

KENMORE SQUARE

BOSTON, MA

PEDESTRIAN WIND STUDY

RWDI # 1902393

May 22, 2019

SUBMITTED TO

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1 INTRODUCTION

RWDI was retained to conduct a pedestrian wind assessment for the One Kenmore Square Project in Boston. On an annual basis, the mean wind speeds around the existing site in the No Build configuration are expected to be appropriate for the intended pedestrian usage. In the Build condition for the proposed Project, the mean wind speeds are generally expected to be suitable for walking or more passive pedestrian usage. This report presents the Project objectives, background and approach and the results from RWDI's assessment.

1.1 Project Description

One Kenmore Square is a single 27 story tower within an approximately one-half acre public plaza.

1.2 Objectives

The objective of the study is to assess the effect of the Project on local conditions in pedestrian areas on and around the study area and provide recommendations for minimizing adverse effects, if needed. The quantitative assessment is 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 are combined with the local wind records and compared to appropriate criteria for gauging wind comfort and safety in pedestrian areas. The assessment focusses on critical pedestrian areas, including the building entrances and sidewalks along adjacent and nearby streets. Image 1 indicates the Project Area.

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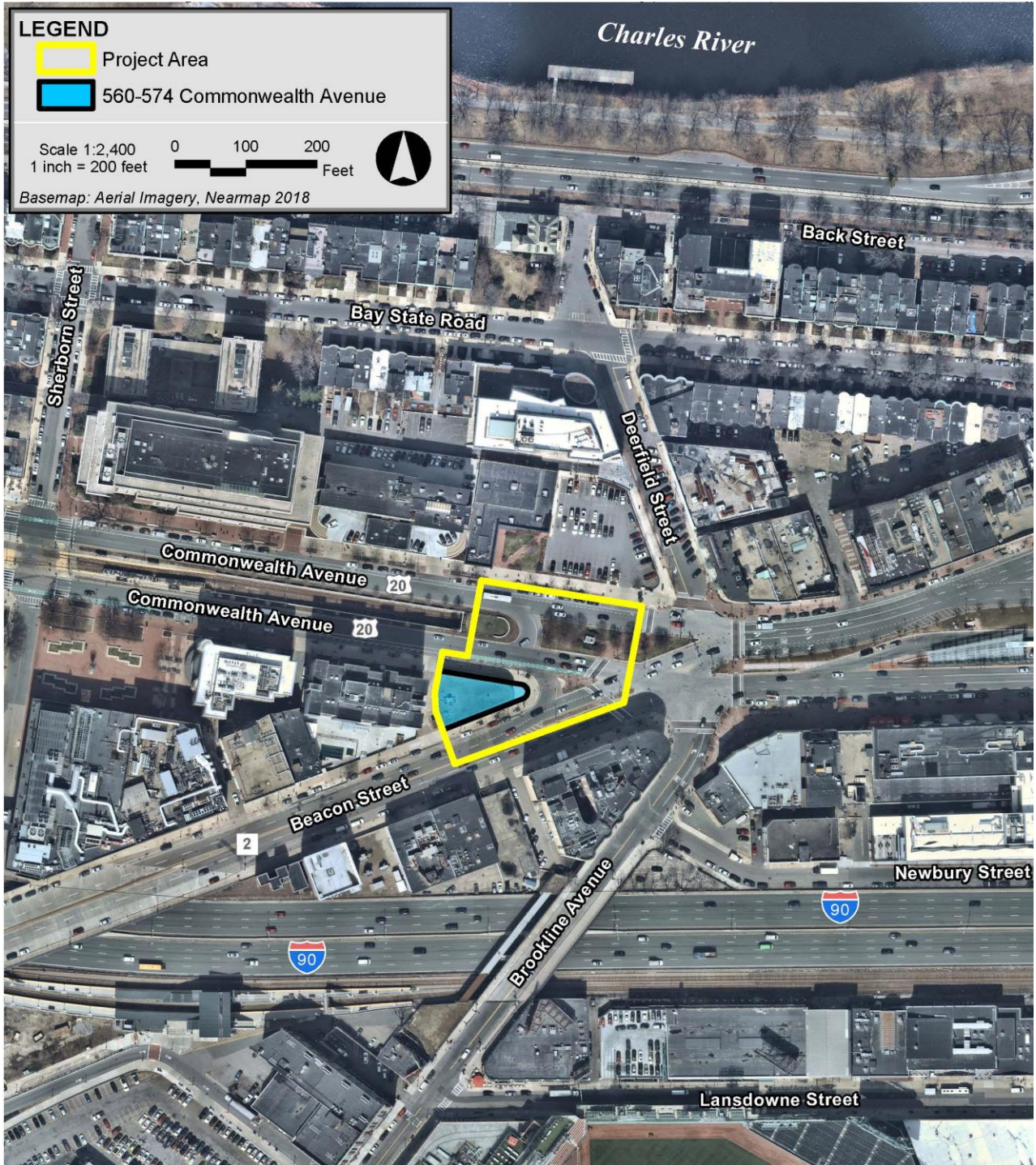


Image 1: Site Plan – Aerial View of Project Area and Surroundings (Photo Courtesy of Nearmap)



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2 BACKGROUND AND APPROACH

2.1 Wind Tunnel Study Model

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

- A – No Build: Existing site with BPDA approved projects and projects under construction (Image 2A),
- B – Build A: No Build conditions with Project included at proposed location, with existing and proposed landscaping (in their winter condition without foliage) and five wind screens (Image 2B),
- C – Build B: No Build conditions with the Project moved to the original PNF location, with existing and proposed landscaping (in their winter condition without foliage) (Image 2C).

The wind tunnel model includes all relevant surrounding buildings and topography within an approximately 1200-foot radius of the Project. 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 123 specially designed wind speed sensors to measure mean and gust speeds at a full-scale height of approximately five feet above local grade in pedestrian areas throughout the study area. Wind speeds were measured for 36 directions in a 10-degree increment. The measurements at each sensor location are 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 is based on RWDI's experience and understanding of the pedestrian usage for this area and reviewed by the BPDA (Figures 1A through 2C).

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Image 2A: Wind Tunnel Study Model – No Build

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Image 3B: Wind tunnel study model - Build A

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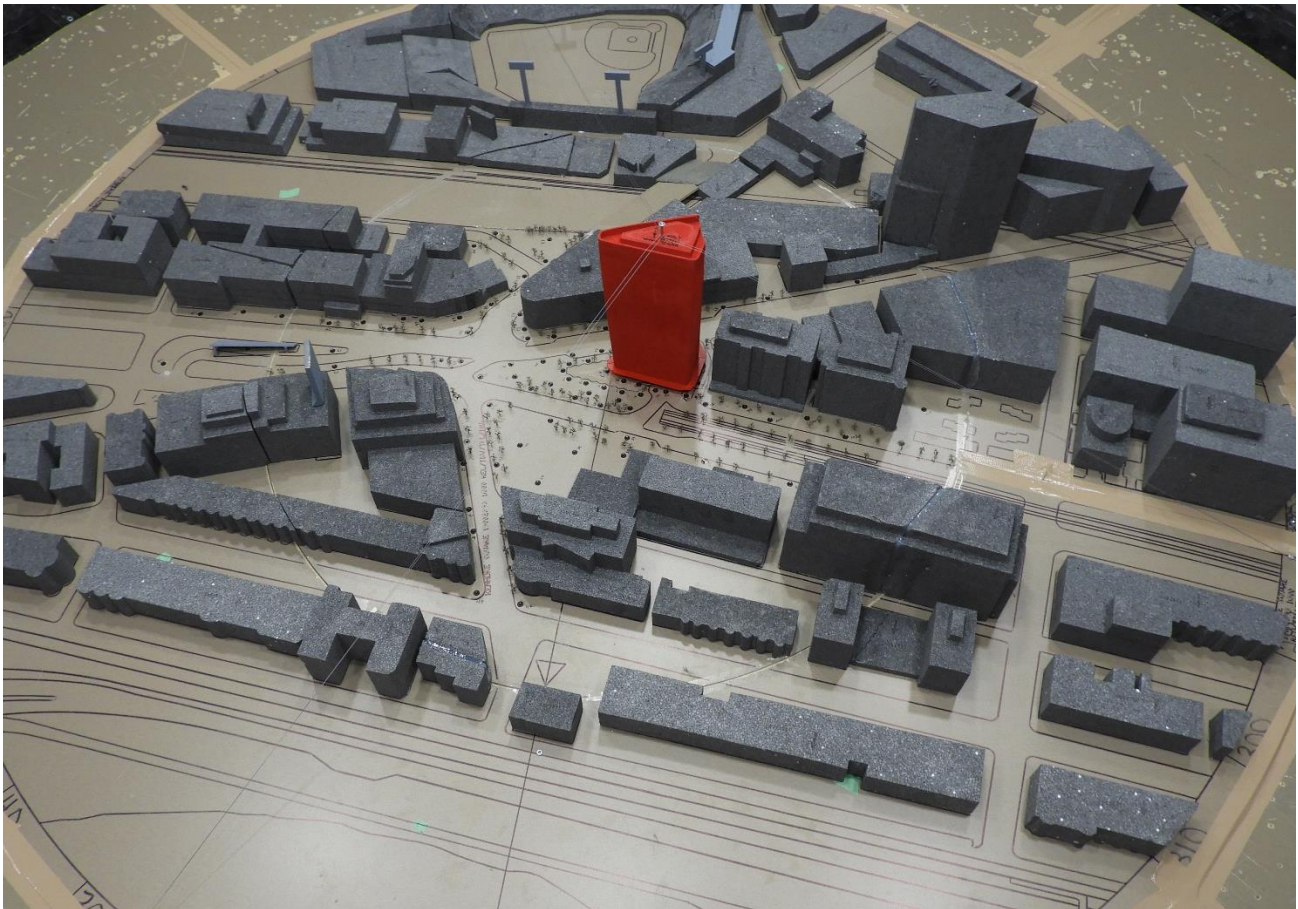
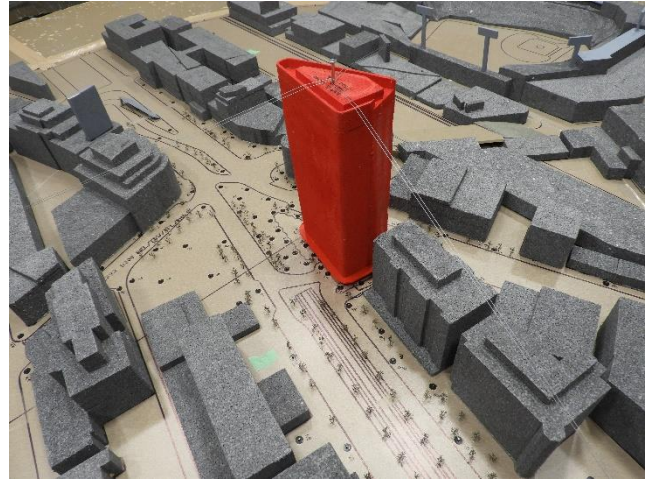
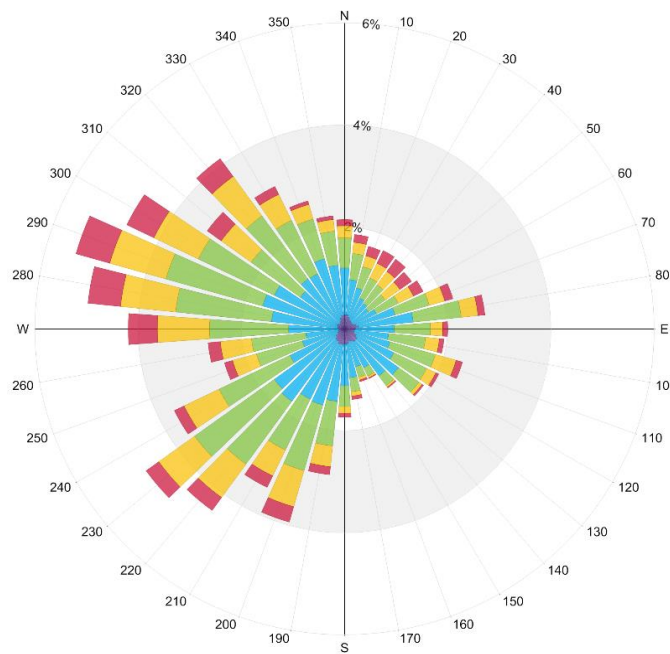


