REPORT

1546 SCOTT STREET

OTTAWA, ON

PEDESTRIAN WIND STUDY
RWDI # 2200082
October 29, 2021

SUBMITTED TO

Melissa MacGregor
Director of Development & Construction
mmacgregor@reidsproperties.com

Reid's Heritage Properties
1515 Gordon Street, Suite 203
Guelph, ON, N1L 1C9
Tel: 519.654.9099 ext. 553
"[Company name & address]"

SUBMITTED BY

Jennifer Shoniker
Technical Coordinator
Jennifer.Shoniker@rwdi.com

Timothy Wiechers, M.Sc.
Technical Coordinator
Tim.Wiechers@rwdi.com

Kelly Baah, M.Eng., P.Eng.
Project Manager | Snr. Engineer
Kelly.Baah@rwdi.com

RWDI
600 Southgate Drive
Guelph, Ontario, Canada N1G 4P6
T: 519.823.1311x2076
C:514.400.3674

EXECUTIVE SUMMARY

RWDI was retained to conduct a pedestrian wind assessment for the proposed 1546 Scott Street project in Ottawa, ON (Image 1). Based on our wind-tunnel testing for the proposed project under the Existing and Proposed configurations (Images 2A and 2B), and the local wind records (Image 3), the potential wind comfort is predicted as shown on site plans in Figures 1A through 4B, while the associated wind speeds are listed in Table 1. These results can be summarized as follows:

- Wind speeds that meet the pedestrian safety criterion are predicted at all locations assessed in both the Existing and Proposed configurations.
- Existing wind conditions on and around the site are comfortable for the intended pedestrian use throughout the year.
- With the proposed project in place, wind speeds are expected to increase at select locations but remain suitable for the intended pedestrian uses throughout the year.
- During all seasons, appropriate wind conditions, comfortable for passive activities, are predicted on the Level 2 outdoor amenity space.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

Rowan Williams Davies & Irwin, Inc. (RWDI) was retained to conduct a pedestrian wind assessment for the proposed 1546 Scott Street project in Ottawa, ON. This report presents the project objectives, approach and the main results from RWDI's assessment.

1.1 Project Description

The project (site shown in Image 1) is located on the south side of Scott Street between Parkdale Avenue and Holland Avenue. It consists of a 25-storey residential building with outdoor amenities on the Level 2 podium.

1.2 Objectives

The objective of the study was 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 RWDI criteria for gauging wind comfort and safety in pedestrian areas. The assessment focused on critical pedestrian areas, including building entrances, public sidewalks and the Level 2 outdoor amenity space.

Image 1: Aerial View of 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 approximately 360 m radius of 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 40 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. 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. The placement of wind measurement locations was based on our experience and understanding of the pedestrian usage for this site and reviewed by the design team.

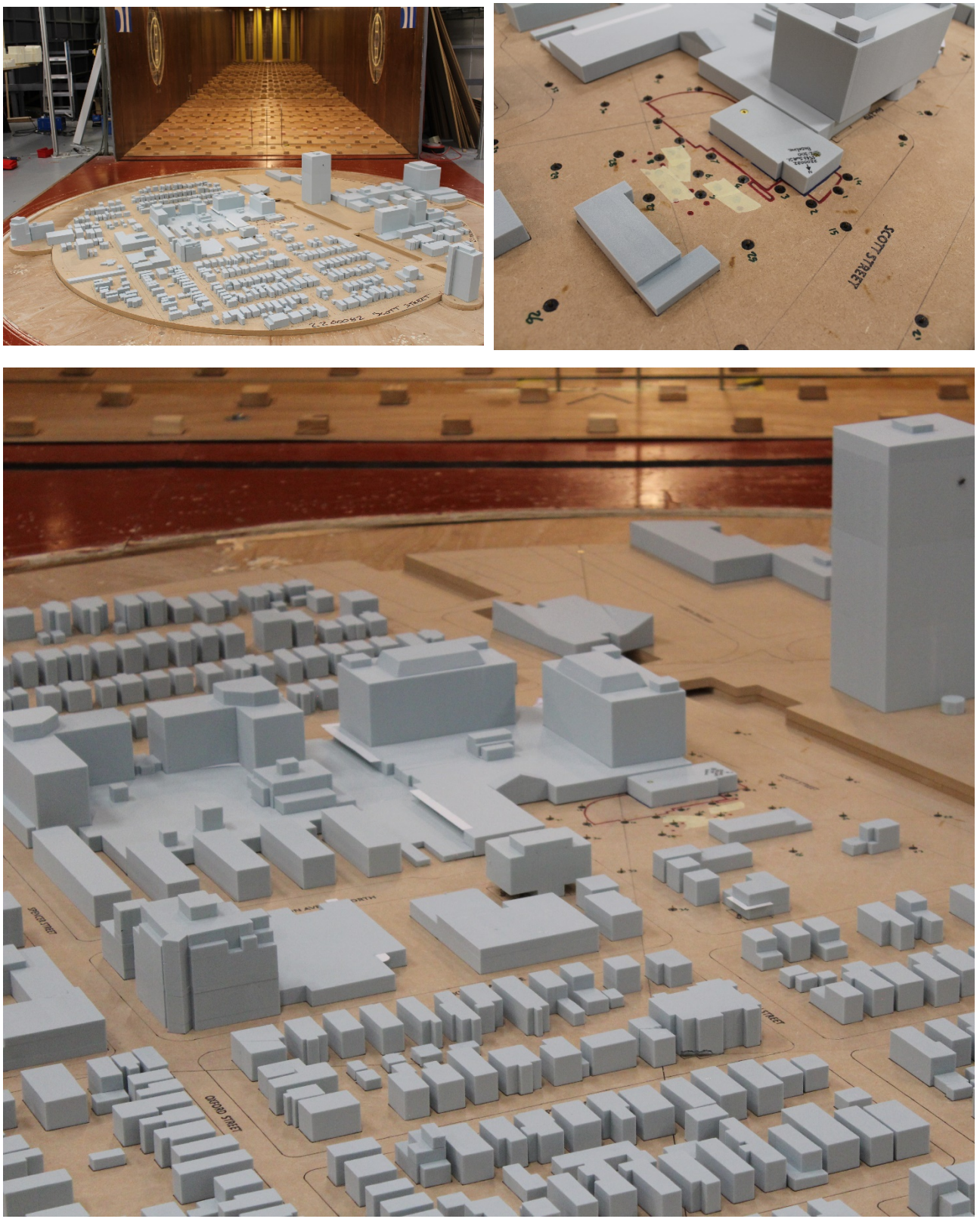
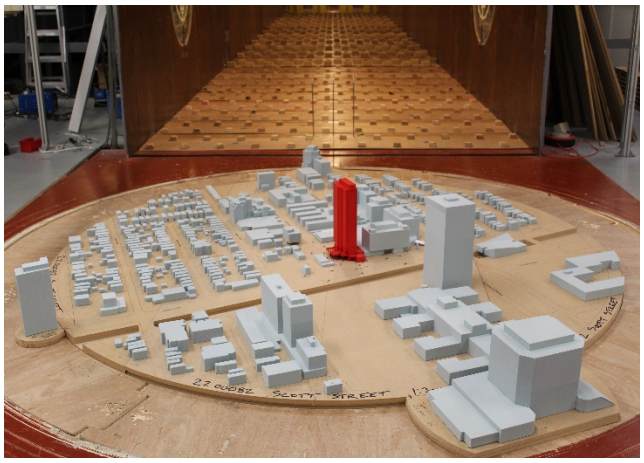
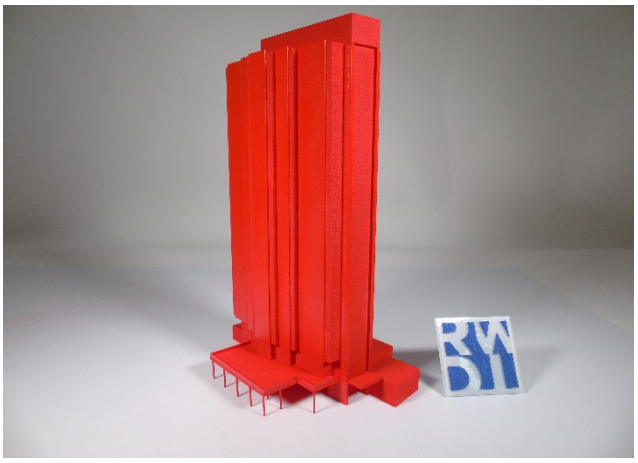


