Appendix 7-1
Wind Study

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Mission Rock EIR

San Francisco, California

Report

Pedestrian Wind Study
Wind Tunnel Tests

RWDI # 1301926
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SUBMITTED TO

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1. INTRODUCTION

Rowan Williams Davies □ Irwin Inc. (RWDI) was retained by ICF International to conduct a Pedestrian Wind Study for the proposed Mission Rock Development (Sea Wall Lot 337 and Pier 48 Mixed-Use Project) in San Francisco, California. The purpose of the study is to assess the existing and proposed wind environment around the project site in terms of pedestrian comfort and ha□ard relative to wind metrics specified in the San Francisco Planning Code Section 148, as applied on a site-wide basis. Section 148 calls for building designs to not cause ground-level wind currents to exceed, more than 10 percent of the time year round, between 7:00 am and 6:00 pm, the comfort level of 11 mph e□uivalent wind speed in areas of substantial pedestrian use and seven mph in public seating areas and for no addition to wind speeds that reach or exceed the ha□ard level of 26 miles per hour for a single hour of the year.

This report summari□es the methodology of wind tunnel studies for pedestrian wind conditions, describes the wind comfort and wind ha□ard criteria associated with wind force, as used in the current study, and presents the test results and recommendations of conceptual wind control measures, where necessary.

1.1 Project Description

The project site is located in the China Basin area of San Francisco, adjacent to the Mission Bay South redevelopment area, and to the southeast of the city's downtown core. The project would develop an approximately 27-acre site, including an existing 2,170-space a surface parking lot (Lot A) located south of AT□T Park.[1] Specifically, at completion, the proposed project would contain 11 development blocks with active□retail uses on the lower floors with: (1) three blocks (Blocks A, F, and K) containing primarily residential uses (with heights ranging from 120 to 240 feet)□(2) four blocks (Blocks B, C, G and E) containing primarily commercial uses (with heights ranging from 90 to 190 feet)□(3) three blocks (Blocks H, I and J) with flexible □oning for development (dictated by future market demand) as either predominantly commercial (High Commercial Assumption) or residential uses (High Residential Assumption), with heights ranging from up to 90 feet (commercial) to 120 feet (residential) (60 feet at base of building and 40 feet along Terry A. Francois Boulevard frontage)□and (4) one block (Block D) that would include two separate but attached buildings, D1, which would comprise a residential tower with a height of 240 feet, which would be located above D2, which would provide above-grade parking (garage height up to 100 feet) (three levels of below grade parking under Mission Rock S□uare is also planned) (see Appendix A1).

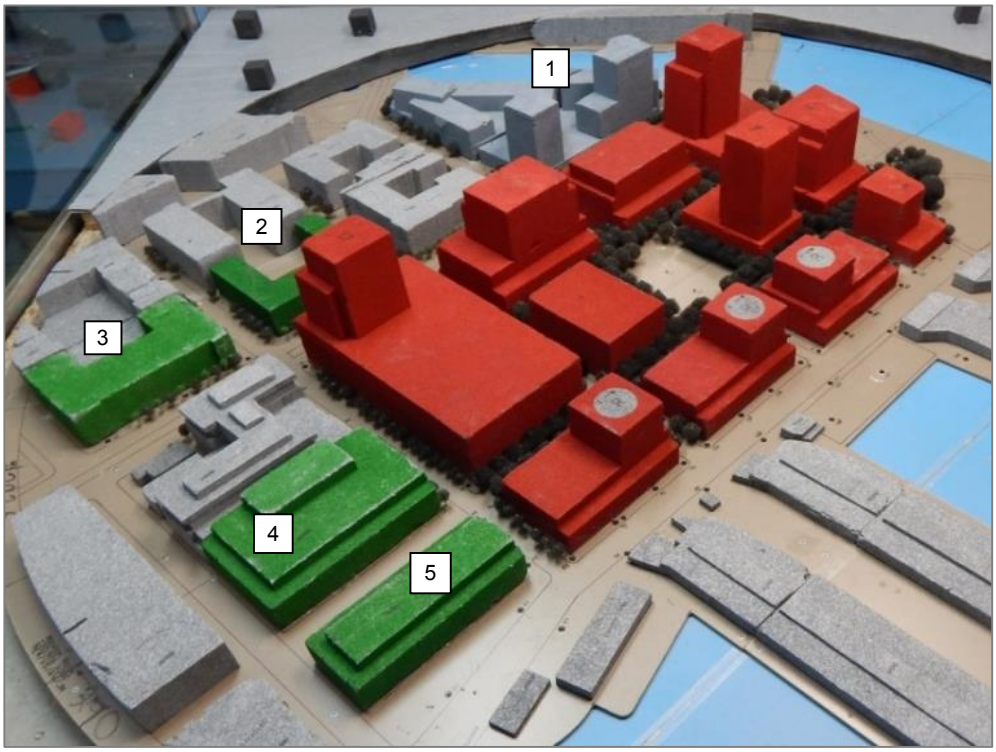
Under the High Commercial Assumption, the height of buildings on these blocks would be 90 feet (approximately 6 stories). Under the High Residential Assumption, the height of buildings on these blocks would be 120 feet (approximately 11 stories). Under either development assumption, a parking structure, on Block D2, located north of Mission Rock Street, would be a maximum of 100-feet tall and the residential tower on Block D2 would be a maximum of 240 feet tall.