Image 4C: Wind tunnel study model - Build B

2.2 Meteorological Data

The data from the wind tunnel test will be combined with long-term meteorological data, recorded during the years 1995 through 2018 at Boston Logan International Airport to predict full scale wind conditions. The analysis is performed separately for each of the four seasons and for the entire year. Images 3 and 4 present "wind roses", summarizing the annual and seasonal wind climates in the Boston area, respectively, based on the data from Logan Airport.

For example, the wind rose in Image 3, summarizes the annual wind data which in general, indicates the most common wind directions are those between north-northwest and south-southwest. Winds from the east-northeast to the east-southeast are also relatively common. In the case of strong winds, northeast, west-northwest, northwest and west are the dominant wind directions.

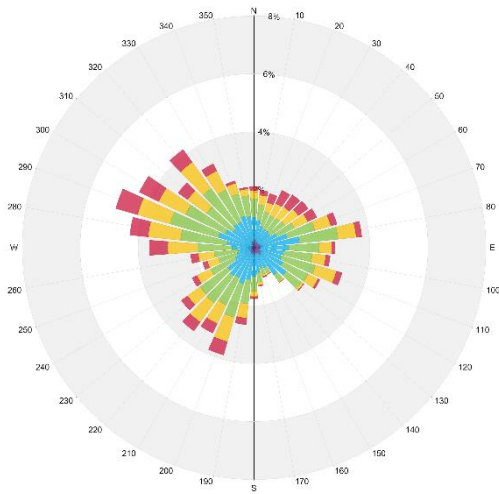


Wind Speed (mph)	Annual Probability (%)
Calm	3.0
1-5	7.9
6-10	32.5
11-15	32.4
16-20	16.3
>20	7.9

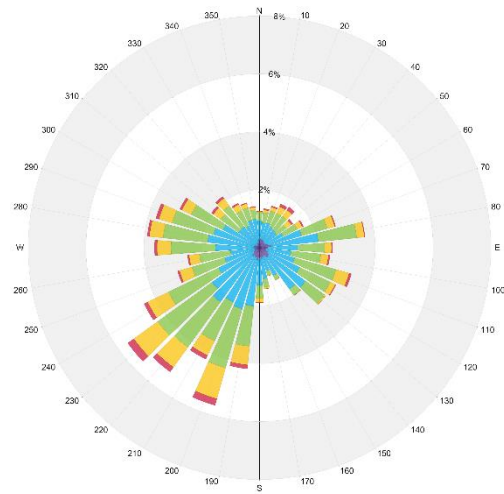
Image 3: Annual Directional Distribution of Winds Approaching Boston Logan International Airport from 1995 to 2018

**PEDESTRIAN WIND STUDY
KENMORE SQUARE**

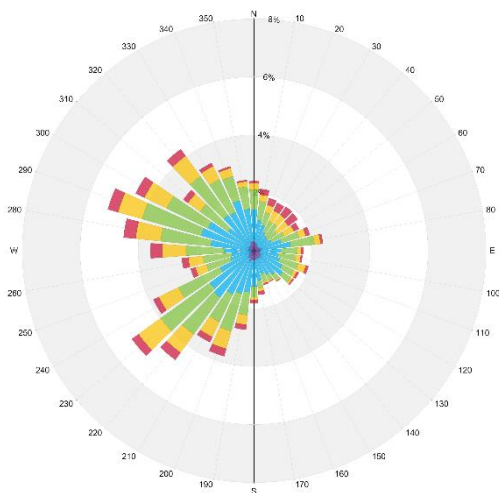
**RWDI #1902393
May 22, 2019**



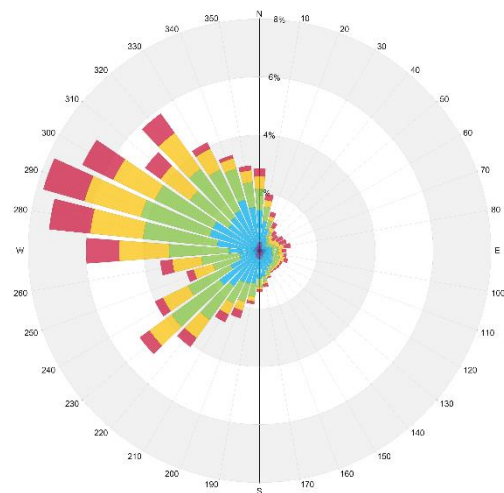
Spring (March - May)



Summer (June - August)



Fall (September - November)



Winter (December - February)

Wind Speed (mph)	Seasonal Probability (%)			
	Spring	Summer	Fall	Winter
Calm	2.8	3.0	3.4	2.6
1-5	6.8	9.4	8.7	6.5
6-10	28.9	38.8	34.6	27.9
11-15	32.3	34.4	32.0	30.9
16-20	19.2	11.8	14.5	19.7
>20	10.1	2.6	6.8	12.4

Image 4: Seasonal Directional Distribution of Winds Approaching Boston Logan International Airport from 1995 to 2018



2.3 BPDA Wind Criteria

The Boston Planning and Development Agency has adopted two standards for assessing the relative wind comfort of pedestrians. First, the BPDA wind design guidance criterion states that an effective gust velocity (hourly mean wind speed +1.5 times the root-mean-square wind speed) of 31 mph should not be exceeded more than one percent of the time.

Wind Acceptability	Effective Gust Speed (mph)
Acceptable	≤ 31
Unacceptable	> 31
<i>* Applicable to hourly mean wind speed exceeded 1% of the time</i>	

The second set of criteria used by the BPDA to determine the acceptability of specific locations is based on the work of Melbourne. This set of criteria is used to determine the relative level of pedestrian wind comfort for activities such as sitting, standing, or walking. The criteria are expressed in terms of benchmarks for the 1-hour mean wind speed exceeded 1% of the time.

Comfort Category	Mean Wind Speed (mph)
Dangerous	> 27
Uncomfortable for Walking	> 19 and ≤ 27
Comfortable for Walking	> 15 and ≤ 19
Comfortable for Standing	> 12 and ≤ 15
Comfortable for Sitting	< 12
<i>* Applicable to the hourly mean wind speed exceeded 1% of the time.</i>	

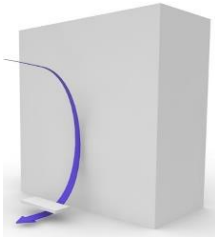
The consideration of wind in planning outdoor activity areas is important since high winds in an area tend to deter pedestrian use. For example, winds should be light or relatively light in areas where people would be sitting, such as outdoor cafes or playgrounds. For bus stops and other locations where people would be standing, somewhat higher winds can be tolerated. For frequently used sidewalks, where people are primarily walking, stronger winds are acceptable. For infrequently used areas, the wind comfort criteria can be relaxed even further. The actual effects of wind can range from pedestrian inconvenience, due to the blowing of dust and other loose material in a moderate breeze, to severe difficulty with walking due to the wind forces on the pedestrian.

The wind climate found in a typical downtown location in Boston is generally comfortable for the pedestrian use of sidewalks and thoroughfares and meets the BPDA effective gust velocity criterion of 31 mph. However, without any mitigation measures, this wind climate is likely to be frequently uncomfortable for more passive activities such as sitting.

The study involves state-of-the-art measurement and analysis techniques to predict wind conditions. Nevertheless, some uncertainty remains in predicting wind comfort. For example, the sensation of comfort among individuals can be quite variable. Variations in age, individual health, clothing, and other human factors can change a particular response of an individual. The comfort limits to be used represent an average for the total population. Also, unforeseen changes in the Project Area, such as the construction or removal of buildings, can affect the conditions experienced at the Project Area. Finally, the prediction of wind speeds is necessarily a statistical procedure. The wind speeds to be reported are for the frequency of occurrence stated (1% of the time). Higher wind speeds will occur but on a less frequent basis.

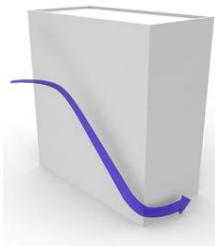
2.4 Generalized Wind Flows

General wind flows that could occur when in contact with tall buildings: (Image 5):



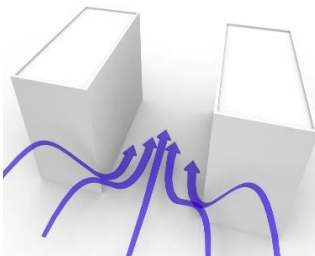
DOWNWASHING

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 winds approach at an oblique angle to a tall façade and are deflected down, a localized increase in the wind activity or corner acceleration can be expected around the exposed building corners at pedestrian level.



CHANNELING EFFECT

When two buildings are situated side by side, wind flow tends to accelerate through the space between the buildings due to channeling effect caused by the narrow gap.

Image 5: Generalized Wind Flows

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, rounded building corners etc. (Image 6) 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, landscaping and wind screens (left to right)

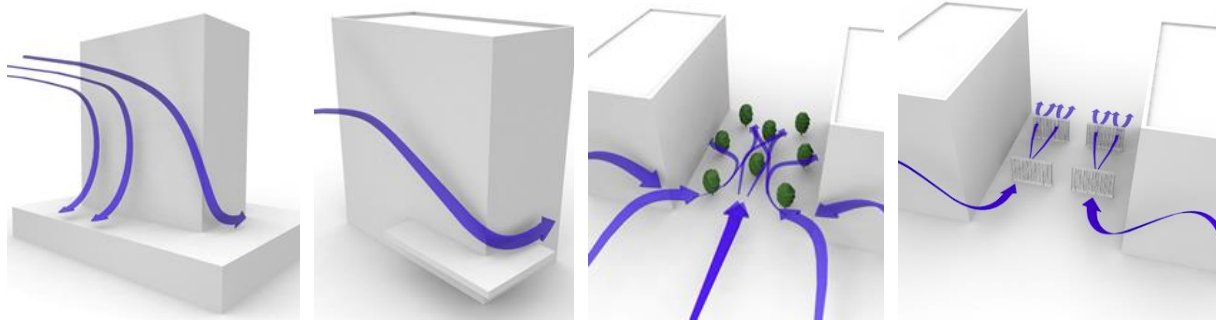


Image 6: Common Wind Control Measures

3 RESULTS AND DISCUSSION

The predicted wind conditions in terms of mean and effective gust speeds pertaining to the tested configurations are graphically depicted on site plans in Figures 1A through 2C located in the “Figures” section of this report. These conditions and the associated wind speeds are presented in Tables 1 and 2, located in the “Tables” section of this report. The following summary of pedestrian wind comfort is based on the annual winds for each configuration tested. Typically, the summer and fall winds tend to be more comfortable than the annual winds while the winter and spring winds are less comfortable than the annual winds.