Image 2A: Wind Tunnel Study Model – Existing Configuration





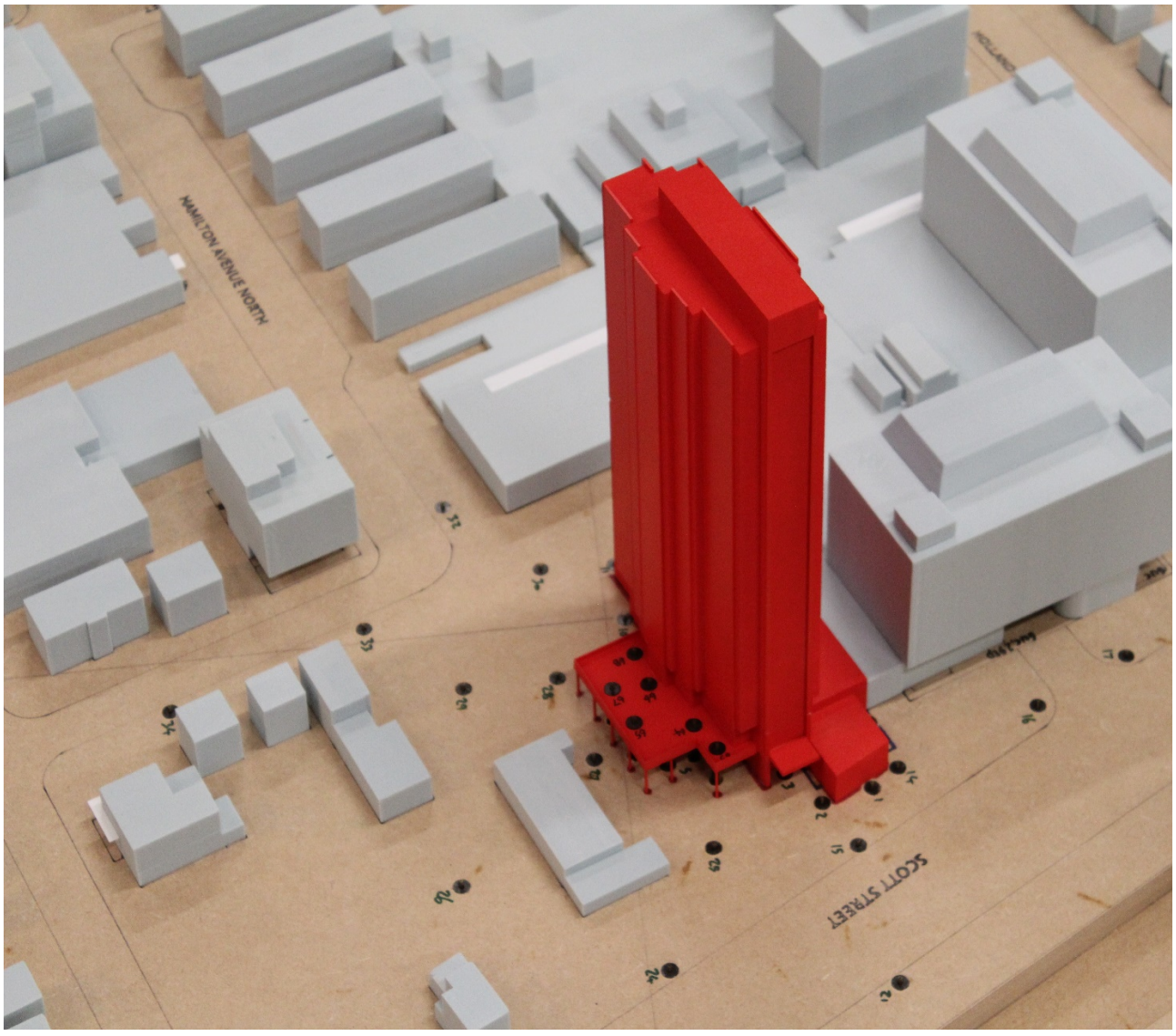
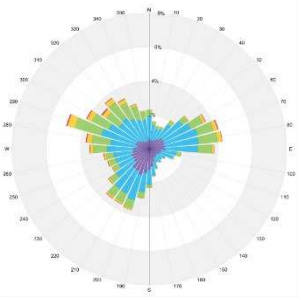


Image 2B: Wind Tunnel Study Model – Proposed Configuration

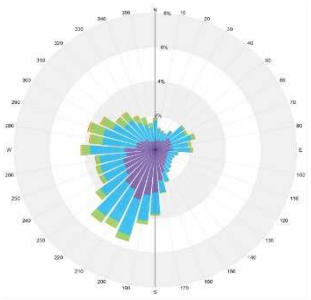
2.2 Meteorological Data

Wind statistics recorded at Ottawa Macdonald-Cartier International Airport between 1989 and 2019, inclusive, were analyzed for the spring (March through May), summer (June through August), fall (September through November) and winter (December through February) seasons. Image 3 graphically depicts the directional distributions of wind frequencies and speeds for these four seasons. Winds from the southwest through northwest are predominant throughout the year, with secondary contribution from the east and northeast as indicated by the wind roses. Strong winds of a mean speed greater than 30 km/h measured at the airport (at an anemometer height of 10 m) are most frequent in the winter (5.2%), followed by spring (4.6%) and fall (3.2%), and least frequent in the summer (0.9%).

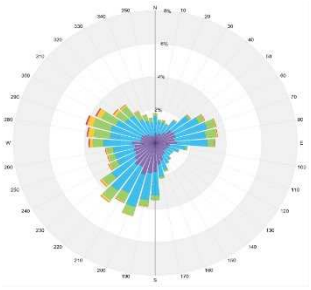
Wind statistics were combined with the wind tunnel data to predict the frequency of occurrence of full-scale wind speeds. The full-scale wind predictions were then compared with the wind criteria for pedestrian comfort and safety.



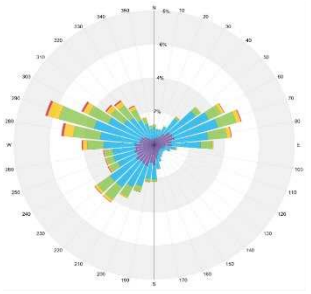
Spring (March – May)



Summer (June – August)



Fall (September – November)



Winter (December – February)

Wind Speed (km/h)	Probability (%) Spring	Summer	Fall	Winter
Calm	3.6	4.8	4.4	4.3
1-10	29.9	44.5	36.4	28.9
11-20	43.4	41.0	43.0	43.4
21-30	18.6	8.8	13.0	18.2
31-40	4.0	0.8	2.7	4.3
>40	0.6	0.1	0.5	0.8

Image 3: Directional Distribution of Winds Approaching Ottawa Macdonald-Cartier International Airport from 1989 to 2019

2.3 RWDI Pedestrian Wind Criteria

The RWDI pedestrian wind criteria, which have been developed by RWDI through research and consulting practice since 1974, are used in the current study. These criteria have been widely accepted by municipal authorities as well as by the building design and city planning community. Regional differences in wind climate and thermal conditions as well as variations in age, health, clothing, etc. can affect a person's perception of the wind climate. Therefore, comparisons of wind speeds for the existing and proposed building configurations are the most objective way in assessing local pedestrian wind conditions. In general, the combined effect of mean and gust speeds on pedestrian comfort can be quantified by a Gust Equivalent Mean (GEM).