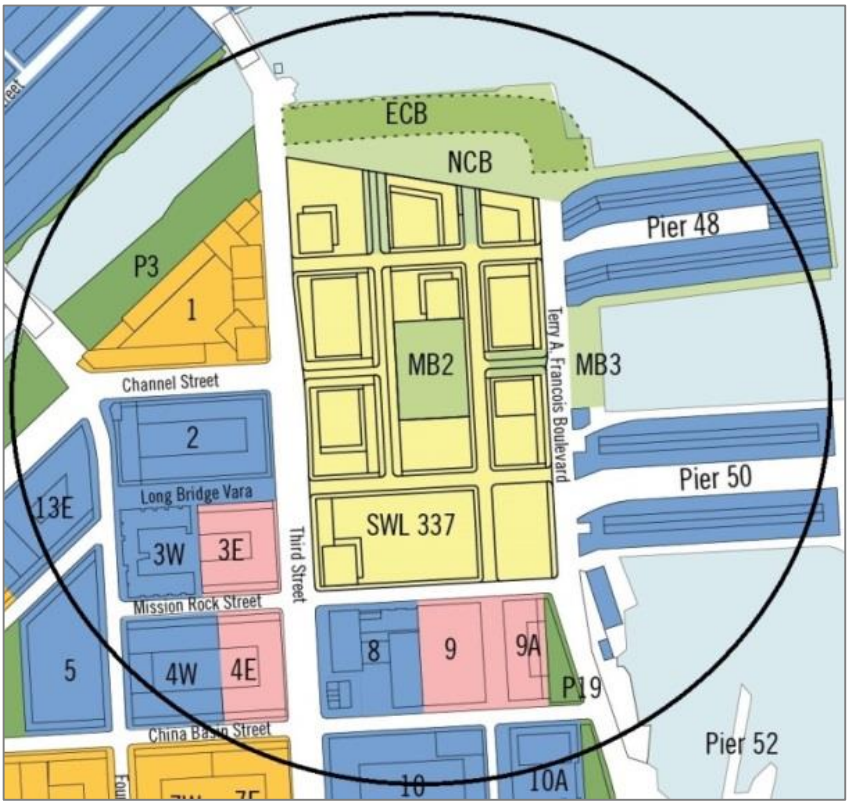
[1] The project analy□ed in the EIR also includes Pier 48, where a change of uses and various tenant improvements are proposed□ however, no physical changes would occur at Pier 48 that could affect future wind conditions. Therefore, this wind study only focuses on the area where new buildings would be constructed,

Since taller buildings tend to intercept stronger winds at higher elevations, redirecting them to ground level and potentially adversely affecting ground-level winds, the High Residential Assumption with taller buildings on Blocks H, I, and J is considered to be the more conservative of the two options from a wind effects perspective. Therefore, the test model reflected the High Residential Assumption. The test model was constructed using the design information and drawings listed in Appendix A and reflects the High Residential Assumption.

1.2 Baseline and Cumulative Surroundings

The Mission Bay area is under development and several building projects are currently under construction and/or have been proposed for the area. This study accounts for the impact of the proposed project when it is added to the existing (baseline) surroundings, as well as wind conditions after the completion of the proposed cumulative projects in the surroundings. Information regarding one building in the surrounding area that was under construction at the time was received on August 4, 2015 and was modeled and included as part of the baseline surroundings. Other anticipated future projects were modelled in accordance with the information received by RWDI on August 22, 2015 from the project team, and were included as part of the cumulative surroundings. These sites are shown in Image 1 and listed in the following table. Existing, under-construction and cumulative buildings are identified in blue, orange and pink, respectively, in the graphic of Image 1.





BASELINE		BUILDING HEIGHT (ft)
1	Block 1 Development	160

CUMULATIVE		BUILDING HEIGHT (ft)
2	Block 3E Development	60
3	Block 4E Development	65
4	Block 9 Development	90
5	Block 9A Development	65

Image 1: Baseline and Cumulative Buildings

1.3 Test Configurations and Locations

The project is anticipated to be completed in phases over the next 6 to 10 years. The phasing of Project implementation would be subject to change due to market conditions and other unanticipated factors. The current phasing plan anticipates the project would generally be developed from northwest to southeast. Although the phasing could shift, buildout would not occur from east to west.

For purposes of construction phasing, the project site generally has been divided into four areas with approximate construction timelines (Image 2). Construction of Area 1 would occur from 2017 to 2020, Area 2 from 2018 to 2021, Area 3 from 2019 to 2022 and Area 4 from 2020 to 2023. Also, there are flexible zoning options for Blocks H, I and J, the High Residential Assumption with taller buildings on these Blocks (120', as compared to 90' under the High Commercial Assumption) would provide worst-case wind effect results. Taller buildings tend to intercept stronger winds at higher elevations, redirecting them to ground level and often adversely affecting pedestrian activities. The study therefore considered the full buildout of the proposed project and block massing of the proposed buildings under the High Residential Assumption.