The following is a detailed discussion of the suitability of the predicted wind comfort conditions for the anticipated pedestrian use of each area of interest. 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. Wind speeds comfortable for sitting are ideal during the summer for areas intended for passive activities, such as plaza spaces.

3.1 No Build Configuration

Mean Speed

On an annual basis, the mean wind speeds around the existing site in the No Build configuration are generally expected to be comfortable for standing or sitting (Figure 1A). These conditions are considered appropriate for the intended pedestrian usage.

Effective Gust

The effective gust criterion used to assess pedestrian wind safety was met for all sensor locations around the existing site (Figure 2A).

3.2 Build A Configuration

Mean Speed

With the addition of the proposed One Kenmore Square Project, annual mean wind speeds immediately around the Project are expected to increase compared to the No Build configuration. In order to improve wind conditions, a canopy was added to the perimeter of the building alongside five windscreens in the new public plaza and the southwest corner (Figures 1B and 2B). Mean wind speeds are generally expected to be suitable for walking or more passive pedestrian usage (Figure 1B). These speeds are considered appropriate for the anticipated use of the area. 95 percent of the 123 receptor locations, have mean wind speeds suitable for walking, standing or sitting. Higher than desired mean wind speeds, categorized as uncomfortable, are predicted at only a few select locations around the Project (Locations 1, 10, 14, 15, 24 and 86 in Figure 1B). Windspeeds at these locations are lower in the summer and fall and higher in the winter and spring. Conditions are generally expected to be comfortable for walking or better at a majority of locations in the Summer and Fall (Table 2).



Main entrances of the proposed building are situated near Locations 1, 3, 4, 8, 11, and 12 in Figure 1B. Predicted mean speeds at these entrances are anticipated to be generally comfortable for standing or sitting which is considered suitable for entrance locations. One exception is at entrance Location 1, where elevated mean wind speeds, classified as uncomfortable, are predicted (Figure 1B).

Farther away from the Project Area, conditions are predicted to be similar to those seen in the No Build configuration, with mean wind speeds generally suitable for standing or sitting pedestrian usage (Figure 1B). No dangerous wind conditions are predicted in the Build A configuration and no perceptible change to mean wind speeds is expected within Fenway Park.

Effective Gust

The effective gust criterion was exceeded at two sensor locations around the Build A configuration (Locations 1 and 86 in Figure 2B).

3.3 Build B Configuration

Mean Speed

With the proposed One Kenmore Square located at the alternate location, to the west of the Build A configuration as identified in the PNF, mean wind speeds and effective gust conditions immediately around the Project Area are anticipated to be similar to the Build A configuration, although this scenario results in more uncomfortable locations. A canopy and the landscaping in its winter condition was also included in this configuration for a better comparison to the Build A conditions. The results are mostly uncomfortable at the building edge to the north and west faces of the building and sitting or standing to the south.

Effective Gust

The effective gust criterion was exceeded at one sensor location around the Build B configuration (Location 105, Figure 2C). This is a proposed entrance as per Location 1 in Build A.

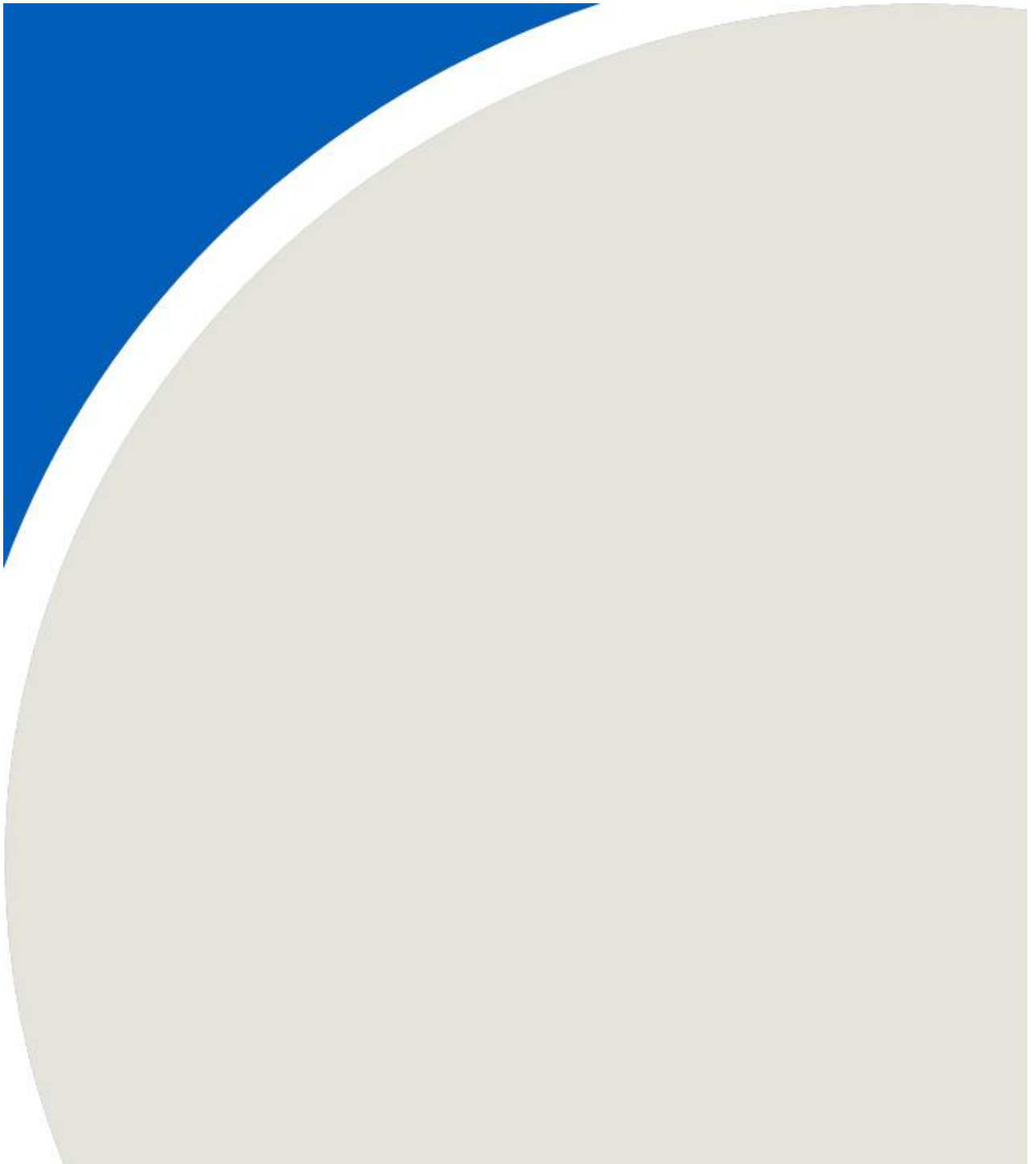


4 APPLICABILITY OF RESULTS

The drawings and information listed below were received from Studio Gang and were used to construct the scale model of the proposed One Kenmore Square Project. The wind conditions presented in this report pertain to the proposed Project as detailed in the architectural design drawings listed in the table 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)
2019 02 07 Solid Export	.3dm	02/28/2019

FIGURES





LEGEND:

MEAN SPEED CATEGORIES:

- Sitting ●
- Standing ●
- Walking ●
- Uncomfortable ●
- Dangerous ●

SENSOR LOCATION:

- Grade Level

Pedestrian Wind Conditions - Mean Speed
 No Build
 Annual
 Kenmore Square - Boston, MA

True North

Drawn by: GRE	Figure: 1A
Approx. Scale: 1"=100'	
Project #1902393	Date Revised: May 22, 2019



LEGEND:

MEAN SPEED CATEGORIES:

- Sitting ●
- Standing ●
- Walking ●
- Uncomfortable ●
- Dangerous ●

SENSOR LOCATION:

- Grade Level
- ▶ Entrance Location

MITIGATION:

- ★ Winter Landscaping
- 70% Solid Screen Wall

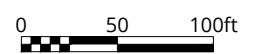
Pedestrian Wind Conditions - Mean Speed - Build A
 Build
 Annual
 Kenmore Square - Boston, MA