Comfort Category	GEM Speed (km/h)	Description
Sitting	≤ 10	Calm or light breezes desired for outdoor restaurants and 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 that would be 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 of this magnitude are considered a nuisance for all pedestrian activities, and wind mitigation is typically recommended

Notes:

(1) GEM Speed = max (Mean Speed, Gust Speed/1.85) and Gust Speed = Mean Speed + 3*RMS Speed;
(2) Wind conditions are considered to be comfortable if the predicted GEM speeds are within the respective thresholds for at least 80% of the time between 6:00 and 23:00. Nightly hours between 0:00 and 5:00 are excluded from the wind analysis for comfort since limited usage of outdoor spaces is anticipated; and,
(3) Wind comfort is assessed on a seasonal basis.

Safety Criterion	Gust Speed (km/h)	Description
Exceeded	> 90	Excessive gust speeds that can adversely affect a pedestrian's balance and footing. Wind mitigation is typically required.

Notes:

(1) Based on an annual exceedance of 9 hours or 0.1% of the time for 24 hours a day; and,
(2) Only gust speeds need to be considered in the wind safety criterion. These are usually rare events but deserve special attention in city planning and building design due to their potential safety impact on pedestrians.

3 RESULTS AND DISCUSSION

The predicted wind conditions are shown on site plans in Figures 1A through 4B located in the "Figures" section of this report. These conditions and the associated wind speeds are also represented in Table 1, located in the "Tables" section of this report. The following is a detailed discussion of the suitability of the predicted wind conditions for the anticipated pedestrian use of each area of interest.

Wind conditions that meet the safety criterion are predicted at all locations for all configurations assessed.

3.1 Grade Level (Locations 1 through 34)

Wind conditions comfortable for walking or strolling 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.

3.1.1 Existing Configuration

Wind conditions on and around the existing project site are generally comfortable for sitting or standing in the summer and fall (Figures 1A and 1C, respectively) and for strolling or more passive use in the spring and winter (Figure 1A and 1D, respectively).

3.1.2 Proposed Configuration

With the addition of the proposed development, wind speeds are predicted to slightly increase at select locations compared to the Existing configuration but are still suitable for the intended usage of the areas. Wind conditions generally comfortable for sitting, standing, or strolling are expected in the summer and fall (Figure 2B and 3B), and walking or better in the spring and winter (Figures 1B and 4B).

Main entrances of the proposed building are situated near Locations 1 and 3 in Figures 1B, 2B, 3B and 4B. Wind conditions at these entrances are anticipated to be comfortable for sitting, which is appropriate for an entrance where pedestrians may linger. The canopy above Location 3 is a positive design feature that helps to disperse winds downwashing off the tall façade and should be retained in the final design.

3.2 Above-Grade Levels (Locations 35 through 40)

It is generally desirable for wind conditions on terraces intended for passive activities to be comfortable for sitting or standing more than 80% of the time in the summer. During the winter, the area would not be used frequently, and increased wind activity would be considered appropriate.

Wind conditions during all seasons on the Level 2 amenity space are predicted to be comfortable for sitting or standing which are suitable for passive pedestrian activities (Figures 1B, 2B, 3B and 4B).

4 APPLICABILITY OF RESULTS

The wind conditions presented in this report pertain to the model of the 1546 Scott Street constructed using the drawings and information listed below. Should there be any design changes that deviate from this list of drawings, the wind condition predictions presented may change. Therefore, if changes in the design are made, it is recommended that RWDI be contacted and requested to review their potential effects on wind conditions.

File Name	File Type	Date Received (dd/mm/yyyy)
1546 Scott Street_Massing Model	Sktechup	21/09/2021
2021-09-02 ARCH PROGRESS SET	PDF	21/09/2021

5 REFERENCES

1. ASCE Task Committee on Outdoor Human Comfort (2004). *Outdoor Human Comfort and Its Assessment*, 68 pages, American Society of Civil Engineers, Reston, Virginia, USA.

2. Williams, C.J., Hunter, M.A. and Waechter, W.F. (1990). "Criteria for Assessing the Pedestrian Wind Environment," *Journal of Wind Engineering and Industrial Aerodynamics*, Vol.36, pp.811-815.

3. Williams, C.J., Soligo M.J. and Cote, J. (1992). "A Discussion of the Components for a Comprehensive Pedestrian Level Comfort Criteria," *Journal of Wind Engineering and Industrial Aerodynamics*, Vol.41-44, pp.2389-2390.

4. Soligo, M.J., Irwin, P.A., and Williams, C.J. (1993). "Pedestrian Comfort Including Wind and Thermal Effects," *Third Asia-Pacific Symposium on Wind Engineering*, Hong Kong.

5. Soligo, M.J., Irwin, P.A., Williams, C.J. and Schuyler, G.D. (1998). "A Comprehensive Assessment of Pedestrian Comfort Including Thermal Effects," *Journal of Wind Engineering and Industrial Aerodynamics*, Vol.77&78, pp.753-766.

6. Williams, C.J., Wu, H., Waechter, W.F. and Baker, H.A. (1999). "Experiences with Remedial Solutions to Control Pedestrian Wind Problems," *Tenth International Conference on Wind Engineering*, Copenhagen, Denmark.

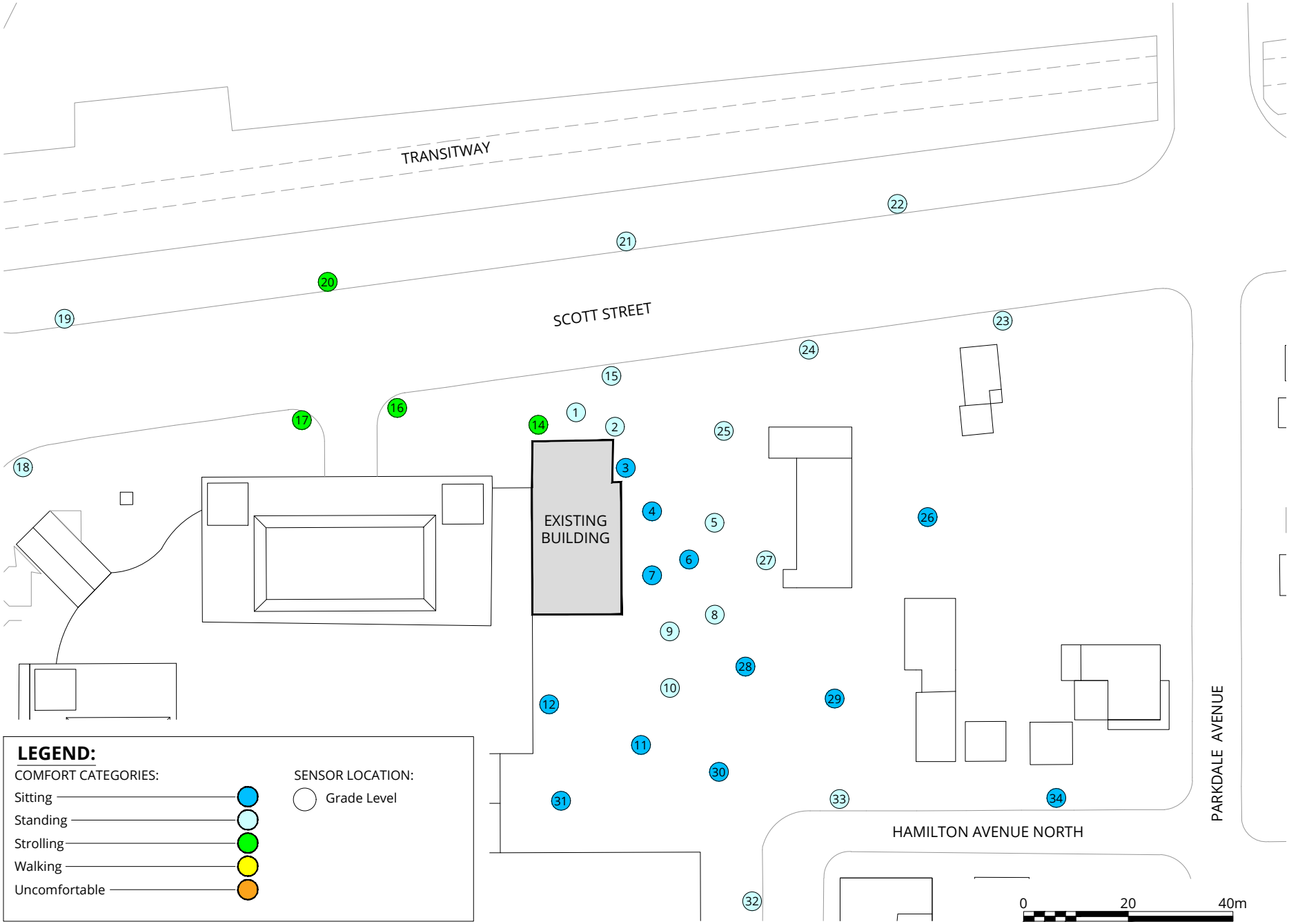
7. Lawson, T.V. (1973). "Wind Environment of Buildings: A Logical Approach to the Establishment of Criteria", *Report No. TVL 7321*, Department of Aeronautic Engineering, University of Bristol, Bristol, England.