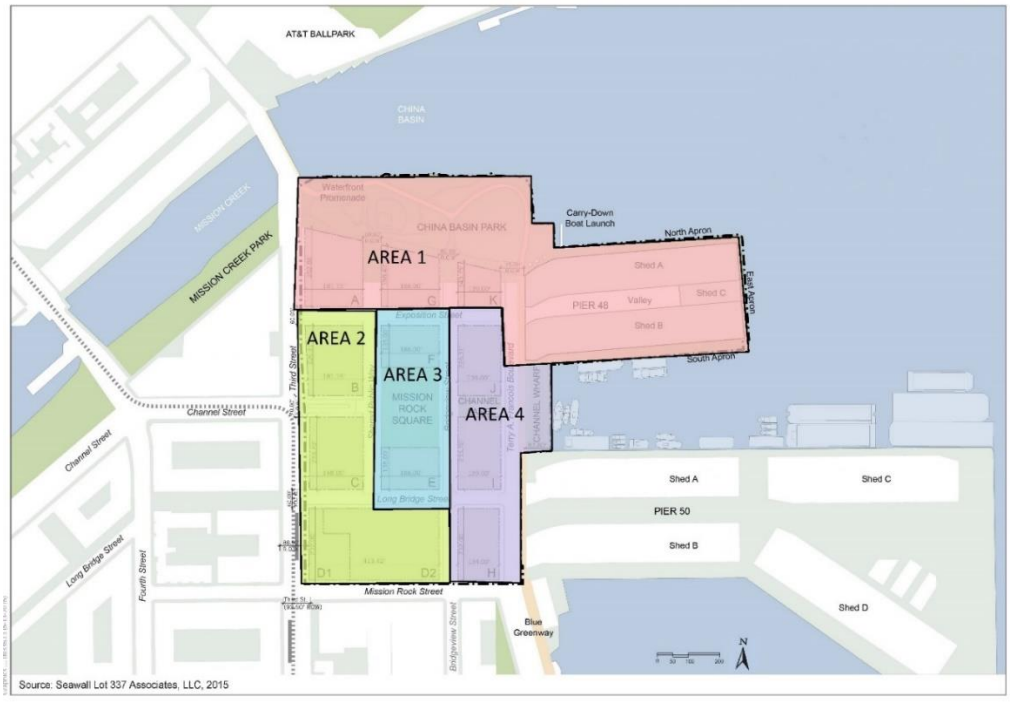


Image 2: Construction Phasing Zones

The wind tunnel study followed the standard methodology for studies in San Francisco however, additional studies were also conducted to evaluate the effect of including various building and landscaping modifications on wind conditions. These studies were done to test if these measures would reduce wind speeds associated with the proposed project. The extra measures included building massing modulations, windscreens, canopies and landscaping. Nine configurations were studied (Configurations A through I) this included the standard methodology Existing, Project and Cumulative configurations prescribed by the San Francisco Planning Code, as well as six additional configurations to assess the effectiveness of various

wind control design measures. The configurations are described in the following table they are depicted graphically in Figures 2a through 2i. Although not stated in the table below, the Existing configuration (Configuration A) included no existing onsite or offsite landscaping, in order to obtain a worst-case exposure baseline. For the same reason, existing onsite and offsite landscaping was also excluded from the project baseline (Configuration B, Existing plus Project) and all but two of the subse uent tests that assessed the effectiveness of the various wind control design measures (Configurations C through F existing offsite landscaping is included in Configurations G and I). Comparison between Configurations A through G provides information on the wind-related performance and wind control effectiveness of the project and wind control design measures.

CONFIGURATION		DESCRIPTION
A	Existing	Existing site and baseline surroundings.
B	Existing plus Project *(Buildings only)*	Proposed Mission Rock project buildings only and baseline surroundings. Initial building setbacks are identified in Image 3.
C	Existing plus Project with Increased Setbacks	Proposed Mission Rock project and baseline surroundings. Towers above the podium on Blocks A, C, D, F and G were re-positioned on the podium such that the minimum offset distance of the towers from the edges of the podiums was set to 15' (for buildings that could accommodate 15' between the tower and the edge of the podium without reducing the tower massing) Buildings to the east along Terry Francois Boulevard did not result in adverse wind conditions so increased setbacks were not applied to Blocks in this region. Building setbacks implemented in this configuration are identified in Image 4.
D	Existing plus Project with Increased Setbacks, Canopies and Windscreens	Proposed Mission Rock project and baseline surroundings, with increased tower setbacks as in Configuration C, canopies on Blocks A, D, F, G and K and wind screens in the China Basin Park and on the sidewalks between Blocks A, B, C and D (see Figure 2d for details)
E	Existing plus Project with Increased Setbacks, Canopies and Proposed Onsite Landscaping	Proposed Mission Rock project and baseline surroundings, with increased tower setbacks as in Configuration C, canopies on Blocks A, D and G and the proposed landscaping for the project site, including trees in the China Basin Park and between the proposed buildings (see Appendices A2 and A3 and Figure 2e for details). The trees were modelled at the locations and maximum of the height ranges for each species and area specified in Appendices A2 and A3.
F	Existing plus Project with Increased Setbacks and Proposed Onsite Landscaping	Proposed Mission Rock project and baseline surroundings, with increased tower setbacks as in Configuration C and the proposed landscaping for the project site as in Configuration E, (see Appendices A2 and A3 and Figure 2f for details).
G	Existing plus Project with Increased Setbacks, Proposed Onsite Landscaping and Additional Existing Offsite Landscaping	Proposed Mission Rock project and baseline surroundings, with increased tower setbacks as in Configuration C, the proposed landscaping for the project site as in Configuration E and the addition of existing offsite landscaping surrounding the development (north of Mission Bay Hotel, West of 3rd Street down adjacent roads, and south of the project site along Mission Rock and 3rd Street (see Appendix A4 and Figure 2g).

