uncomfortable	19	Walking	23	Uncomfortable	28	Uncomfortable	106	Exceeded
8	Existing	11	Standing	9	Sitting	11	Standing	13	Standing	60	Pass
	Proposed	18	Walking	16	Walking	18	Walking	22	Uncomfortable	85	Pass
9	Existing	10	Sitting	8	Sitting	10	Sitting	11	Standing	55	Pass
	Proposed	23	Uncomfortable	20	Walking	23	Uncomfortable	28	Uncomfortable	106	Exceeded
10	Existing	10	Sitting	9	Sitting	10	Sitting	11	Standing	50	Pass
	Proposed	13	Standing	12	Standing	13	Standing	15	Standing	65	Pass
11	Existing	11	Standing	9	Sitting	10	Sitting	12	Standing	55	Pass
	Proposed	24	Uncomfortable	20	Walking	23	Uncomfortable	27	Uncomfortable	107	Exceeded
12	Existing	13	Standing	10	Sitting	12	Standing	13	Standing	61	Pass
	Proposed	20	Walking	17	Walking	19	Walking	23	Uncomfortable	98	Exceeded

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort								Wind Safety	
		Spring		Summer		Fall		Winter		Annual	
		Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating
13	Existing	10	Sitting	9	Sitting	10	Sitting	11	Standing	53	Pass
	Proposed	9	Sitting	7	Sitting	8	Sitting	8	Sitting	55	Pass
14	Existing	9	Sitting	8	Sitting	9	Sitting	11	Standing	58	Pass
	Proposed	12	Standing	10	Sitting	12	Standing	14	Standing	66	Pass
15	Existing	9	Sitting	8	Sitting	9	Sitting	11	Standing	55	Pass
	Proposed	9	Sitting	7	Sitting	9	Sitting	9	Sitting	58	Pass
16	Existing	9	Sitting	7	Sitting	9	Sitting	10	Sitting	47	Pass
	Proposed	13	Standing	11	Standing	13	Standing	15	Standing	68	Pass
17	Existing	9	Sitting	7	Sitting	8	Sitting	10	Sitting	43	Pass
	Proposed	14	Standing	11	Standing	12	Standing	14	Standing	61	Pass
18	Existing	8	Sitting	7	Sitting	8	Sitting	9	Sitting	43	Pass
	Proposed	17	Walking	14	Standing	17	Walking	20	Walking	76	Pass
19	Existing	8	Sitting	7	Sitting	8	Sitting	10	Sitting	46	Pass
	Proposed	14	Standing	11	Standing	13	Standing	15	Standing	66	Pass
20	Existing	8	Sitting	7	Sitting	8	Sitting	10	Sitting	51	Pass
	Proposed	13	Standing	12	Standing	14	Standing	17	Walking	84	Pass
21	Existing	9	Sitting	8	Sitting	9	Sitting	10	Sitting	54	Pass
	Proposed	16	Walking	13	Standing	16	Walking	19	Walking	75	Pass
22	Existing	13	Standing	10	Sitting	11	Standing	13	Standing	53	Pass
	Proposed	18	Walking	16	Walking	18	Walking	23	Uncomfortable	97	Exceeded
23	Existing	9	Sitting	8	Sitting	8	Sitting	10	Sitting	42	Pass
	Proposed	13	Standing	12	Standing	14	Standing	17	Walking	75	Pass
24	Existing	11	Standing	9	Sitting	10	Sitting	11	Standing	47	Pass
	Proposed	16	Walking	14	Standing	17	Walking	20	Walking	88	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort								Wind Safety	
		Spring		Summer		Fall		Winter		Annual	
		Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating
25	Existing	13	Standing	12	Standing	12	Standing	13	Standing	60	Pass
	Proposed	16	Walking	14	Standing	15	Standing	18	Walking	78	Pass
26	Existing	13	Standing	11	Standing	12	Standing	13	Standing	52	Pass
	Proposed	14	Standing	12	Standing	13	Standing	15	Standing	65	Pass