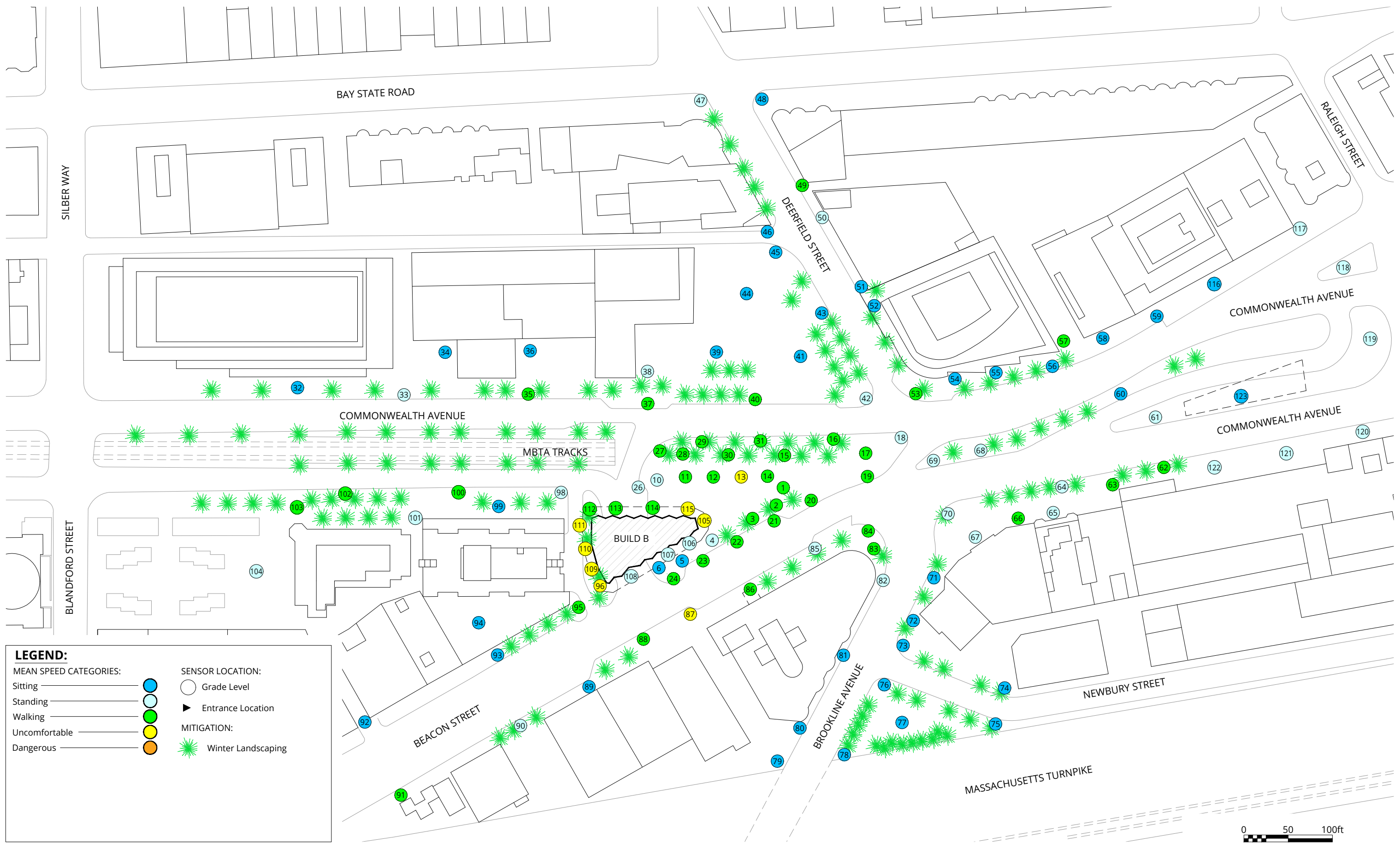
True North

Drawn by: GRE | Figure: 1B

Approx. Scale: 1"=100'

Project #1902393 | Date Revised: May 22, 2019





LEGEND:

MEAN SPEED CATEGORIES:

- Sitting ●
- Standing ●
- Walking ●
- Uncomfortable ●
- Dangerous ●

SENSOR LOCATION:

- Grade Level
- ▶ Entrance Location

MITIGATION:

- ★ Winter Landscaping

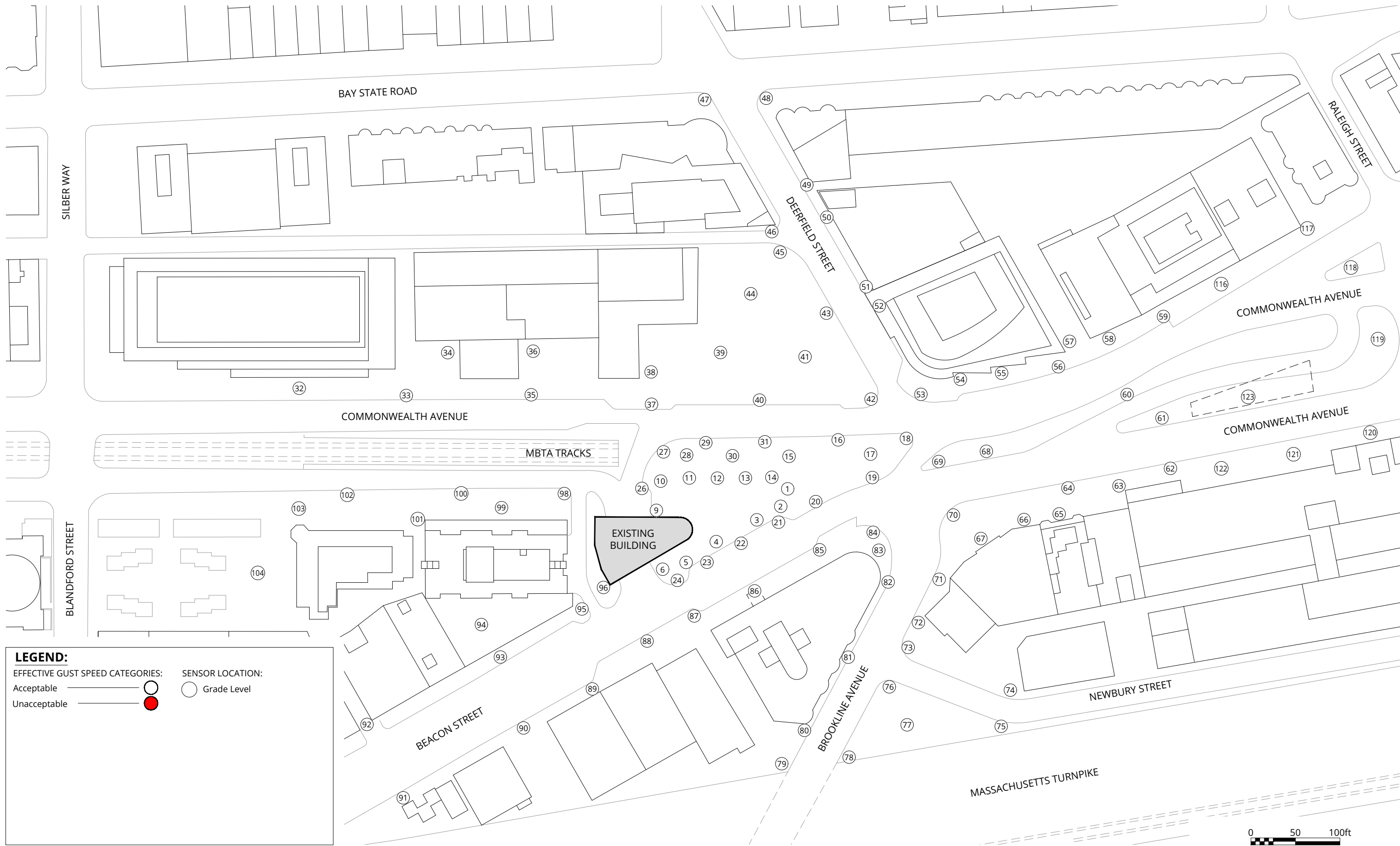
Pedestrian Wind Conditions - Mean Speed - Build B (Original PNF Location)
 Build
 Annual
 Kenmore Square - Boston, MA

True North

Drawn by: GRE | Figure: 1C

Approx. Scale: 1"=100'

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LEGEND:

EFFECTIVE GUST SPEED CATEGORIES:

- Acceptable
- Unacceptable

SENSOR LOCATION:

- Grade Level

Pedestrian Wind Conditions - Effective Gust Speed
 No Build
 Annual
 Kenmore Square - Boston, MA

True North

Drawn by: GRE Figure: 2A

Approx. Scale: 1"=100'

Project #1902393 Date Revised: May 22, 2019



LEGEND:

EFFECTIVE GUST SPEED CATEGORIES:
 Acceptable ———— ○
 Unacceptable ———— ●

SENSOR LOCATION:
 ○ Grade Level
 ► Entrance Location

MITIGATION:
 * Winter Landscaping
 - - - - - 70% Solid Screen Wall



LEGEND:


EFFECTIVE GUST SPEED CATEGORIES:
 Acceptable ———— ○
 Unacceptable ———— ●

SENSOR LOCATION:
 ○ Grade Level
 ► Entrance Location

MITIGATION:
 * Winter Landscaping

Pedestrian Wind Conditions - Effective Gust Speed - Build B (Original PNF Location)
 Build
 Annual
 Kenmore Square - Boston, MA

True North
 Drawn by: GRE | Figure: 2C
 Approx. Scale: 1"=100'
 Project #1902393 | Date Revised: May 22, 2019