CONFIGURATION		DESCRIPTION
H	Project plus Cumulative *(Buildings only)*	Proposed Mission Rock project with initial building setbacks as previously tested in Configuration B (Image 3) and the addition of cumulative surroundings.
I	Project plus Cumulative with Increased Setbacks, Proposed Onsite Landscaping and Additional Existing Offsite Landscaping	Proposed Mission Rock project and cumulative surroundings, with increased tower setbacks as in Configuration C (Image 4), and landscaping as in Configuration G including the proposed landscaping for the development as well as existing street trees surrounding the development. (see Appendix A4 and Figure 2i)
Proposed onsite landscaping analyed in these configurations is part of the proposed Project. Additional existing offsite landscaping (3rd Street, Channel Street, Long Bridge Street, Mission Rock Street, the park north of Block 1), as shown in Appendix A4 and Figure 2g was modelled according to the existing off site conditions including appropriate tree heights, arrangements, and locations.		

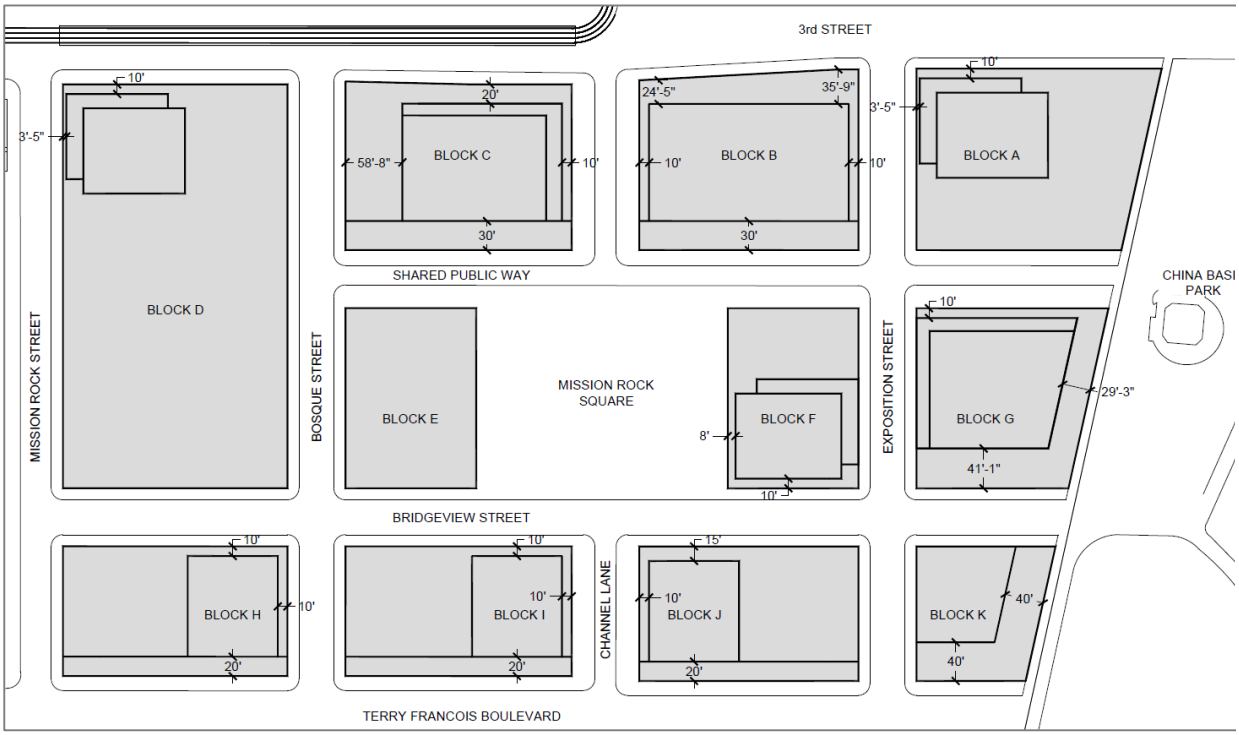


Image 3: Initial Project Setback Dimensions

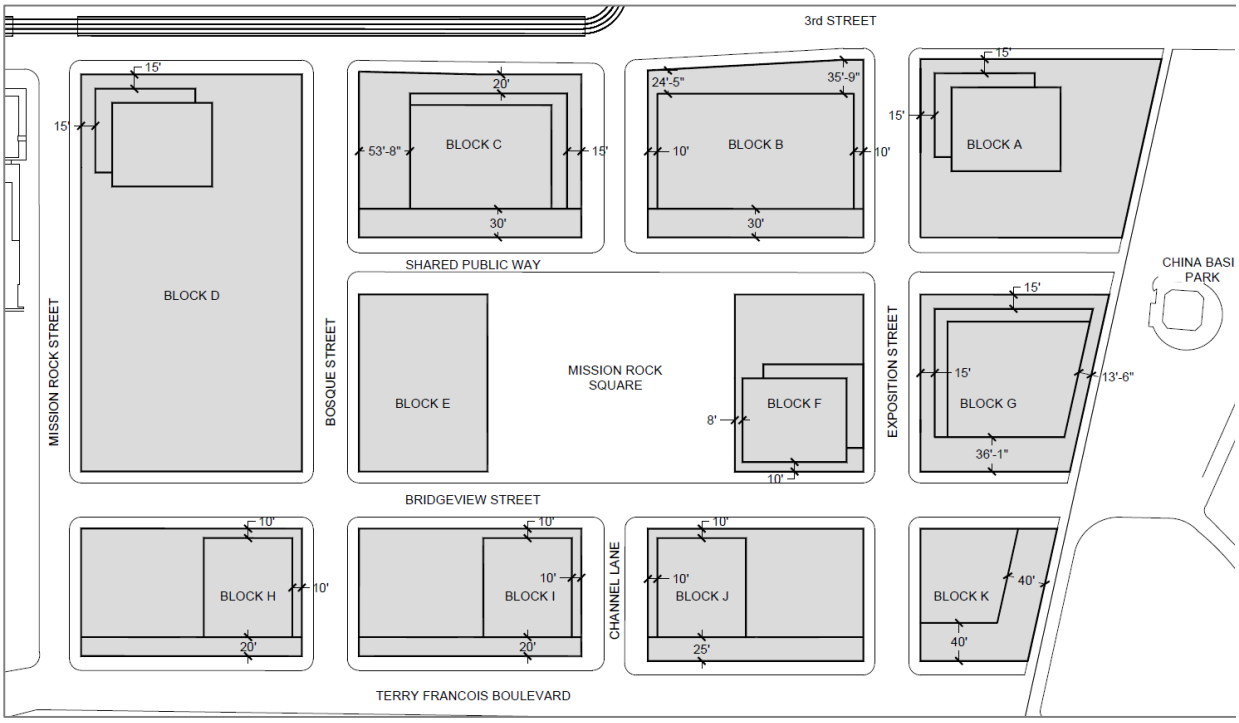


Image 4: Initial and Increased Project Setback Dimensions

2. PRINCIPAL RESULTS

The results of the tests are discussed in detail in Section 4 of this report. The following summarizes the information regarding hazard speed exceedances that identify significant impacts, Wind comfort was also analyzed for informational purposes and is discussed in Section 4.

Configuration		Number of Exceedance Locations	Hours/Year of Exceedance	Wind Speed Exceeded (mph) 1 Hour/Year
A	Existing	10	104	28
B	Existing plus Project (buildings only)	23 (5 existing, 18 new)	335	27
C	Existing plus Project with Increased Setbacks	25 (5 existing, 20 new)	352	27
D	Existing plus Project with Increased Setbacks, Canopies and Windscreens	16 (4 existing, 12 new)	419	27
E	Existing plus Project with Increased Setbacks, Canopies and Proposed Onsite Landscaping	7 (3 existing, 4 new)	147	21
F	Existing plus Project with Increased Setbacks and Proposed Onsite Landscaping	8 (3 existing, 5 new)	127	21
G	Existing plus Project with Increased Setbacks, Proposed Onsite Landscaping and Additional Existing Offsite Landscaping	5 (2 existing, 3 new)	67	20
H	Project plus Cumulative (buildings only)	29 (5 existing, 24 new)	517	27
I	Project plus Cumulative with Increased Setbacks, Proposed Onsite Landscaping and Additional Existing Offsite Landscaping	5 (2 existing, 3 new)	40	19