27	Existing	12	Standing	10	Sitting	11	Standing	13	Standing	53	Pass
	Proposed	16	Walking	13	Standing	15	Standing	18	Walking	82	Pass
28	Existing	14	Standing	11	Standing	12	Standing	14	Standing	57	Pass
	Proposed	19	Walking	16	Walking	18	Walking	21	Uncomfortable	91	Exceeded
29	Existing	9	Sitting	7	Sitting	8	Sitting	9	Sitting	38	Pass
	Proposed	21	Uncomfortable	17	Walking	20	Walking	24	Uncomfortable	91	Exceeded
30	Existing	14	Standing	12	Standing	13	Standing	16	Walking	65	Pass
	Proposed	17	Walking	14	Standing	16	Walking	20	Walking	89	Pass
31	Existing	12	Standing	10	Sitting	12	Standing	13	Standing	58	Pass
	Proposed	13	Standing	11	Standing	12	Standing	14	Standing	64	Pass
32	Existing	14	Standing	12	Standing	14	Standing	16	Walking	70	Pass
	Proposed	14	Standing	12	Standing	13	Standing	16	Walking	67	Pass
33	Existing	11	Standing	10	Sitting	10	Sitting	10	Sitting	50	Pass
	Proposed	13	Standing	11	Standing	11	Standing	12	Standing	63	Pass
34	Existing	14	Standing	11	Standing	12	Standing	14	Standing	62	Pass
	Proposed	16	Walking	13	Standing	15	Standing	17	Walking	75	Pass
35	Existing	10	Sitting	8	Sitting	9	Sitting	11	Standing	49	Pass
	Proposed	9	Sitting	8	Sitting	9	Sitting	10	Sitting	44	Pass
36	Existing	10	Sitting	9	Sitting	10	Sitting	12	Standing	57	Pass
	Proposed	11	Standing	9	Sitting	10	Sitting	11	Standing	50	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort								Wind Safety	
		Spring		Summer		Fall		Winter		Annual	
		Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating
37	Existing	13	Standing	11	Standing	13	Standing	15	Standing	62	Pass
	Proposed	12	Standing	10	Sitting	11	Standing	12	Standing	52	Pass
38	Existing	9	Sitting	8	Sitting	9	Sitting	11	Standing	48	Pass
	Proposed	14	Standing	12	Standing	14	Standing	18	Walking	75	Pass
39	Existing	10	Sitting	8	Sitting	9	Sitting	10	Sitting	46	Pass
	Proposed	12	Standing	10	Sitting	11	Standing	12	Standing	56	Pass
40	Existing	10	Sitting	8	Sitting	9	Sitting	10	Sitting	48	Pass
	Proposed	16	Walking	13	Standing	15	Standing	17	Walking	68	Pass
41	Existing	13	Standing	11	Standing	14	Standing	18	Walking	74	Pass
	Proposed	14	Standing	11	Standing	13	Standing	16	Walking	73	Pass
42	Existing	9	Sitting	8	Sitting	9	Sitting	11	Standing	45	Pass
	Proposed	9	Sitting	8	Sitting	8	Sitting	10	Sitting	40	Pass
43	Existing	10	Sitting	9	Sitting	10	Sitting	11	Standing	48	Pass
	Proposed	10	Sitting	9	Sitting	9	Sitting	11	Standing	49	Pass
44	Existing	12	Standing	10	Sitting	10	Sitting	11	Standing	49	Pass
	Proposed	15	Standing	13	Standing	15	Standing	18	Walking	73	Pass
45	Existing	12	Standing	10	Sitting	10	Sitting	11	Standing	50	Pass
	Proposed	14	Standing	12	Standing	13	Standing	15	Standing	61	Pass
46	Existing	12	Standing	10	Sitting	10	Sitting	11	Standing	50	Pass
	Proposed	13	Standing	10	Sitting	11	Standing	12	Standing	54	Pass
47	Existing	10	Sitting	9	Sitting	9	Sitting	10	Sitting	43	Pass
	Proposed	10	Sitting	9	Sitting	9	Sitting	10	Sitting	43	Pass