TABLES

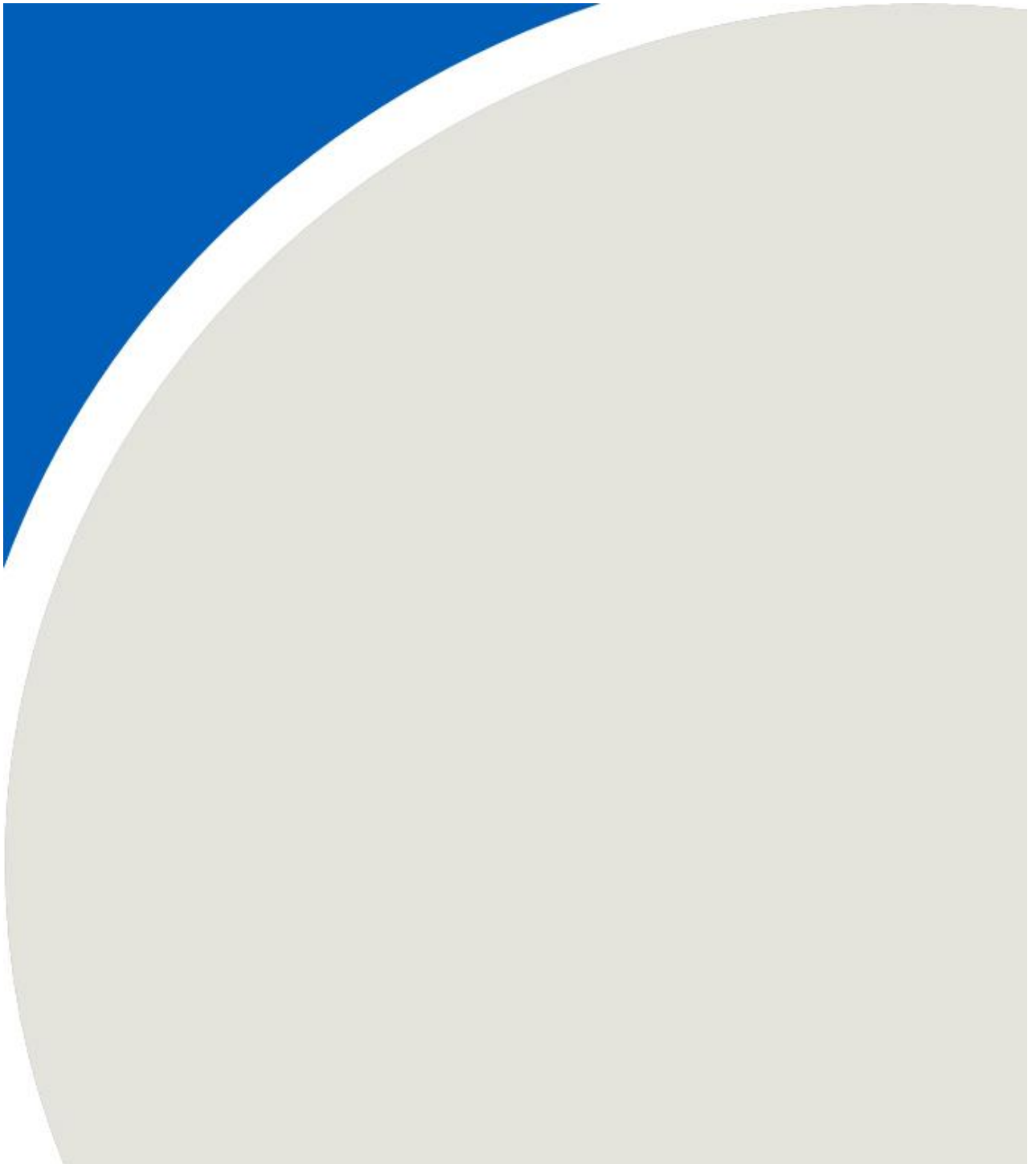




Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
1	No Build	Annual	13		Standing	20		Acceptable
	Build A	Annual	25	92%	Uncomfortable	32	72%	Unacceptable
	Build B	Annual	18	38%	Walking	27	35%	Acceptable
2	No Build	Annual	12		Sitting	19		Acceptable
	Build A	Annual	19	58%	Walking	26	37%	Acceptable
	Build B	Annual	18	50%	Walking	26	37%	Acceptable
3	No Build	Annual	11		Sitting	18		Acceptable
	Build A	Annual	14	27%	Standing	20	11%	Acceptable
	Build B	Annual	18	64%	Walking	26	44%	Acceptable
4	No Build	Annual	10		Sitting	16		Acceptable
	Build A	Annual	11		Sitting	18	12%	Acceptable
	Build B	Annual	14	40%	Standing	22	38%	Acceptable
5	No Build	Annual	11		Sitting	18		Acceptable
	Build A	Annual	15	36%	Standing	22	22%	Acceptable
	Build B	Annual	11		Sitting	18		Acceptable
6	No Build	Annual	10		Sitting	16		Acceptable
	Build A	Annual	18	80%	Walking	26	62%	Acceptable
	Build B	Annual	12	20%	Sitting	20	25%	Acceptable
7	No Build	-	-		-		-	-
	Build A	Annual	19		Walking	24		Acceptable
	Build B	-	-		-		-	-
8	No Build	-	-		-		-	-
	Build A	Annual	15		Standing	22		Acceptable
	Build B	-	-		-		-	-
9	No Build	Annual	13		Standing	20		Acceptable
	Build A	Annual	17	31%	Walking	24	20%	Acceptable
	Build B	-	-		-		-	-
10	No Build	Annual	14		Standing	21		Acceptable
	Build A	Annual	23	64%	Uncomfortable	30	43%	Acceptable
	Build B	Annual	13		Standing	20		Acceptable
11	No Build	Annual	14		Standing	21		Acceptable
	Build A	Annual	11	-21%	Sitting	16	-24%	Acceptable
	Build B	Annual	16	14%	Walking	23		Acceptable
12	No Build	Annual	13		Standing	20		Acceptable
	Build A	Annual	10	-23%	Sitting	15	-25%	Acceptable
	Build B	Annual	19	46%	Walking	27	35%	Acceptable
13	No Build	Annual	13		Standing	20		Acceptable
	Build A	Annual	19	46%	Walking	24	20%	Acceptable
	Build B	Annual	20	54%	Uncomfortable	28	40%	Acceptable



Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
14	No Build	Annual	13		Standing	19		Acceptable
	Build A	Annual	25	92%	Uncomfortable	31	63%	Acceptable
	Build B	Annual	17	31%	Walking	25	32%	Acceptable
15	No Build	Annual	13		Standing	20		Acceptable
	Build A	Annual	22	69%	Uncomfortable	31	55%	Acceptable
	Build B	Annual	18	38%	Walking	26	30%	Acceptable
16	No Build	Annual	13		Standing	19		Acceptable
	Build A	Annual	18	38%	Walking	26	37%	Acceptable
	Build B	Annual	16	23%	Walking	24	26%	Acceptable
17	No Build	Annual	14		Standing	20		Acceptable
	Build A	Annual	19	36%	Walking	27	35%	Acceptable
	Build B	Annual	17	21%	Walking	24	20%	Acceptable
18	No Build	Annual	15		Standing	21		Acceptable
	Build A	Annual	18	20%	Walking	24	14%	Acceptable
	Build B	Annual	15		Standing	21		Acceptable
19	No Build	Annual	15		Standing	21		Acceptable
	Build A	Annual	19	27%	Walking	27	29%	Acceptable
	Build B	Annual	17	13%	Walking	24	14%	Acceptable
20	No Build	Annual	14		Standing	21		Acceptable
	Build A	Annual	18	29%	Walking	26	24%	Acceptable
	Build B	Annual	18	29%	Walking	25	19%	Acceptable
21	No Build	Annual	12		Sitting	18		Acceptable
	Build A	Annual	17	42%	Walking	27	44%	Unacceptable
	Build B	Annual	17	42%	Walking	26	44%	Acceptable
22	No Build	Annual	10		Sitting	17		Acceptable
	Build A	Annual	15	50%	Standing	25	47%	Acceptable
	Build B	Annual	19	90%	Walking	28	65%	Acceptable
23	No Build	Annual	11		Sitting	18		Acceptable
	Build A	Annual	16	45%	Walking	27	50%	Acceptable
	Build B	Annual	17	55%	Walking	26	44%	Acceptable
24	No Build	Annual	12		Sitting	19		Acceptable
	Build A	Annual	23	92%	Uncomfortable	31	63%	Acceptable
	Build B	Annual	17	42%	Walking	26	37%	Acceptable
25	No Build	-	-		-		-	
	Build A	Annual	15		Standing	23		Acceptable
	Build B	-	-		-		-	
26	No Build	Annual	14		Standing	21		Acceptable
	Build A	Annual	18	29%	Walking	27	29%	Acceptable
	Build B	Annual	14		Standing	21		Acceptable



Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
27	No Build	Annual	14		Standing	22		Acceptable
	Build A	Annual	18	29%	Walking	24		Acceptable
	Build B	Annual	18	29%	Walking	27	23%	Acceptable
28	No Build	Annual	14		Standing	21		Acceptable
	Build A	Annual	19	36%	Walking	27	29%	Acceptable
	Build B	Annual	18	29%	Walking	26	24%	Acceptable
29	No Build	Annual	14		Standing	21		Acceptable
	Build A	Annual	17	21%	Walking	26	24%	Acceptable
	Build B	Annual	18	29%	Walking	27	29%	Acceptable
30	No Build	Annual	13		Standing	20		Acceptable
	Build A	Annual	14		Standing	21		Acceptable
	Build B	Annual	19	46%	Walking	28	40%	Acceptable
31	No Build	Annual	13		Standing	20		Acceptable
	Build A	Annual	17	31%	Walking	25	25%	Acceptable
	Build B	Annual	19	46%	Walking	27	35%	Acceptable
32	No Build	Annual	13		Standing	20		Acceptable
	Build A	Annual	10	-23%	Sitting	16	-20%	Acceptable
	Build B	Annual	11	-15%	Sitting	16	-20%	Acceptable
33	No Build	Annual	15		Standing	23		Acceptable
	Build A	Annual	13	-13%	Standing	20	-13%	Acceptable
	Build B	Annual	14		Standing	21		Acceptable
34	No Build	Annual	8		Sitting	13		Acceptable
	Build A	Annual	7	-12%	Sitting	12		Acceptable
	Build B	Annual	8		Sitting	13		Acceptable
35	No Build	Annual	14		Standing	21		Acceptable
	Build A	Annual	12	-14%	Sitting	18	-14%	Acceptable
	Build B	Annual	16	14%	Walking	23		Acceptable
36	No Build	Annual	6		Sitting	10		Acceptable
	Build A	Annual	7	17%	Sitting	11		Acceptable
	Build B	Annual	6		Sitting	10		Acceptable
37	No Build	Annual	14		Standing	21		Acceptable
	Build A	Annual	19	36%	Walking	26	24%	Acceptable
	Build B	Annual	18	29%	Walking	26	24%	Acceptable
38	No Build	Annual	6		Sitting	11		Acceptable
	Build A	Annual	14	133%	Standing	21	91%	Acceptable
	Build B	Annual	15	150%	Standing	22	100%	Acceptable
39	No Build	Annual	10		Sitting	16		Acceptable
	Build A	Annual	15	50%	Standing	23	44%	Acceptable
	Build B	Annual	12	20%	Sitting	19	19%	Acceptable



Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
40	No Build	Annual	13		Standing	19		Acceptable
	Build A	Annual	19	46%	Walking	28	47%	Acceptable
	Build B	Annual	17	31%	Walking	24	26%	Acceptable
41	No Build	Annual	10		Sitting	17		Acceptable
	Build A	Annual	12	20%	Sitting	19	12%	Acceptable
	Build B	Annual	12	20%	Sitting	19	12%	Acceptable
42	No Build	Annual	14		Standing	20		Acceptable
	Build A	Annual	15		Standing	22		Acceptable
	Build B	Annual	13		Standing	18		Acceptable
43	No Build	Annual	14		Standing	21		Acceptable
	Build A	Annual	12	-14%	Sitting	19		Acceptable
	Build B	Annual	12	-14%	Sitting	17	-19%	Acceptable
44	No Build	Annual	9		Sitting	15		Acceptable
	Build A	Annual	10	11%	Sitting	16		Acceptable
	Build B	Annual	10	11%	Sitting	16		Acceptable
45	No Build	Annual	9		Sitting	16		Acceptable
	Build A	Annual	9		Sitting	15		Acceptable
	Build B	Annual	9		Sitting	16		Acceptable
46	No Build	Annual	9		Sitting	15		Acceptable
	Build A	Annual	8	-11%	Sitting	14		Acceptable
	Build B	Annual	9		Sitting	15		Acceptable
47	No Build	Annual	13		Standing	20		Acceptable
	Build A	Annual	14		Standing	20		Acceptable
	Build B	Annual	13		Standing	20		Acceptable
48	No Build	Annual	12		Sitting	19		Acceptable
	Build A	Annual	12		Sitting	18		Acceptable
	Build B	Annual	12		Sitting	19		Acceptable
49	No Build	Annual	15		Standing	22		Acceptable
	Build A	Annual	16		Walking	23		Acceptable
	Build B	Annual	16		Walking	23		Acceptable
50	No Build	Annual	14		Standing	21		Acceptable
	Build A	Annual	14		Standing	21		Acceptable
	Build B	Annual	15		Standing	22		Acceptable
51	No Build	Annual	9		Sitting	15		Acceptable
	Build A	Annual	9		Sitting	15		Acceptable
	Build B	Annual	10	11%	Sitting	15		Acceptable
52	No Build	Annual	12		Sitting	18		Acceptable
	Build A	Annual	12		Sitting	19		Acceptable
	Build B	Annual	11		Sitting	18		Acceptable



Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
53	No Build	Annual	18		Walking	25		Acceptable
	Build A	Annual	17		Walking	23		Acceptable
	Build B	Annual	16	-11%	Walking	23		Acceptable
54	No Build	Annual	13		Standing	20		Acceptable
	Build A	Annual	11	-15%	Sitting	18		Acceptable
	Build B	Annual	12		Sitting	19		Acceptable
55	No Build	Annual	13		Standing	19		Acceptable
	Build A	Annual	12		Sitting	19		Acceptable
	Build B	Annual	12		Sitting	20		Acceptable
56	No Build	Annual	10		Sitting	17		Acceptable
	Build A	Annual	11		Sitting	17		Acceptable
	Build B	Annual	10		Sitting	17		Acceptable
57	No Build	Annual	16		Walking	24		Acceptable
	Build A	Annual	16		Walking	23		Acceptable
	Build B	Annual	16		Walking	24		Acceptable
58	No Build	Annual	12		Sitting	18		Acceptable
	Build A	Annual	12		Sitting	18		Acceptable
	Build B	Annual	12		Sitting	18		Acceptable
59	No Build	Annual	10		Sitting	16		Acceptable
	Build A	Annual	11		Sitting	17		Acceptable
	Build B	Annual	11		Sitting	16		Acceptable
60	No Build	Annual	15		Standing	21		Acceptable
	Build A	Annual	10	-33%	Sitting	17	-19%	Acceptable
	Build B	Annual	12	-20%	Sitting	18	-14%	Acceptable
61	No Build	Annual	16		Walking	22		Acceptable
	Build A	Annual	14	-12%	Standing	21		Acceptable
	Build B	Annual	14	-12%	Standing	21		Acceptable
62	No Build	Annual	17		Walking	24		Acceptable
	Build A	Annual	14	-18%	Standing	20	-17%	Acceptable
	Build B	Annual	16		Walking	23		Acceptable
63	No Build	Annual	15		Standing	21		Acceptable
	Build A	Annual	15		Standing	22		Acceptable
	Build B	Annual	16		Walking	22		Acceptable
64	No Build	Annual	16		Walking	23		Acceptable
	Build A	Annual	14	-12%	Standing	20	-13%	Acceptable
	Build B	Annual	15		Standing	22		Acceptable
65	No Build	Annual	12		Sitting	19		Acceptable
	Build A	Annual	13		Standing	21	11%	Acceptable
	Build B	Annual	14	17%	Standing	21	11%	Acceptable



Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
66	No Build	Annual	15		Standing	22		Acceptable
	Build A	Annual	16		Walking	24		Acceptable
	Build B	Annual	17	13%	Walking	25	14%	Acceptable
67	No Build	Annual	13		Standing	20		Acceptable
	Build A	Annual	13		Standing	20		Acceptable
	Build B	Annual	15	15%	Standing	22		Acceptable
68	No Build	Annual	15		Standing	21		Acceptable
	Build A	Annual	15		Standing	21		Acceptable
	Build B	Annual	13	-13%	Standing	19		Acceptable
69	No Build	Annual	15		Standing	21		Acceptable
	Build A	Annual	17	13%	Walking	24	14%	Acceptable
	Build B	Annual	15		Standing	21		Acceptable
70	No Build	Annual	14		Standing	20		Acceptable
	Build A	Annual	14		Standing	21		Acceptable
	Build B	Annual	13		Standing	20		Acceptable
71	No Build	Annual	11		Sitting	18		Acceptable
	Build A	Annual	13	18%	Standing	20	11%	Acceptable
	Build B	Annual	12		Sitting	19		Acceptable
72	No Build	Annual	13		Standing	18		Acceptable
	Build A	Annual	14		Standing	20	11%	Acceptable
	Build B	Annual	12		Sitting	19		Acceptable
73	No Build	Annual	9		Sitting	13		Acceptable
	Build A	Annual	11	22%	Sitting	17	31%	Acceptable
	Build B	Annual	9		Sitting	14		Acceptable
74	No Build	Annual	9		Sitting	15		Acceptable
	Build A	Annual	9		Sitting	16		Acceptable
	Build B	Annual	10	11%	Sitting	17	13%	Acceptable
75	No Build	Annual	10		Sitting	15		Acceptable
	Build A	Annual	9		Sitting	15		Acceptable
	Build B	Annual	10		Sitting	16		Acceptable
76	No Build	Annual	9		Sitting	15		Acceptable
	Build A	Annual	10	11%	Sitting	17	13%	Acceptable
	Build B	Annual	9		Sitting	14		Acceptable
77	No Build	Annual	9		Sitting	14		Acceptable
	Build A	Annual	8	-11%	Sitting	14		Acceptable
	Build B	Annual	9		Sitting	14		Acceptable
78	No Build	Annual	10		Sitting	15		Acceptable
	Build A	Annual	10		Sitting	16		Acceptable
	Build B	Annual	10		Sitting	16		Acceptable



Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
79	No Build	Annual	8		Sitting	13		Acceptable
	Build A	Annual	9	12%	Sitting	15	15%	Acceptable
	Build B	Annual	10	25%	Sitting	15	15%	Acceptable
80	No Build	Annual	11		Sitting	16		Acceptable
	Build A	Annual	11		Sitting	16		Acceptable
	Build B	Annual	11		Sitting	16		Acceptable
81	No Build	Annual	10		Sitting	15		Acceptable
	Build A	Annual	11		Sitting	17	13%	Acceptable
	Build B	Annual	11		Sitting	16		Acceptable
82	No Build	Annual	11		Sitting	18		Acceptable
	Build A	Annual	19	73%	Walking	28	56%	Acceptable
	Build B	Annual	13	18%	Standing	22	22%	Acceptable
83	No Build	Annual	15		Standing	22		Acceptable
	Build A	Annual	18	20%	Walking	26	18%	Acceptable
	Build B	Annual	19	27%	Walking	27	23%	Acceptable
84	No Build	Annual	16		Walking	24		Acceptable
	Build A	Annual	19	19%	Walking	28	17%	Acceptable
	Build B	Annual	19	19%	Walking	27	12%	Acceptable
85	No Build	Annual	14		Standing	21		Acceptable
	Build A	Annual	16	14%	Walking	24	14%	Acceptable
	Build B	Annual	14		Standing	21		Acceptable
86	No Build	Annual	10		Sitting	17		Acceptable
	Build A	Annual	26	160%	Uncomfortable	34	100%	Unacceptable
	Build B	Annual	17	70%	Walking	25	47%	Acceptable
87	No Build	Annual	12		Sitting	19		Acceptable
	Build A	Annual	19	58%	Walking	25	32%	Acceptable
	Build B	Annual	20	67%	Uncomfortable	29	53%	Acceptable
88	No Build	Annual	13		Standing	19		Acceptable
	Build A	Annual	13		Standing	20		Acceptable
	Build B	Annual	18	38%	Walking	25	32%	Acceptable
89	No Build	Annual	12		Sitting	18		Acceptable
	Build A	Annual	14	17%	Standing	20	11%	Acceptable
	Build B	Annual	12		Sitting	18		Acceptable
90	No Build	Annual	15		Standing	22		Acceptable
	Build A	Annual	14		Standing	21		Acceptable
	Build B	Annual	14		Standing	21		Acceptable
91	No Build	Annual	13		Standing	20		Acceptable
	Build A	Annual	16	23%	Walking	25	25%	Acceptable
	Build B	Annual	16	23%	Walking	24	20%	Acceptable



Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
92	No Build	Annual	11		Sitting	16		Acceptable
	Build A	Annual	12		Sitting	18	12%	Acceptable
	Build B	Annual	11		Sitting	17		Acceptable
93	No Build	Annual	12		Sitting	17		Acceptable
	Build A	Annual	12		Sitting	18		Acceptable
	Build B	Annual	12		Sitting	18		Acceptable
94	No Build	Annual	12		Sitting	19		Acceptable
	Build A	Annual	10	-17%	Sitting	17	-11%	Acceptable
	Build B	Annual	12		Sitting	19		Acceptable
95	No Build	Annual	13		Standing	19		Acceptable
	Build A	Annual	16	23%	Walking	22	16%	Acceptable
	Build B	Annual	19	46%	Walking	27	42%	Acceptable
96	No Build	Annual	14		Standing	22		Acceptable
	Build A	Annual	18	29%	Walking	26	18%	Acceptable
	Build B	Annual	20	43%	Uncomfortable	26	18%	Acceptable
97	No Build	-	-		-		-	
	Build A	Annual	19		Walking	26		Acceptable
	Build B	-	-		-		-	
98	No Build	Annual	15		Standing	23		Acceptable
	Build A	Annual	13	-13%	Standing	20	-13%	Acceptable
	Build B	Annual	15		Standing	23		Acceptable
99	No Build	Annual	13		Standing	21		Acceptable
	Build A	Annual	11	-15%	Sitting	17	-19%	Acceptable
	Build B	Annual	12		Sitting	19		Acceptable
100	No Build	Annual	15		Standing	22		Acceptable
	Build A	Annual	16		Walking	22		Acceptable
	Build B	Annual	17	13%	Walking	24		Acceptable
101	No Build	Annual	12		Sitting	19		Acceptable
	Build A	Annual	13		Standing	19		Acceptable
	Build B	Annual	14	17%	Standing	21	11%	Acceptable
102	No Build	Annual	16		Walking	23		Acceptable
	Build A	Annual	16		Walking	23		Acceptable
	Build B	Annual	18	12%	Walking	24		Acceptable
103	No Build	Annual	16		Walking	24		Acceptable
	Build A	Annual	18	12%	Walking	26		Acceptable
	Build B	Annual	19	19%	Walking	27	12%	Acceptable
104	No Build	Annual	14		Standing	22		Acceptable
	Build A	Annual	14		Standing	22		Acceptable
	Build B	Annual	14		Standing	22		Acceptable



Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
105	No Build	-	-	-	-	-	-	-
	Build A	-	-	-	-	-	-	-
	Build B	Annual	23	-	Uncomfortable	32	-	Unacceptable
106	No Build	-	-	-	-	-	-	-
	Build A	-	-	-	-	-	-	-
	Build B	Annual	15	-	Standing	21	-	Acceptable
107	No Build	-	-	-	-	-	-	-
	Build A	-	-	-	-	-	-	-
	Build B	Annual	15	-	Standing	22	-	Acceptable
108	No Build	-	-	-	-	-	-	-
	Build A	-	-	-	-	-	-	-
	Build B	Annual	13	-	Standing	19	-	Acceptable
109	No Build	-	-	-	-	-	-	-
	Build A	Annual	17	-	Walking	24	-	Acceptable
	Build B	Annual	20	-	Uncomfortable	28	-	Acceptable
110	No Build	-	-	-	-	-	-	-
	Build A	Annual	17	-	Walking	24	-	Acceptable
	Build B	Annual	20	-	Uncomfortable	29	-	Acceptable
111	No Build	-	-	-	-	-	-	-
	Build A	Annual	16	-	Walking	23	-	Acceptable
	Build B	Annual	20	-	Uncomfortable	28	-	Acceptable
112	No Build	-	-	-	-	-	-	-
	Build A	Annual	16	-	Walking	24	-	Acceptable
	Build B	Annual	19	-	Walking	27	-	Acceptable
113	No Build	-	-	-	-	-	-	-
	Build A	-	-	-	-	-	-	-
	Build B	Annual	18	-	Walking	26	-	Acceptable
114	No Build	-	-	-	-	-	-	-
	Build A	-	-	-	-	-	-	-
	Build B	Annual	18	-	Walking	25	-	Acceptable
115	No Build	-	-	-	-	-	-	-
	Build A	-	-	-	-	-	-	-
	Build B	Annual	20	-	Uncomfortable	29	-	Acceptable
116	No Build	-	-	-	-	-	-	-
	Build A	Annual	12	-	Sitting	18	-	Acceptable
	Build B	Annual	11	-	Sitting	17	-	Acceptable
117	No Build	-	-	-	-	-	-	-
	Build A	Annual	13	-	Standing	20	-	Acceptable
	Build B	Annual	14	-	Standing	21	-	Acceptable
		Annual	13	-	Standing	20	-	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
118	No Build	Annual	13		Standing	20		Acceptable
	Build A	Annual	13		Standing	20		Acceptable
	Build B	Annual	13		Standing	19		Acceptable
119	No Build	Annual	15		Standing	22		Acceptable
	Build A	Annual	14		Standing	21		Acceptable
	Build B	Annual	15		Standing	22		Acceptable
120	No Build	Annual	13		Standing	20		Acceptable
	Build A	Annual	13		Standing	20		Acceptable
	Build B	Annual	14		Standing	21		Acceptable
121	No Build	Annual	14		Standing	21		Acceptable
	Build A	Annual	13		Standing	21		Acceptable
	Build B	Annual	15		Standing	22		Acceptable
122	No Build	Annual	13		Standing	19		Acceptable
	Build A	Annual	13		Standing	16		Acceptable
	Build B	Annual	14		Standing	21		Acceptable
123	No Build	Annual	11		Sitting	17		Acceptable
	Build A	Annual	10		Sitting	16		Acceptable
	Build B	Annual	11		Sitting	16		Acceptable