- The existing project site is generally windy due to its open surroundings and exposure to the prevailing westerly winds. Currently wind speeds exceed the ha□ard criterion at ten locations in the China Basin Park. It is the professional opinion of RWDI staff that the addition of any large massing on the project site, in isolation and without wind control design measures, to such an exposed and windy site is likely to result in increased exceedances of the wind ha□ard criteria set forth in Section 148.

- Ha□ard conditions would be expected to worsen overall with the addition of the proposed building development under the Existing plus Project (B) and Project plus Cumulative (H) configurations (23 and 29 ha□ard exceedances □e.g. wind speed increases of greater than 26 mph in a single hour of the year – see p. 11 for this discussion□, respectively) assuming setback conditions proposed by the project (identified in Image 2) and no other adaptive measures (including streetscape and public realm improvements, such as landscaping).

- The effect of wind control measures on improving the hazard wind conditions were studied through five wind control design measure configurations. These configurations included the proposed Project with various permutations and combinations of increased tower setbacks, canopies, wind screens and landscaping.

- The addition of increased tower setbacks (Configuration C) resulted in reduced wind speeds in areas adjacent to the modified setbacks, and increased wind speeds in areas exposed to winds redirected by the tower setbacks. Under this scenario, the number of locations with hazard exceedances is expected to be 25.

- The combination of increased tower setbacks with canopies and wind screens (Configuration D) would further reduce the number of hazard exceedance locations to 16. The combination of increased tower setbacks, canopies and proposed landscaping (Configuration E) would further reduce the number to seven (7) exceedance locations.

- The increased tower setbacks and the proposed landscaping plan as reflected in Appendix A2, A3, and A4 (Configuration F) would result in a total of eight (8) exceedance locations. In addition, with the additional landscaping (Appendix A4) in conjunction with the increased tower setbacks and proposed landscaping (Configuration G) the number of exceedance locations would be expected to reduce to five (5).

- Although increased setbacks may not have reduced overall wind speeds throughout various configurations, localized reductions to street side hazard exceedances are expected. Increased setbacks were therefore regarded as effective and modelled throughout Configurations C through G and I.

- Although not tested, it can be inferred by the limited area of influence of the increased setbacks tested in the majority of the configurations, that the benefits of the proposed onsite landscaping, canopies, screens and additional existing offsite landscaping would still apply even with the original setbacks (as proposed by the project).