48	Existing	12	Standing	10	Sitting	11	Standing	12	Standing	50	Pass
	Proposed	14	Standing	11	Standing	13	Standing	14	Standing	57	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort								Wind Safety	
		Spring		Summer		Fall		Winter		Annual	
		Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating
49	Existing	8	Sitting	7	Sitting	8	Sitting	8	Sitting	43	Pass
	Proposed	12	Standing	10	Sitting	12	Standing	13	Standing	55	Pass
50	Existing	10	Sitting	9	Sitting	10	Sitting	10	Sitting	54	Pass
	Proposed	12	Standing	11	Standing	12	Standing	14	Standing	64	Pass
51	Existing	11	Standing	9	Sitting	10	Sitting	11	Standing	51	Pass
	Proposed	11	Standing	10	Sitting	11	Standing	12	Standing	59	Pass
52	Existing	13	Standing	11	Standing	12	Standing	13	Standing	54	Pass
	Proposed	13	Standing	11	Standing	12	Standing	14	Standing	58	Pass
53	Existing	10	Sitting	9	Sitting	10	Sitting	10	Sitting	43	Pass
	Proposed	11	Standing	10	Sitting	11	Standing	13	Standing	57	Pass
54	Existing	10	Sitting	8	Sitting	9	Sitting	10	Sitting	43	Pass
	Proposed	11	Standing	10	Sitting	11	Standing	13	Standing	61	Pass
55	Existing	10	Sitting	8	Sitting	9	Sitting	10	Sitting	45	Pass
	Proposed	14	Standing	11	Standing	13	Standing	15	Standing	70	Pass
56	Existing	9	Sitting	8	Sitting	9	Sitting	10	Sitting	45	Pass
	Proposed	13	Standing	11	Standing	13	Standing	15	Standing	70	Pass
57	Existing	10	Sitting	9	Sitting	9	Sitting	10	Sitting	44	Pass
	Proposed	14	Standing	12	Standing	14	Standing	17	Walking	74	Pass
58	Existing	11	Standing	9	Sitting	10	Sitting	12	Standing	49	Pass
	Proposed	16	Walking	14	Standing	17	Walking	20	Walking	85	Pass
59	Existing	9	Sitting	8	Sitting	9	Sitting	10	Sitting	39	Pass
	Proposed	18	Walking	15	Standing	17	Walking	20	Walking	79	Pass
60	Existing	-	-	-	-	-	-	-	-	-	-
	Proposed	13	Standing	11	Standing	12	Standing	14	Standing	68	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort								Wind Safety	
		Spring		Summer		Fall		Winter		Annual	
		Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating	Speed (km/h)	Rating
61	Existing	-	-	-	-	-	-	-	-	-	-
	Proposed	11	Standing	10	Sitting	11	Standing	12	Standing	52	Pass
62	Existing	-	-	-	-	-	-	-	-	-	-
	Proposed	22	Uncomfortable	19	Walking	20	Walking	21	Uncomfortable	107	Exceeded
63	Existing	-	-	-	-	-	-	-	-	-	-
	Proposed	23	Uncomfortable	20	Walking	21	Uncomfortable	22	Uncomfortable	102	Exceeded
64	Existing	-	-	-	-	-	-	-	-	-	-
	Proposed	26	Uncomfortable	22	Uncomfortable	25	Uncomfortable	29	Uncomfortable	120	Exceeded

Season	Months	Hours
Spring	March - May	6:00 - 23:00
Summer	June - August	6:00 - 23:00
Fall	September - November	6:00 - 23:00
Winter	December - February	6:00 - 23:00
Annual	January - December	0:00 - 23:00

Configurations	
Existing	Existing site and surroundings
Proposed	Project with existing surroundings

Comfort Speed (km/h)	
(20% Seasonal Exceedance)	
≤ 10	Sitting
11 - 15	Standing
16 - 20	Walking
> 20	Uncomfortable

Safety Speed (km/h)	
(0.1% Annual Exceedance)	
≤ 90	Pass
> 90	Exceeded