8. Durgin, F. H. (1997). "Pedestrian Level Wind Criteria Using the Equivalent average", *Journal of Wind Engineering and Industrial Aerodynamics*, Vol. 66, pp.215-226.

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

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

FIGURES



LEGEND:

COMFORT CATEGORIES:

- Sitting
- Standing
- Strolling
- Walking
- Uncomfortable

SENSOR LOCATION:

- Grade Level

Pedestrian Wind Comfort Conditions

Existing Configuration

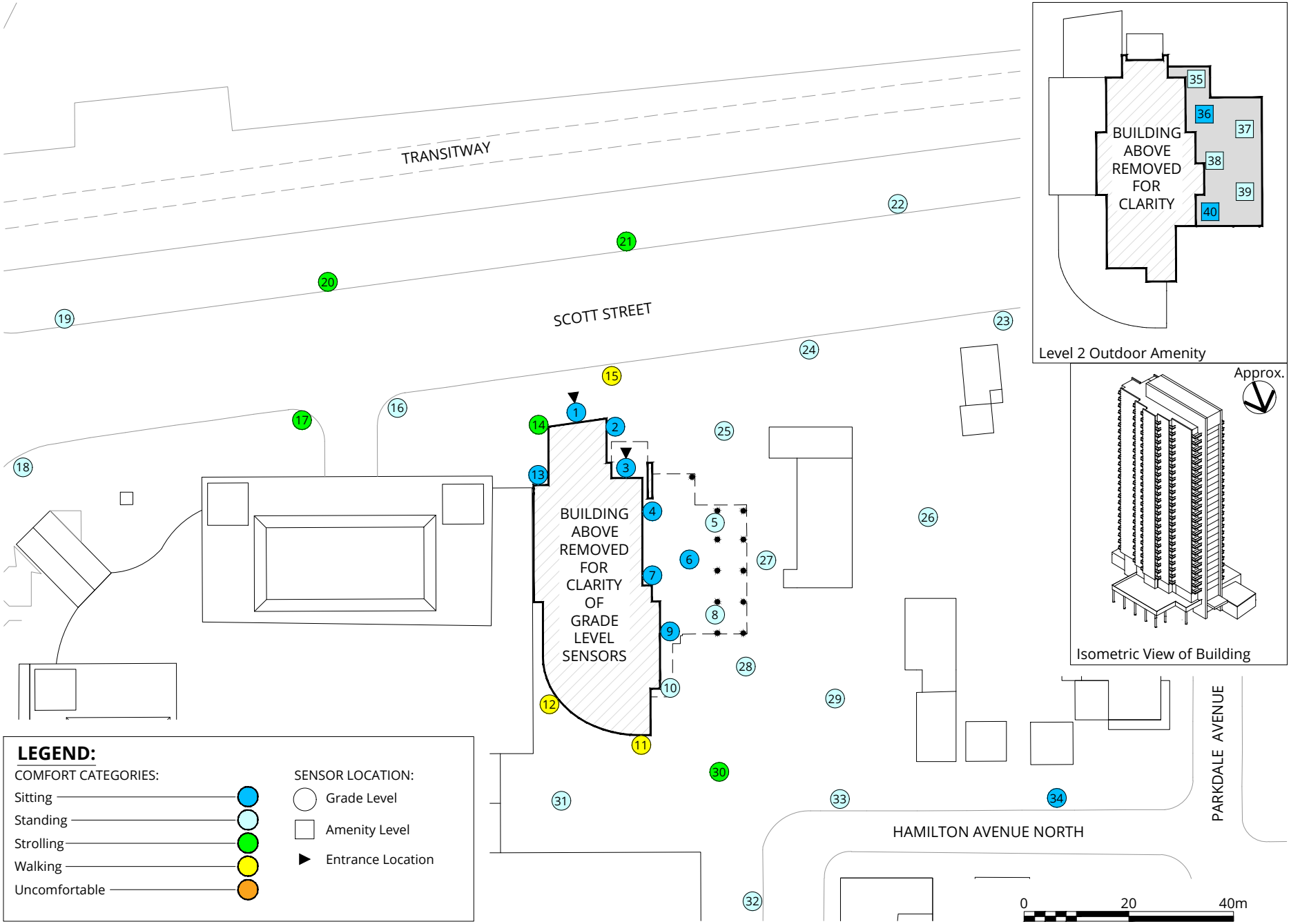
Spring (March to May, 6:00 to 23:00)