- Overall, it was noted that the wind control design measures studied have a positive impact on wind conditions surrounding the project. The wind control design measures reduce wind speeds in localized areas around them therefore, the larger the area of coverage of these measures, the greater the wind reduction efficacy of the measures.

3. METHODOLOGY

3.1 Wind Tunnel Testing

As shown in Figures 1a through 1i, the 1:300 (1" = 25') scale wind tunnel model included the project site and all relevant surrounding buildings and topography within a 1200 foot radius of the study site. The mean speed profile and turbulence of the natural wind approaching the modelled area were simulated in RWDI's boundary-layer wind tunnel. The model was instrumented with 169 wind speed sensors to measure mean and gust wind speeds at a full-scale height of approximately 5 ft. The placement for wind measurement locations was based on wind consultant experience and understanding of pedestrian usage for this site, and was reviewed by ICF International and the City of San Francisco public agency staff prior to the wind tunnel tests. The project is proposing to rehabilitate and develop an essentially vacant parking lot site. At a master plan stage, a more detailed site design is expected in the future. The wind measurement locations were placed at strategic points on and around the project to capture potential wind accelerations caused by the buildings. This included building corners, narrow (pedestrian-oriented) streets between buildings, broad pedestrian-friendly public sidewalks and known pedestrian areas including the proposed Mission Rock S□uare and China Basin Park. Locations of these points and details of the nine test configurations can be seen in Figures 2a through 2i. Wind measurements at each of the 169 locations were recorded for the west-southwest, west, west-northwest and northwest wind directions, as re□uired by the San Francisco Planning Code.

3.2 Local Climate

Average wind speeds in San Francisco are the highest in the summer and lowest in winter. However, the strongest peak winds occur in winter. Throughout the year, the highest wind speeds occur in mid-afternoon and the lowest in the early morning. Westerly to northwesterly winds are the most fre□uent and strongest winds during all seasons. Of the primary wind directions, four have the greatest fre□uency of occurrence and also make up the majority of the strong winds that occur. These winds include the northwest, west-northwest, west and west-southwest. Data describing the speed, direction, and fre□uency of occurrence of winds were gathered at the old San Francisco Federal Building at 50 United Nations Pla□a (at a height of 132 ft.) during the six-year period, 1945 to 1950.

Currently, the site is predominantly a surface parking lot and is unoccupied by development. The surroundings in the directions of the prevailing winds are comprised of predominantly low rise buildings, unconstructed sites or open water bodies. As such, the site is exposed to the strong prevailing winds. When tall buildings are added to a windy site, buildings re-direct winds to ground level and there is the potential for increased, and even severe, wind activity at ground level depending on the building orientation and si□e. These details are discussed further in the following sections.

3.3 Planning Code Standard / Significance Threshold

This project is located outside the area that is subject to the San Francisco Planning Code Section 148, Reduction of Ground-level Wind Currents in C-3 Districts. The Planning Code specifically outlines wind reduction criteria for the C-3 District. However, these criteria can also and have been applied as a guideline to nearby areas such as the Mission Rock site. This analysis was performed using the wind testing analysis and evaluation methodology consistent with the Planning Code Section 148 criteria (see Appendix B). The current study pertains to the masterplan development of the Mission Rock project. It is anticipated that the Mission Rock project wind hazard conditions would be evaluated on a district-wide basis. Once the designs of the individual blocks or buildings are refined on a block-by-block basis, additional wind evaluation, including quantification of future wind speeds taking into account the specific building designs as reflected in the draft Design Controls (Section 6: Building Form) would be undertaken and evaluated against the criteria in the Planning Code (Appendix B).

The Planning Code establishes pedestrian comfort and hazard criteria. The comfort criteria are that wind speeds will not exceed, more than 10% of the time year round, between 7:00 a.m. and 6:00 p.m., 11 mph in substantial pedestrian use areas, and 7 mph in public seating areas. The comfort criteria are used for informational purposes only, not to identify significant impacts, whereas the hazard criterion of the Code is of main concern with respect to significant impact determination for the Environmental Impact Report (EIR). The hazard criterion requires that the development not cause equivalent wind speeds to exceed the hazard level of 26 mph as averaged for a single full hour of the year.

The comfort criteria are based on wind speeds that are measured for one minute and averaged. In contrast, the hazard criterion is based on winds that are measured for one hour and averaged. However, the wind speeds reported directly from available meteorological data have much shorter averaging periods, of about one minute, so the speed must be adjusted to correct for the difference between the one-hour and the one-minute averaging time. When adjusted to a one-minute averaging period, the hazard criterion speed is a one-minute average of 36 mph, [2] The Planning Code defines these wind speeds in terms of equivalent wind speeds, and average wind speed (mean velocity), adjusted to include the level of gustiness and turbulence.

The equivalent wind speeds were calculated according to the specifications in the San Francisco Planning Code Section 148, whereby the mean hourly wind speed is increased when the turbulence intensity is greater than 15% according to the following formula:

$$\boldsymbol{EWS} = \boldsymbol{V_m} \times (\mathbf{2} \times \boldsymbol{TI} + \mathbf{0.7})$$

where $\boldsymbol{EWS}$ = equivalent wind speed
$\boldsymbol{V_m}$ = mean pedestrian-level wind speed
$\boldsymbol{TI}$ = turbulence intensity

[2] Arens, E., et. al., "Developing the San Francisco Wind Ordinance and Its Guidelines for Compliance," *Building and Environment* 24:4, 297-303 1989.