Configurations	Mean Wind Criteria Speed (mph)	Effective Gust Criteria (mph)
No Build - Existing site and surrounds	≤ 12 Comfortable for Sitting 13 - 15 Comfortable for Standing	≤ 31 Acceptable > 31 Unacceptable
Build A - Existing surrounds with proposed development	16 - 19 Comfortable for Walking 20 - 27 Uncomfortable for Walking	
Build B - Existing surrounds with proposed development (PNF location)	> 27 Dangerous Conditions	

Notes

- 1) Wind Speeds are for a 1% probability of exceedance
- 2) % Change is based on comparison with Configuration A
- 3) % changes less than 10% are excluded



Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
1	No Build	14	10	12	14	21	15	19	22
	Build A	27	20	26	26	38	29	36	37
	Build B	19	14	18	20	27	21	26	29
2	No Build	13	9	12	13	20	15	18	21
	Build A	20	17	19	20	28	22	26	28
	Build B	19	14	17	20	27	20	25	28
3	No Build	12	9	11	12	19	15	17	20
	Build A	14	12	14	14	21	17	20	22
	Build B	19	14	18	19	27	21	25	28
4	No Build	11	9	10	10	17	15	16	17
	Build A	11	9	11	12	19	14	18	20
	Build B	15	11	14	14	24	17	22	23
5	No Build	12	10	11	12	19	16	17	18
	Build A	16	13	15	16	22	19	22	23
	Build B	12	9	10	12	18	14	17	20
6	No Build	10	8	10	10	17	14	16	17
	Build A	19	15	18	20	27	21	25	28
	Build B	12	9	11	13	20	15	19	22
7	No Build	-	-	-	-	-	-	-	-
	Build A	17	13	16	18	25	19	23	27
	Build B	-	-	-	-	-	-	-	-
8	No Build	-	-	-	-	-	-	-	-
	Build A	15	11	14	16	22	17	20	24
	Build B	-	-	-	-	-	-	-	-
9	No Build	13	10	12	14	20	15	19	22
	Build A	17	13	15	19	24	18	22	27
	Build B	-	-	-	-	-	-	-	-
10	No Build	14	11	13	15	21	16	20	23
	Build A	23	17	21	25	32	23	29	33
	Build B	14	10	13	15	21	15	20	22
11	No Build	15	11	13	15	22	16	20	23
	Build A	12	8	11	11	17	12	16	16
	Build B	17	13	16	18	24	18	23	25
12	No Build	14	10	12	14	20	15	19	22
	Build A	10	8	10	10	16	13	15	16
	Build B	20	15	19	21	29	22	27	29
13	No Build	14	10	13	15	21	15	19	22
	Build A	20	15	19	21	29	22	27	29
	Build B	21	16	20	22	30	23	28	30



Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
14	No Build	13	10	12	14	20	15	18	21
	Build A	27	20	26	26	31	23	28	35
	Build B	18	14	17	19	26	20	25	27
15	No Build	14	10	13	15	20	15	18	21
	Build A	24	19	23	24	31	23	28	34
	Build B	19	15	17	19	27	21	25	28
16	No Build	14	10	13	14	20	15	18	21
	Build A	19	14	18	20	27	20	25	28
	Build B	17	14	16	18	25	20	24	26
17	No Build	15	11	13	15	21	16	19	22
	Build A	20	16	19	21	28	22	26	29
	Build B	17	13	16	18	25	19	23	26
18	No Build	15	11	14	16	21	16	20	22
	Build A	18	14	17	19	25	20	23	26
	Build B	15	11	14	16	21	17	20	23
19	No Build	15	11	14	16	22	16	20	23
	Build A	20	16	18	21	28	22	26	29
	Build B	18	13	16	19	25	19	23	27
20	No Build	15	11	13	15	21	16	19	22
	Build A	19	16	18	19	28	22	26	28
	Build B	18	14	17	19	26	20	24	27
21	No Build	12	9	11	12	20	15	18	19
	Build A	18	14	17	19	27	21	25	28
	Build B	18	14	17	19	27	20	25	28
22	No Build	11	8	10	11	18	14	16	18
	Build A	16	11	14	17	26	18	23	28
	Build B	20	16	19	21	29	22	27	29
23	No Build	12	10	11	12	19	16	18	19
	Build A	16	12	15	18	27	20	25	31
	Build B	18	13	17	19	27	20	25	28
24	No Build	12	10	11	12	20	17	18	20
	Build A	24	17	21	26	31	23	28	35
	Build B	18	13	16	19	27	20	24	30
25	No Build	-	-	-	-	-	-	-	-
	Build A	16	12	15	15	25	18	23	24
	Build B	-	-	-	-	-	-	-	-
26	No Build	14	11	13	15	22	16	20	23
	Build A	20	14	19	18	29	20	27	27
	Build B	15	11	13	15	22	16	20	22



Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
27	No Build	15	12	14	16	22	18	21	23
	Build A	19	14	17	19	26	19	24	26
	Build B	20	14	18	19	29	21	27	29
28	No Build	14	11	13	15	21	16	20	22
	Build A	19	14	17	21	28	20	25	30
	Build B	19	14	18	20	28	20	26	28
29	No Build	14	11	13	15	21	17	20	22
	Build A	18	13	17	19	27	20	25	28
	Build B	19	14	19	20	29	21	28	29
30	No Build	13	10	12	14	20	15	19	21
	Build A	14	11	13	16	21	16	20	23
	Build B	20	16	19	21	29	23	28	29
31	No Build	14	10	12	14	20	16	19	21
	Build A	18	13	16	19	26	20	24	27
	Build B	20	16	19	20	28	23	27	28
32	No Build	14	11	13	14	20	17	19	21
	Build A	11	8	10	11	16	13	15	17
	Build B	11	9	11	12	17	14	16	18
33	No Build	15	13	15	16	24	20	23	25
	Build A	14	11	13	14	21	16	20	21
	Build B	14	12	13	15	22	18	20	22
34	No Build	8	7	8	9	13	10	13	14
	Build A	8	6	7	8	12	10	12	13
	Build B	9	7	8	9	14	11	13	14
35	No Build	14	12	14	15	21	18	21	22
	Build A	14	10	12	13	19	15	18	19
	Build B	17	13	16	16	25	19	23	24
36	No Build	6	5	6	6	10	8	10	10
	Build A	7	5	7	7	12	8	11	12
	Build B	7	5	6	7	11	8	10	11
37	No Build	14	11	13	15	21	17	20	22
	Build A	21	14	19	19	29	20	26	27
	Build B	19	14	17	19	28	20	25	27
38	No Build	7	5	7	7	12	10	11	11
	Build A	16	11	14	15	23	16	21	22
	Build B	16	11	15	16	24	17	22	23
39	No Build	10	8	9	10	17	13	15	17
	Build A	17	12	15	16	25	18	22	24
	Build B	13	10	13	13	20	15	19	20



Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
40	No Build	13	10	12	14	19	15	18	20
	Build A	20	15	19	20	30	22	28	30
	Build B	17	14	16	18	26	21	24	26
41	No Build	11	8	10	11	18	13	17	18
	Build A	12	10	12	12	20	17	19	20
	Build B	13	11	12	12	20	17	18	19
42	No Build	14	11	13	15	20	16	20	22
	Build A	16	12	15	16	23	19	22	24
	Build B	13	10	12	14	19	15	18	20
43	No Build	15	11	14	16	22	16	20	23
	Build A	13	10	12	13	20	15	18	20
	Build B	13	10	12	12	19	14	17	18
44	No Build	10	8	9	9	15	13	15	15
	Build A	10	8	10	10	17	14	16	17
	Build B	10	9	10	10	17	15	16	17
45	No Build	10	8	9	10	17	14	16	17
	Build A	9	7	9	9	16	13	15	16
	Build B	10	8	9	10	16	14	16	17
46	No Build	9	8	9	9	16	14	15	16
	Build A	9	7	8	9	15	12	14	15
	Build B	9	8	9	9	16	13	15	16
47	No Build	14	10	13	15	20	15	19	22
	Build A	15	11	13	16	21	15	19	22
	Build B	14	10	13	15	21	15	19	22
48	No Build	12	9	11	13	19	14	18	20
	Build A	12	9	11	13	19	14	17	20
	Build B	12	9	11	13	20	15	18	21
49	No Build	15	12	14	16	22	17	21	24
	Build A	16	12	15	17	23	17	21	25
	Build B	16	12	15	17	23	18	22	25
50	No Build	14	10	13	15	21	16	19	23
	Build A	15	11	13	16	22	17	20	23
	Build B	15	12	14	16	23	18	21	24
51	No Build	10	7	9	10	15	11	14	16
	Build A	10	7	9	10	16	12	14	16
	Build B	10	8	10	11	16	12	15	17
52	No Build	13	10	12	14	19	15	18	20
	Build A	13	10	12	13	20	17	19	21
	Build B	12	9	11	12	18	14	17	19



Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
53	No Build	19	15	18	20	25	20	24	28
	Build A	18	13	16	19	24	18	22	26
	Build B	17	13	16	18	23	18	22	25
54	No Build	13	10	12	15	20	15	19	22
	Build A	11	9	10	12	19	15	17	20
	Build B	12	9	11	13	20	15	18	21
55	No Build	13	10	12	14	20	15	18	21
	Build A	12	10	11	13	20	17	19	21
	Build B	12	9	11	13	20	16	19	22
56	No Build	11	9	10	11	17	14	17	18
	Build A	11	9	10	11	18	15	17	18
	Build B	11	9	10	11	17	14	17	18
57	No Build	18	13	17	16	26	18	24	24
	Build A	18	13	16	16	25	18	24	24
	Build B	18	13	16	16	26	18	24	24
58	No Build	12	10	11	13	19	15	17	19
	Build A	12	10	11	12	18	15	17	19
	Build B	12	10	11	12	18	14	17	19
59	No Build	11	9	10	10	17	15	16	17
	Build A	12	10	11	11	18	15	17	17
	Build B	11	9	11	11	17	15	16	17
60	No Build	16	12	15	17	22	18	21	23
	Build A	11	9	10	11	17	15	17	18
	Build B	12	10	12	13	19	15	18	19
61	No Build	16	13	15	17	23	18	21	23
	Build A	15	12	14	15	21	17	20	22
	Build B	15	12	14	15	22	17	20	22
62	No Build	19	13	17	17	28	19	25	24
	Build A	15	11	14	14	22	16	20	20
	Build B	18	12	16	16	26	17	23	22
63	No Build	15	11	14	16	22	16	20	23
	Build A	16	12	14	16	23	17	21	23
	Build B	17	12	15	17	24	17	21	24
64	No Build	17	12	15	17	24	18	22	24
	Build A	15	11	13	15	22	16	19	22
	Build B	16	12	14	16	23	17	21	24
65	No Build	13	10	12	13	20	15	18	20
	Build A	14	11	13	14	22	17	20	22
	Build B	15	11	13	15	22	17	20	23



Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
66	No Build	16	12	15	16	24	18	21	24
	Build A	17	13	16	17	25	19	23	26
	Build B	18	13	16	18	26	20	23	27
67	No Build	15	11	13	14	21	16	19	21
	Build A	15	11	13	14	21	16	19	21
	Build B	16	12	15	15	23	17	21	23
68	No Build	15	11	14	16	22	16	20	23
	Build A	15	12	14	16	21	17	20	22
	Build B	13	10	12	14	20	15	18	21
69	No Build	16	11	14	17	22	16	20	23
	Build A	18	13	16	19	24	19	22	26
	Build B	15	12	14	16	22	17	20	23
70	No Build	15	11	14	14	22	16	20	21
	Build A	14	11	13	15	22	17	20	23
	Build B	14	10	13	14	21	16	19	21
71	No Build	12	10	11	12	19	15	17	20
	Build A	14	10	12	14	21	16	19	22
	Build B	13	9	11	13	20	15	18	21
72	No Build	14	12	13	13	19	17	18	19
	Build A	15	12	14	15	21	17	20	22
	Build B	13	11	12	13	20	16	18	20
73	No Build	9	8	9	9	14	12	13	14
	Build A	11	8	10	12	18	13	17	19
	Build B	9	7	8	9	15	11	14	15
74	No Build	10	8	9	10	16	13	15	16
	Build A	10	8	9	10	16	13	15	16
	Build B	10	8	9	10	17	14	16	18
75	No Build	10	8	10	10	16	12	15	16
	Build A	10	8	9	10	16	12	14	16
	Build B	11	8	10	10	17	13	15	16
76	No Build	10	9	9	10	15	13	14	15
	Build A	10	8	10	11	17	13	16	18
	Build B	9	7	9	9	15	12	14	16
77	No Build	9	8	8	9	14	12	14	15
	Build A	9	7	8	9	14	11	13	15
	Build B	9	7	8	9	15	11	14	15
78	No Build	10	9	10	11	16	13	15	16
	Build A	11	9	10	11	16	14	16	17
	Build B	11	9	10	11	16	14	15	17



Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
79	No Build	9	7	8	9	14	11	13	14
	Build A	10	7	9	10	15	12	14	16
	Build B	11	8	10	10	16	12	15	16
80	No Build	12	9	11	13	16	13	15	17
	Build A	12	9	11	12	16	13	15	17
	Build B	11	9	10	11	17	13	16	17
81	No Build	11	7	10	10	17	12	15	15
	Build A	11	8	11	11	18	13	17	19
	Build B	12	8	11	11	18	13	17	17
82	No Build	12	10	12	12	19	14	18	19
	Build A	20	15	18	21	29	22	27	30
	Build B	14	10	13	14	23	17	21	24
83	No Build	16	12	14	16	24	18	22	24
	Build A	19	14	17	19	27	20	25	28
	Build B	19	15	18	21	28	21	26	29
84	No Build	17	13	16	18	25	19	23	25
	Build A	20	15	19	21	29	22	27	30
	Build B	20	15	18	21	28	21	26	30
85	No Build	15	11	14	15	22	17	20	22
	Build A	17	14	16	17	25	20	23	26
	Build B	15	12	14	15	22	17	21	23
86	No Build	11	8	10	11	18	13	17	18
	Build A	26	20	24	29	35	26	32	38
	Build B	18	14	17	19	26	20	24	28
87	No Build	13	10	12	13	19	15	18	20
	Build A	19	14	18	21	26	20	24	27
	Build B	21	15	19	22	29	22	27	31
88	No Build	13	10	12	14	20	15	18	21
	Build A	14	11	13	14	20	16	19	21
	Build B	18	14	17	20	25	20	24	27
89	No Build	13	9	12	14	19	14	18	20
	Build A	15	11	14	14	22	16	20	21
	Build B	12	9	12	13	19	14	17	19
90	No Build	16	14	15	15	23	20	21	22
	Build A	16	12	14	15	23	19	21	22
	Build B	15	13	13	14	23	19	21	21
91	No Build	13	10	12	14	21	16	19	22
	Build A	17	13	15	18	25	19	23	27
	Build B	16	13	15	18	25	19	23	26



Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
92	No Build	11	9	10	12	17	14	16	18
	Build A	12	9	11	13	19	15	17	19
	Build B	11	9	10	12	18	14	16	18
93	No Build	12	9	11	13	18	14	17	19
	Build A	12	9	11	13	18	14	17	19
	Build B	13	10	12	13	18	15	17	19
94	No Build	12	11	12	12	20	18	19	19
	Build A	11	10	10	10	18	16	17	17
	Build B	13	12	12	12	20	18	19	19
95	No Build	15	11	14	14	21	15	19	21
	Build A	18	12	16	16	25	17	22	22
	Build B	21	15	19	20	29	21	27	28
96	No Build	14	10	13	15	23	16	21	23
	Build A	20	14	18	19	28	20	25	27
	Build B	20	16	19	22	26	21	25	28
97	No Build	-	-	-	-	-	-	-	-
	Build A	21	15	19	19	29	21	26	27
	Build B	-	-	-	-	-	-	-	-
98	No Build	16	12	15	16	24	18	22	24
	Build A	14	10	13	14	22	16	21	21
	Build B	17	13	15	16	25	20	23	25
99	No Build	14	11	13	14	21	16	20	22
	Build A	12	9	11	11	19	14	17	18
	Build B	14	9	12	12	21	15	19	20
100	No Build	16	12	15	16	24	18	22	24
	Build A	18	12	16	16	25	17	22	22
	Build B	20	13	18	17	26	18	24	24
101	No Build	12	10	12	13	19	15	18	20
	Build A	14	10	13	13	20	15	19	20
	Build B	15	11	14	14	23	16	21	21
102	No Build	17	13	15	17	25	19	23	25
	Build A	19	13	17	16	25	18	23	23
	Build B	20	14	18	18	27	19	24	25
103	No Build	17	13	16	17	26	19	23	25
	Build A	20	14	18	19	28	20	25	27
	Build B	22	15	19	19	30	21	27	28
104	No Build	14	10	13	15	22	16	20	24
	Build A	15	11	13	16	23	17	20	25
	Build B	14	10	13	15	23	17	20	25



Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
105	No Build	-	-	-	-	-	-	-	-
	Build A	-	-	-	-	-	-	-	-
	Build B	24	19	23	25	34	26	32	34
106	No Build	-	-	-	-	-	-	-	-
	Build A	-	-	-	-	-	-	-	-
	Build B	16	14	15	15	22	19	21	21
107	No Build	-	-	-	-	-	-	-	-
	Build A	-	-	-	-	-	-	-	-
	Build B	16	14	15	16	23	19	22	23
108	No Build	-	-	-	-	-	-	-	-
	Build A	-	-	-	-	-	-	-	-
	Build B	14	12	13	14	20	17	20	21
109	No Build	-	-	-	-	-	-	-	-
	Build A	19	13	17	17	26	18	24	24
	Build B	21	15	19	21	30	22	27	30
110	No Build	-	-	-	-	-	-	-	-
	Build A	19	13	17	17	26	19	24	25
	Build B	22	16	20	22	31	23	28	31
111	No Build	-	-	-	-	-	-	-	-
	Build A	17	13	16	17	25	19	23	24
	Build B	21	16	20	21	30	22	28	29
112	No Build	-	-	-	-	-	-	-	-
	Build A	18	13	17	17	25	19	24	25
	Build B	21	16	20	20	29	22	27	29
113	No Build	-	-	-	-	-	-	-	-
	Build A	-	-	-	-	-	-	-	-
	Build B	20	14	18	19	28	20	25	27
114	No Build	-	-	-	-	-	-	-	-
	Build A	-	-	-	-	-	-	-	-
	Build B	20	14	18	19	28	19	25	26
115	No Build	-	-	-	-	-	-	-	-
	Build A	-	-	-	-	-	-	-	-
	Build B	22	16	20	22	32	22	29	31
116	No Build	12	11	12	12	19	17	18	18
	Build A	10	10	11	12	19	18	18	18
	Build B	11	10	11	11	18	15	17	17
117	No Build	14	12	13	13	22	19	20	20
	Build A	14	13	13	14	22	19	20	20
	Build B	14	13	13	14	22	19	20	20



Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
118	No Build	14	13	13	13	22	19	20	20
	Build A	14	12	13	13	21	18	19	20
	Build B	14	12	13	13	21	18	19	20
119	No Build	16	12	14	16	23	17	21	23
	Build A	16	12	15	16	24	18	22	23
	Build B	16	12	15	16	24	18	22	23
120	No Build	15	10	13	14	22	16	20	21
	Build A	16	11	14	14	24	17	22	22
	Build B	16	11	14	14	24	17	22	22
121	No Build	15	10	14	14	24	16	21	21
	Build A	17	11	15	15	25	17	23	22
	Build B	17	11	15	15	25	17	23	22
122	No Build	14	10	13	13	22	15	20	20
	Build A	16	11	14	14	24	16	21	21
	Build B	16	11	14	14	24	16	21	21
123	No Build	12	9	11	12	18	14	17	18
	Build A	11	9	12	12	19	14	17	19
	Build B	11	10	11	11	19	15	17	18

Seasons	Months	Mean Wind Criteria Speed (mph)		Effective Gust Criteria (mph)
Spring	March - May	≤ 12	Comfortable for Sitting	≤ 31 Acceptable > 31 Unacceptable
Summer	June - August	13 - 15	Comfortable for Standing	
Fall	September - November	16 - 19	Comfortable for Walking	
Winter	December - February	20 - 27	Uncomfortable for Walking	
Annual	January - December	> 27	Dangerous Conditions	

Configurations

No Build	Existing site and surrounds
Build A	Existing surrounds with proposed development
Build B	Existing surrounds with proposed development (PNF location)

Notes