1546 Scott Street - Ottawa, ON

True North

Project #2200082

Drawn by: GRE	Figure: 1A
Approx. Scale:	1:1000
Date Revised:	Oct. 28, 2021



Pedestrian Wind Comfort Conditions

Proposed Configuration

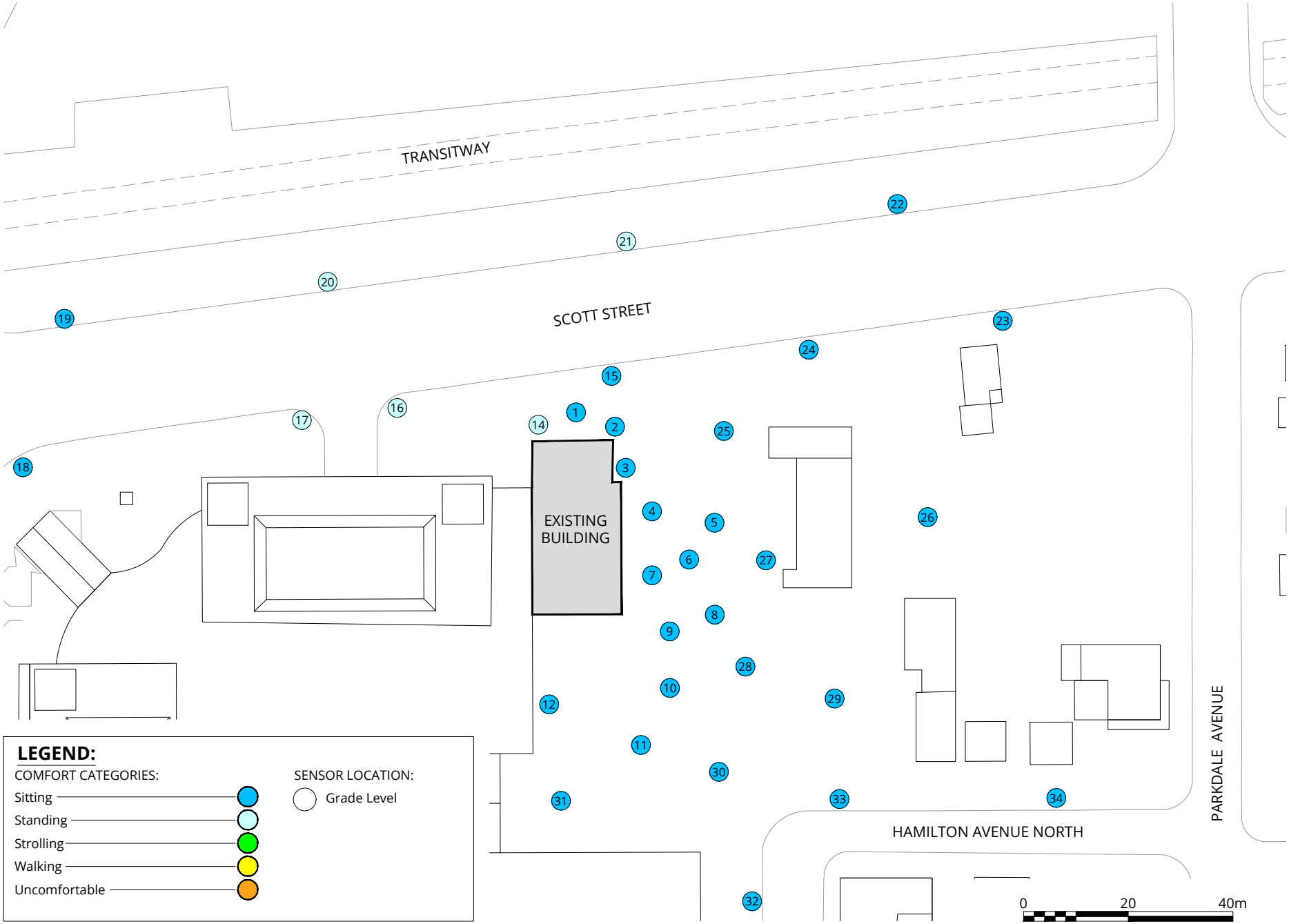
Spring (March to May, 6:00 to 23:00)

1546 Scott Street - Ottawa, ON

True North

Project #2200082

Drawn by: GRE	Figure: 1B
Approx. Scale:	1:1000
Date Revised:	Oct. 28, 2021



LEGEND:

COMFORT CATEGORIES:

- Sitting
- Standing
- Strolling
- Walking
- Uncomfortable

SENSOR LOCATION:

- Grade Level

Pedestrian Wind Comfort Conditions

Existing Configuration

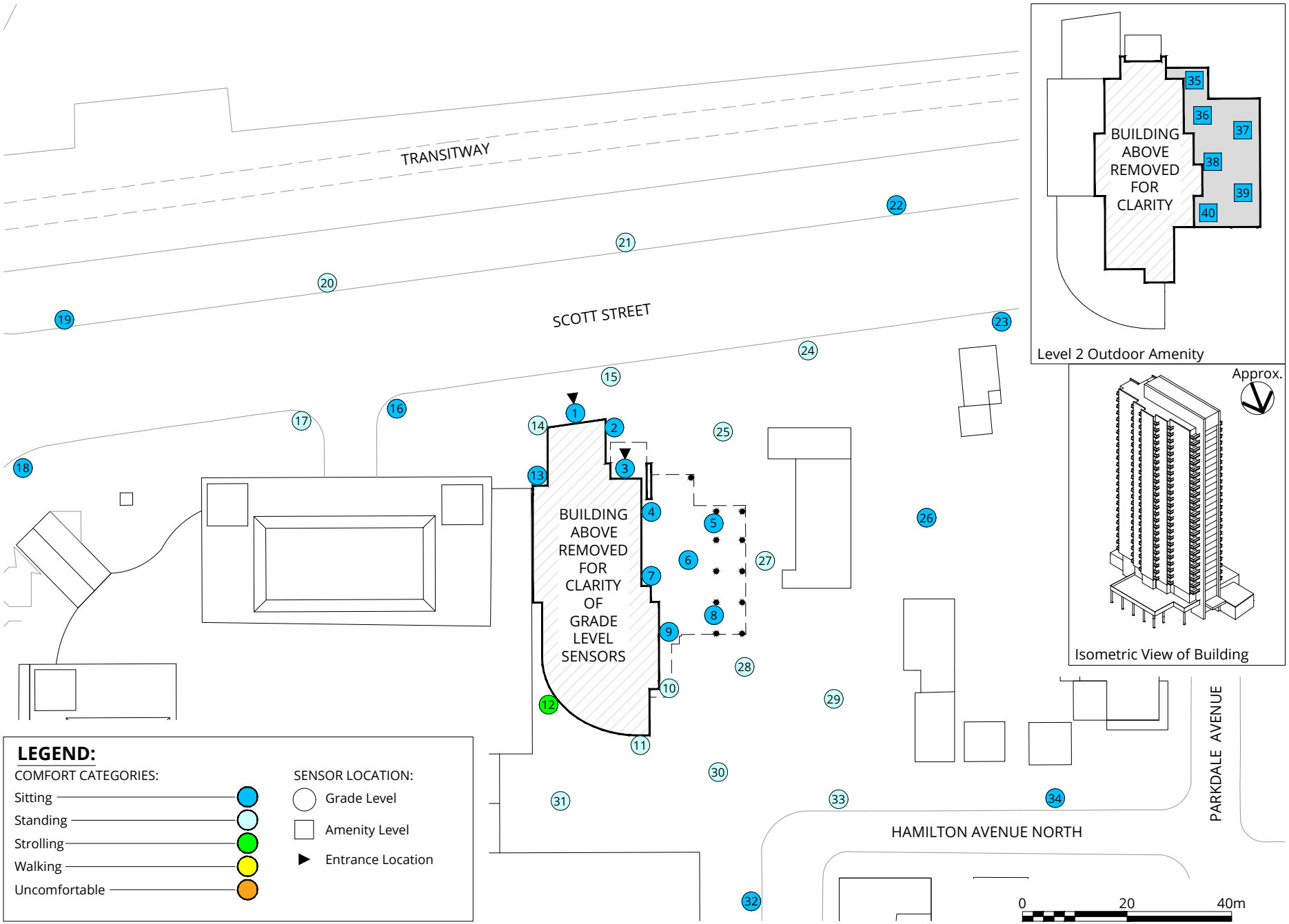
Summer (June to August, 6:00 to 23:00)