4. TEST RESULTS

4.1 Background

The addition of project-related buildings to a site is likely to result in a reduction in wind speeds on the leeward side of buildings (east side in this case) as the buildings would shelter the leeward side from winds. On the windward side, buildings intercept, deflect and redirect winds and result in increased wind activity. The following is a discussion of these generalized wind phenomenon:

- Tall buildings tend to intercept the stronger winds at higher elevations and redirect them to the ground level (see Image 5). Such a *Downwashing Flow* is often the main cause for wind accelerations around large buildings at the pedestrian level.

- When oblique winds are deflected down by a building, a localized increase in the wind activity can be expected around the downwind building corner at pedestrian level (see Image 6).

- 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 (see Image 7).

If these building-wind combinations occur for prevailing wind directions, and in an already windy area like the Mission Bay area, there is a greater potential for increased wind activity.

Design details like 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. can help reduce wind speeds to a large extent (Images 8 and 9). 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.

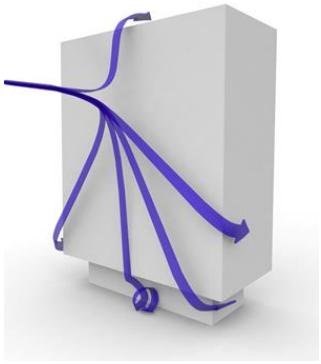


Image 5: Downwashing Flow

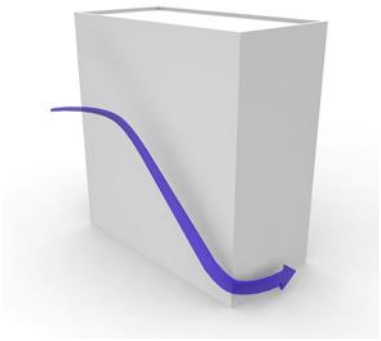


Image 6: Corner Acceleration

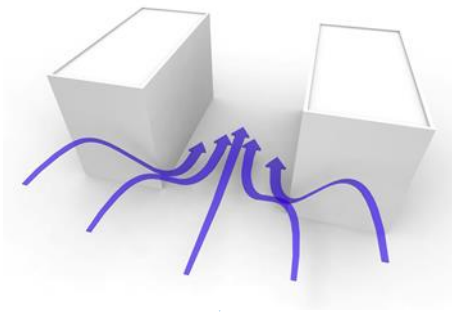


Image 7: Channelling Effect

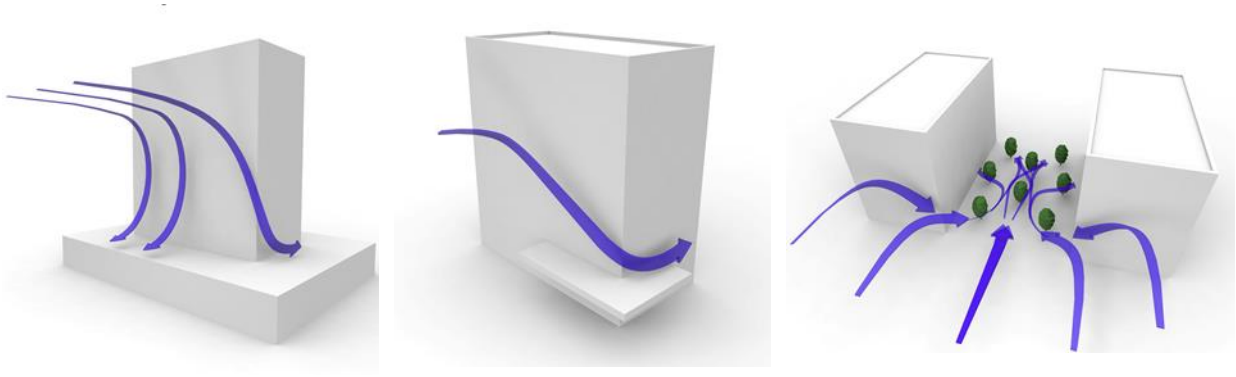


Image 8: Podium Tower Setbacks and Canopies Reduce Impact of Downwashing at Ground Level

Image 9: Landscaping Reduces Vertical and Horizontal Wind Accelerations

4.2 Discussion of Results

This section presents the results of the wind tunnel measurements analyzed in terms of equivalent wind speeds as defined by the equation in Section 3.3. The text of the report simply refers to the data as wind speeds.

Wind speeds calculated according to the hazard criterion defined in Section 148 of the Planning Code (one-minute wind speed of 36 mph, See Section 3.3) are applicable towards the significant wind impact analysis required by CEQA and presented in the Draft EIR for the proposed project. These results at each wind measurement location are graphically depicted on a site plan in Figures 2a through 2i for each of the nine (9) configurations tested. The corresponding numerical data are presented in Tables 1.1 and 1.2, wherein the predicted wind speeds corresponding to an exceedance of one hour per year are listed. Tables 1.1 and 1.2 also list the predicted number of hours per year that the hazard criterion (one-minute wind speed of 36 mph) is exceeded and a letter “e” in the last column of each configuration indicates a wind hazard exceedance.