1546 Scott Street - Ottawa, ON

Project #2200082

True North

Drawn by:	GRE	Figure:	2A
Approx. Scale:	1:1000		
Date Revised:	Oct. 28, 2021		



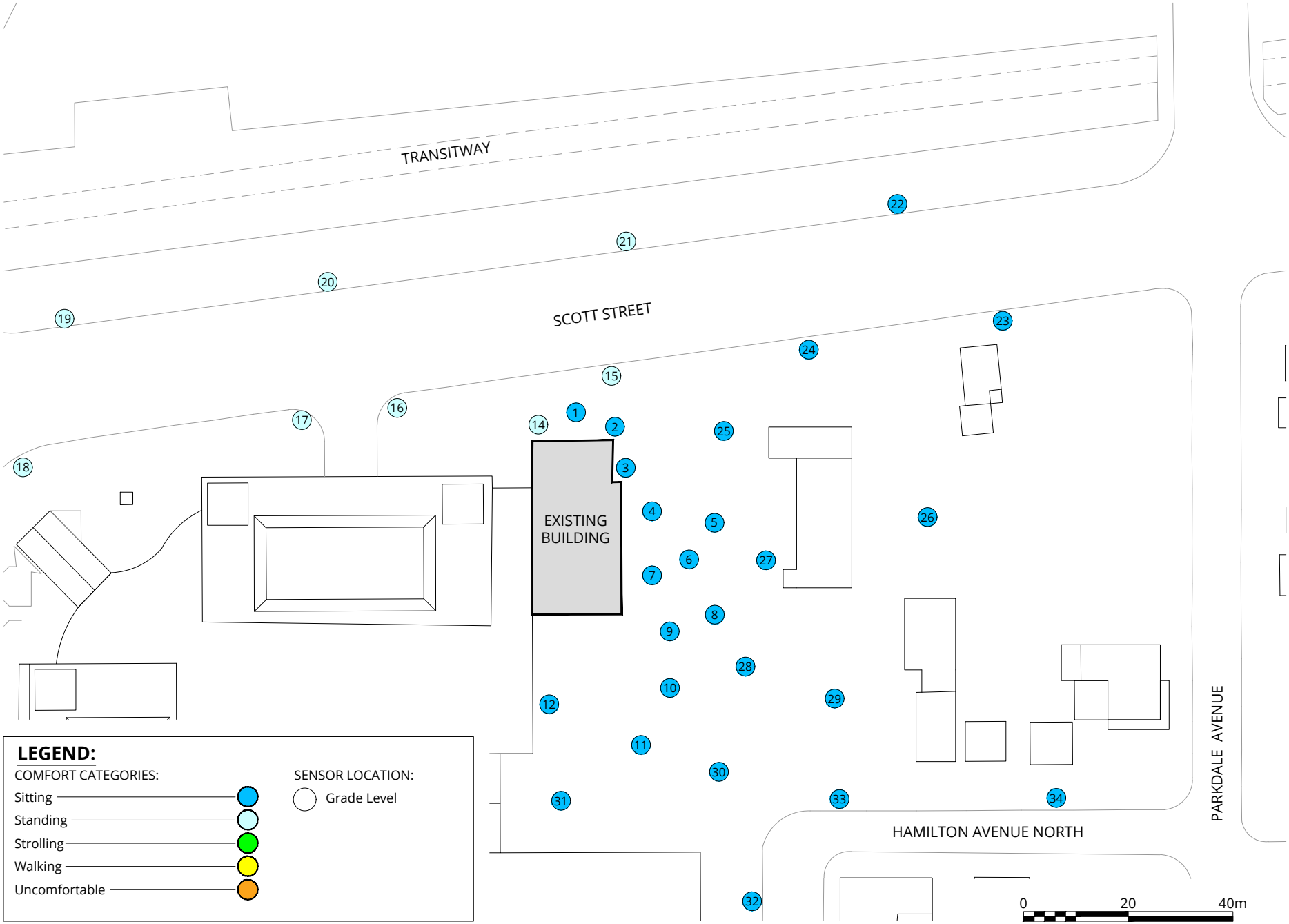
Pedestrian Wind Comfort Conditions
Proposed Configuration
Summer (June to August, 6:00 to 23:00)

1546 Scott Street - Ottawa, ON

True North

Project #2200082

Drawn by: GRE	Figure: 2B
Approx. Scale:	1:1000
Date Revised:	Oct. 28, 2021



LEGEND:

COMFORT CATEGORIES:

- Sitting
- Standing
- Strolling
- Walking
- Uncomfortable

SENSOR LOCATION:

- Grade Level

Pedestrian Wind Comfort Conditions

Existing Configuration

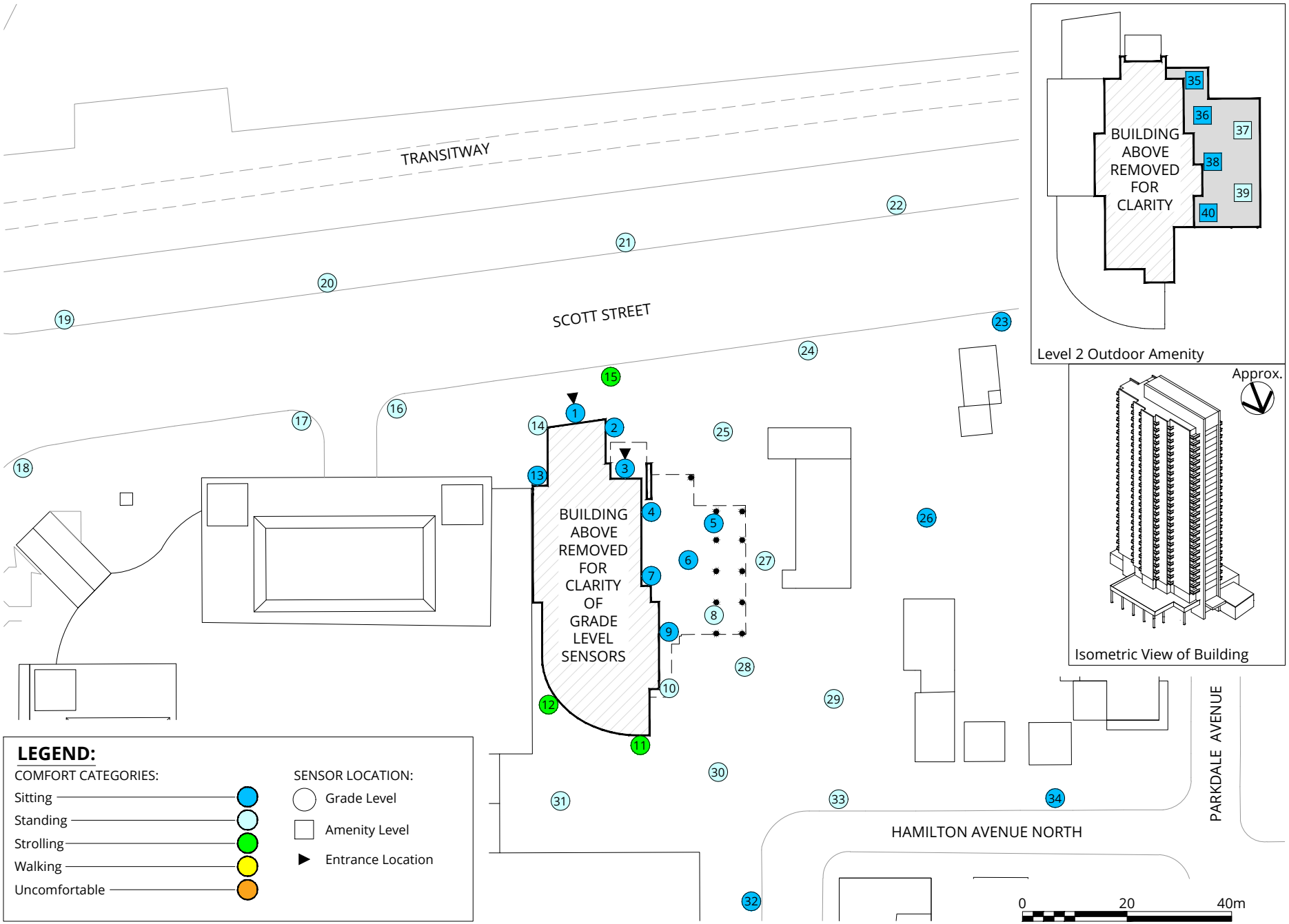
Fall (September to November, 6:00 to 23:00)

1546 Scott Street - Ottawa, ON

True North

Project #2200082

Drawn by:	GRE	Figure:	3A
Approx. Scale:	1:1000		
Date Revised:	Oct. 28, 2021		



Pedestrian Wind Comfort Conditions

Proposed Configuration

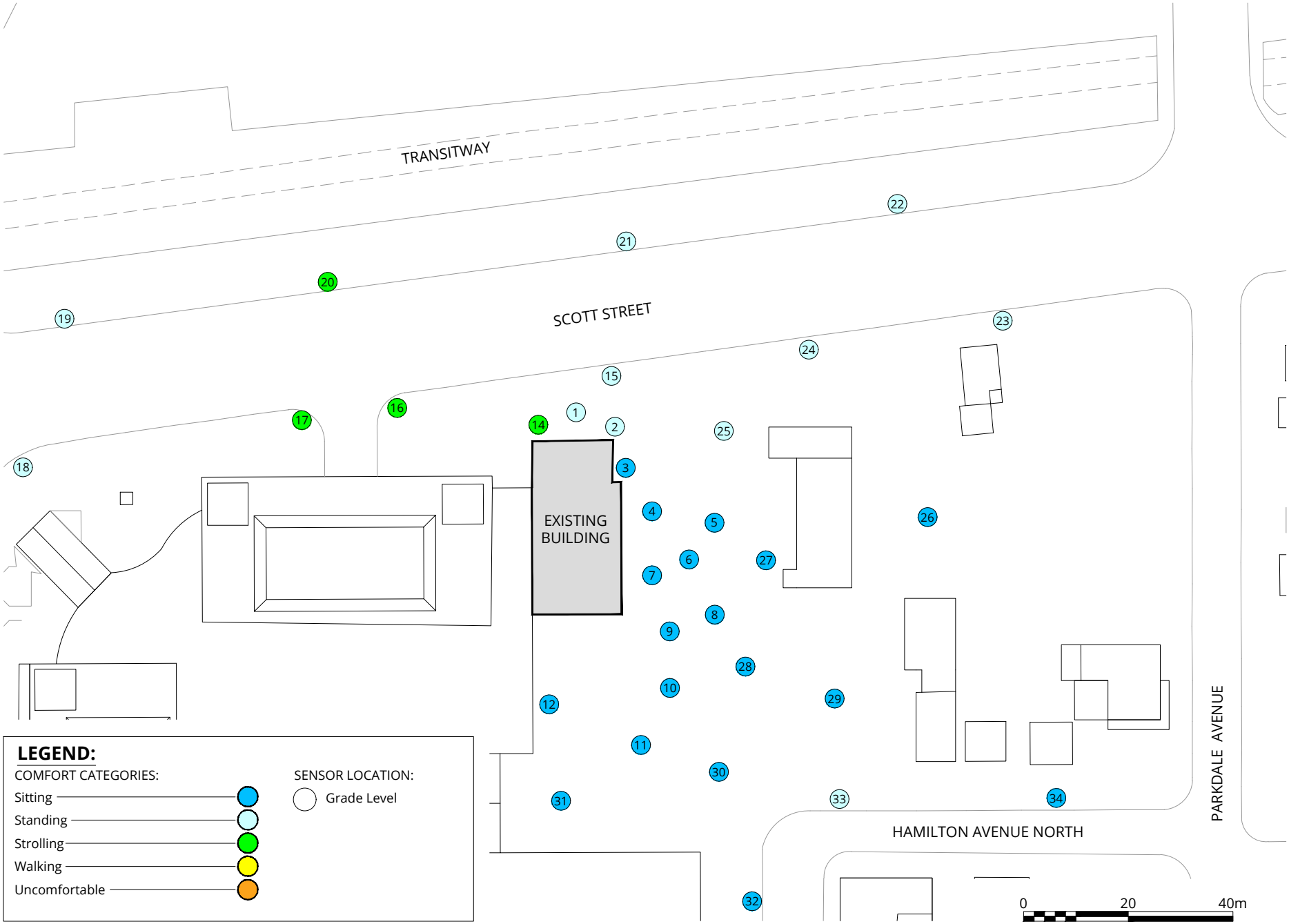
Fall (September to November, 6:00 to 23:00)

1546 Scott Street - Ottawa, ON

True North

Project #2200082

Drawn by: GRE	Figure: 3B
Approx. Scale:	1:1000
Date Revised:	Oct. 28, 2021



LEGEND:

COMFORT CATEGORIES:
- Sitting
- Standing
- Strolling
- Walking
- Uncomfortable

SENSOR LOCATION:
- Grade Level

Pedestrian Wind Comfort Conditions

Existing Configuration

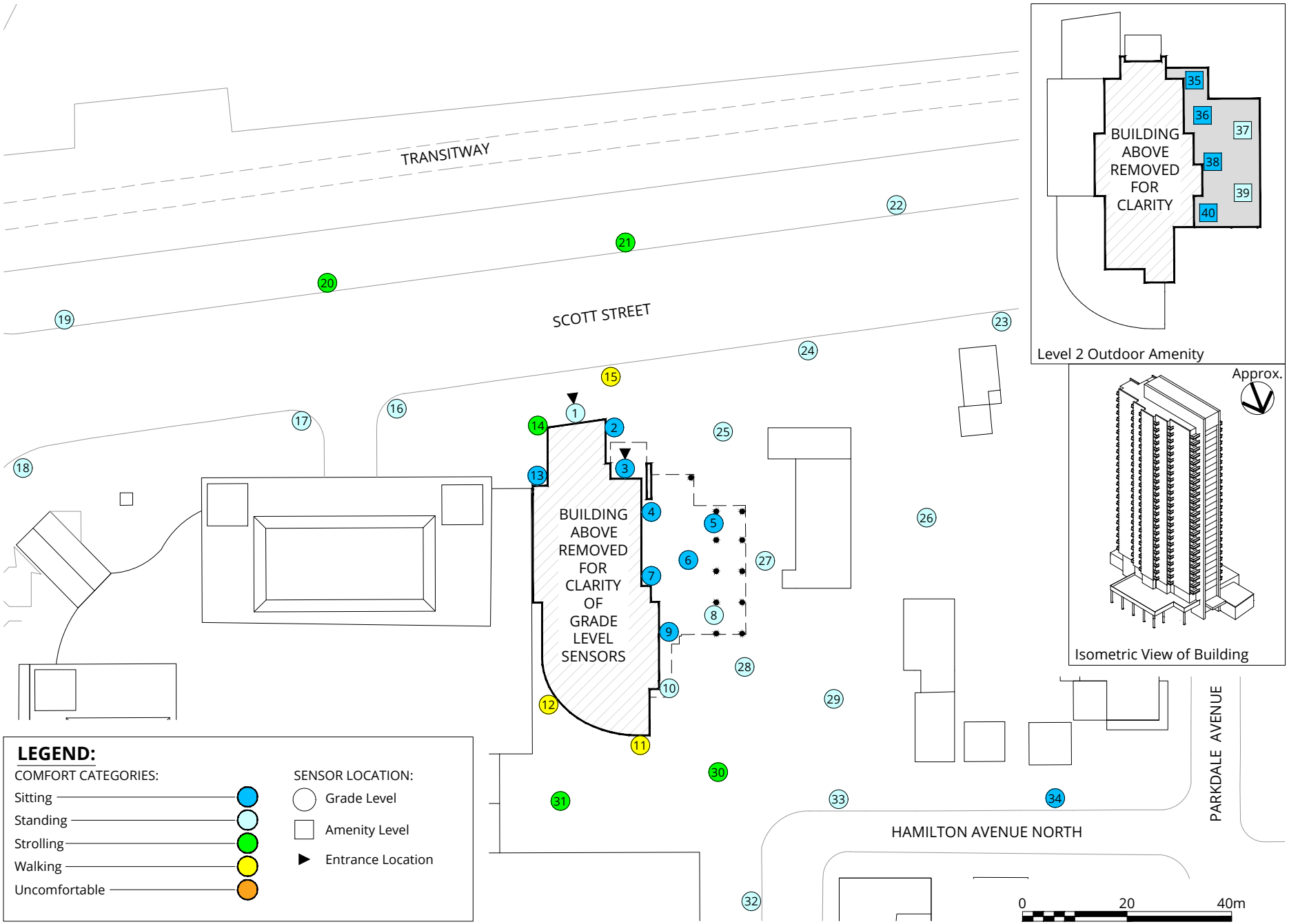
Winter (December to February, 6:00 to 23:00)

1546 Scott Street - Ottawa, ON

True North

Project #2200082

Drawn by:	GRE	Figure:	4A
Approx. Scale:	1:1000		
Date Revised:	Oct. 28, 2021		



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

1546 Scott Street - Ottawa, ON

True North

Project #2200082

Drawn by: GRE	Figure: 4B
Approx. Scale:	1:1000
Date Revised:	Oct. 28, 2021

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	12	Standing	9	Sitting	10	Sitting	12	Standing	63	Pass
	Proposed	10	Sitting	9	Sitting	10	Sitting	11	Standing	55	Pass
2	Existing	12	Standing	9	Sitting	10	Sitting	12	Standing	53	Pass
	Proposed	9	Sitting	7	Sitting	8	Sitting	9	Sitting	42	Pass
3	Existing	9	Sitting	7	Sitting	8	Sitting	9	Sitting	42	Pass
	Proposed	6	Sitting	5	Sitting	5	Sitting	6	Sitting	28	Pass
4	Existing	10	Sitting	7	Sitting	8	Sitting	10	Sitting	55	Pass
	Proposed	8	Sitting	6	Sitting	7	Sitting	7	Sitting	43	Pass
5	Existing	11	Standing	8	Sitting	9	Sitting	10	Sitting	50	Pass
	Proposed	11	Standing	8	Sitting	9	Sitting	10	Sitting	48	Pass
6	Existing	10	Sitting	8	Sitting	9	Sitting	10	Sitting	43	Pass
	Proposed	8	Sitting	6	Sitting	7	Sitting	7	Sitting	39	Pass
7	Existing	10	Sitting	8	Sitting	9	Sitting	9	Sitting	45	Pass
	Proposed	8	Sitting	6	Sitting	6	Sitting	7	Sitting	34	Pass
8	Existing	11	Standing	8	Sitting	9	Sitting	10	Sitting	48	Pass
	Proposed	12	Standing	9	Sitting	11	Standing	11	Standing	48	Pass
9	Existing	11	Standing	8	Sitting	9	Sitting	10	Sitting	47	Pass
	Proposed	10	Sitting	8	Sitting	9	Sitting	9	Sitting	43	Pass
10	Existing	11	Standing	8	Sitting	9	Sitting	10	Sitting	46	Pass
	Proposed	13	Standing	11	Standing	12	Standing	12	Standing	69	Pass
11	Existing	9	Sitting	7	Sitting	8	Sitting	9	Sitting	42	Pass
	Proposed	18	Walking	14	Standing	16	Strolling	19	Walking	79	Pass
12	Existing	8	Sitting	6	Sitting	7	Sitting	8	Sitting	32	Pass
	Proposed	18	Walking	15	Strolling	16	Strolling	19	Walking	90	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
13	Existing	-	-	-	-	-	-	-	-	-	-
	Proposed	9	Sitting	7	Sitting	8	Sitting	9	Sitting	41	Pass
14	Existing	15	Strolling	11	Standing	12	Standing	15	Strolling	76	Pass
	Proposed	16	Strolling	13	Standing	14	Standing	17	Strolling	72	Pass
15	Existing	13	Standing	10	Sitting	11	Standing	14	Standing	70	Pass
	Proposed	18	Walking	13	Standing	15	Strolling	18	Walking	73	Pass
16	Existing	15	Strolling	11	Standing	13	Standing	15	Strolling	66	Pass
	Proposed	14	Standing	10	Sitting	11	Standing	14	Standing	66	Pass
17	Existing	15	Strolling	12	Standing	13	Standing	15	Strolling	62	Pass
	Proposed	15	Strolling	11	Standing	13	Standing	14	Standing	60	Pass
18	Existing	13	Standing	10	Sitting	12	Standing	13	Standing	51	Pass
	Proposed	13	Standing	10	Sitting	12	Standing	13	Standing	52	Pass
19	Existing	14	Standing	10	Sitting	12	Standing	13	Standing	52	Pass
	Proposed	14	Standing	10	Sitting	12	Standing	13	Standing	54	Pass
20	Existing	16	Strolling	13	Standing	14	Standing	17	Strolling	69	Pass
	Proposed	17	Strolling	13	Standing	14	Standing	17	Strolling	69	Pass
21	Existing	14	Standing	11	Standing	12	Standing	14	Standing	62	Pass
	Proposed	15	Strolling	12	Standing	13	Standing	15	Strolling	64	Pass
22	Existing	12	Standing	9	Sitting	10	Sitting	12	Standing	50	Pass
	Proposed	12	Standing	10	Sitting	11	Standing	12	Standing	52	Pass
23	Existing	11	Standing	8	Sitting	9	Sitting	11	Standing	45	Pass
	Proposed	11	Standing	9	Sitting	10	Sitting	12	Standing	51	Pass
24	Existing	12	Standing	9	Sitting	10	Sitting	12	Standing	56	Pass
	Proposed	14	Standing	12	Standing	13	Standing	14	Standing	65	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	11	Standing	9	Sitting	10	Sitting	11	Standing	50	Pass
	Proposed	14	Standing	11	Standing	13	Standing	14	Standing	62	Pass
26	Existing	10	Sitting	8	Sitting	9	Sitting	10	Sitting	46	Pass
	Proposed	12	Standing	10	Sitting	10	Sitting	12	Standing	59	Pass
27	Existing	11	Standing	8	Sitting	9	Sitting	10	Sitting	52	Pass
	Proposed	14	Standing	12	Standing	13	Standing	14	Standing	60	Pass
28	Existing	10	Sitting	8	Sitting	9	Sitting	10	Sitting	42	Pass
	Proposed	13	Standing	12	Standing	13	Standing	13	Standing	73	Pass
29	Existing	9	Sitting	8	Sitting	8	Sitting	9	Sitting	39	Pass
	Proposed	14	Standing	11	Standing	12	Standing	14	Standing	68	Pass
30	Existing	9	Sitting	7	Sitting	8	Sitting	9	Sitting	41	Pass
	Proposed	16	Strolling	13	Standing	14	Standing	17	Strolling	75	Pass
31	Existing	8	Sitting	6	Sitting	7	Sitting	8	Sitting	36	Pass
	Proposed	14	Standing	11	Standing	13	Standing	15	Strolling	64	Pass
32	Existing	11	Standing	9	Sitting	9	Sitting	10	Sitting	44	Pass
	Proposed	11	Standing	8	Sitting	10	Sitting	11	Standing	46	Pass
33	Existing	11	Standing	9	Sitting	10	Sitting	11	Standing	48	Pass
	Proposed	13	Standing	11	Standing	12	Standing	14	Standing	71	Pass
34	Existing	9	Sitting	7	Sitting	8	Sitting	9	Sitting	39	Pass
	Proposed	10	Sitting	8	Sitting	8	Sitting	10	Sitting	49	Pass
35	Existing	-	-	-	-	-	-	-	-	-	-
	Proposed	12	Standing	8	Sitting	9	Sitting	10	Sitting	52	Pass
36	Existing	-	-	-	-	-	-	-	-	-	-
	Proposed	10	Sitting	8	Sitting	9	Sitting	9	Sitting	44	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	-	-	-	-	-	-	-	-	-	-
	Proposed	12	Standing	9	Sitting	11	Standing	12	Standing	47	Pass
38	Existing	-	-	-	-	-	-	-	-	-	-
	Proposed	11	Standing	8	Sitting	9	Sitting	10	Sitting	46	Pass
39	Existing	-	-	-	-	-	-	-	-	-	-
	Proposed	12	Standing	10	Sitting	11	Standing	12	Standing	51	Pass
40	Existing	-	-	-	-	-	-	-	-	-	-
	Proposed	9	Sitting	6	Sitting	7	Sitting	8	Sitting	36	Pass

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 - 14	Standing
15 - 17	Strolling
18 - 20	Walking
> 20	Uncomfortable

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