Although not applicable towards determining significant wind impacts for purposes of CEQA, wind comfort speeds have also been calculated in accordance with the comfort criterion of 11 mph at 10 exceedance for informational purposes. These results are presented in Figures 3a through 3i, for the nine (9) tested configurations. Locations have been colour-coded according to the criteria satisfied based on the 7 mph and 11 mph categories explained in the Planning Code (Appendix B). Tables 2.1 and 2.2 present the equivalent wind speeds as well as the percentage of time that the wind speeds exceed 11 mph. The point is marked as a comfort exceedance if the applicable threshold of 11 mph is exceeded. A letter “e” in the last column of each configuration indicates a wind comfort exceedance in Figures 3a through 3j.

A. Existing

Hazard

Of the 169 locations tested for the Existing Configuration, 10 locations currently exceed the hazard criterion at Locations 1 through 3 and 6 through 12, as shown in Figure 2a and Table 1.1, for a total of 104 hours per year. These locations occur in the northwest portion of the project site, on the western side of the existing China Basin Park. For all 169 locations tested, the average wind speed which is exceeded for 1 hour per year is 28 mph.

Comfort

For the Existing Configuration, the average measured 90th percentile equivalent wind speed for the 169 test locations is approximately 15 mph. Most of the existing site, due to its vacancy, experiences windy conditions (Figure 3a and Table 2.1). Wind speeds at 163 test locations (out of 169) exceed the Planning Code's pedestrian-comfort criterion of 11 mph. Winds currently exceed the applicable criterion 25% of the time.

The results for the existing site show that the project area exceeds the hazard criterion and the area is windy in general due to it being a predominantly empty surface parking lot and due to its exposure to the prevailing westerly winds.

B. Existing plus Project (Buildings Only)

Compared to the Existing configuration, in the Existing plus Project *(Buildings Only)* configuration, the addition of the proposed buildings is expected to improve wind conditions in the interior of the development complex (on sidewalks between buildings) and on the downwind (east) side along Terry Francois Boulevard (see Tables 1.1 and 2.1). An increase in wind speeds is anticipated on the upwind (west) side of the development along 3rd Street and China Basin Park, particularly near building corners as presented in Tables 1.1 and 2.1 and Figures 2b and 3b. The dimensions of the initial building setbacks included in the proposed project are depicted in Image 2.

Hazard

The addition of the proposed project is expected to eliminate five (5) of the 10 existing hazard exceedances; however, it would also create 18 new hazard locations around the exposed windward side of buildings on Blocks A, B, C, D, F, G and K (Figure 2b). A total of 23 hazard exceedances are expected for the Existing plus Project configuration (Configuration B) of which seven (7) are off-site on the west side of 3rd Street (Location 32), east side of Terry Francois Boulevard (Location 164) and near the Public Safety Building to the south on 3rd Street and Mission Rock Street. These additional hazard exceedances are the result of common wind flow patterns such as downwashing, corner accelerations and channeling flows that typically occur with the addition of building mass to an exposed site (Images 1 through 3). These locations represent the windiest areas on and around the proposed project within the Existing plus Project (*Buildings Only*) configuration (Configuration B).

Although increased wind activity is expected in the above-mentioned exposed areas (335 hours of exceedance per year, or 231 hours more than the current 104 hours of exceedance in the Existing configuration), a decrease in wind speeds can be expected in the interior of the project site between the proposed buildings (see Table 1.1). The overall "redistribution" of wind speeds on and around the proposed site would result in an average hazard wind speed of 27 mph (under Configuration B), which is slightly lower than the average speed of 28 mph in the Existing configuration (Configuration A), but this would occur more than three times as many hours as under the Existing configuration.

Comfort

Wind speeds calculated at 10% exceedance are expected to average at 14 mph, with winds at 111 of the 169 locations tested exceeding the 11 mph criterion. Winds would exceed the applicable criterion 20% of the time. This is an improvement compared to the 15 mph average wind speed and 163 exceedances 25% of the time in the Existing configuration (Configuration A).

C. Existing plus Project with Increased Setbacks

In this configuration, the towers above the podium on Blocks A, C, D, F and G were set back further on the podium such that the offset distance of the tower from the edges of the podiums was set as close to 15 feet as feasible (the dimensions of these increased setbacks are shown in Image 3). The blocks to be modified were chosen due to their large windward facing facades, relatively narrower initial setbacks (Image 2) and wind consultant assessment of wind flow patterns in the area. Due to the height of the towers along the windward side (west) of the proposed project, the increased offset had minimal impact on the wind conditions.

Hazard

The hazard results are presented in Figure 2c and Table 1.1. The adjustments to the tower locations on the podiums resulted in an average hazard wind speed of 27 mph, similar to the Existing plus Project configuration without this wind control design measure (Configuration B). Compared to the Existing plus Project (*Buildings Only)* configuration, two (2) hazard locations would be eliminated on 3rd Street (Locations 32 and 46) and four (4) additional hazard locations would be generated in the China Basin Park (Locations 4 and 5) and near Blocks C (Location 55) and G (Location 20). Thus, the total number of hazard locations in this configuration would be 25, compared to 23 in the Existing plus Project (*Buildings Only)* configuration (Configuration B) and 10 in the Existing configuration (Configuration A). There would be 352 hours of exceedance per year, compared to 335 hours in the Existing plus Project (*Buildings Only)* configuration (Configuration B) and 104 hours in the Existing configuration (Configuration A). The new hazard exceedance locations generated would be due to the redirection of winds by the modified building massing. This is a common occurrence around buildings, and it occurs in an area where existing wind speeds at several locations are already close to the hazard speed threshold (see Table 1.1). This would result in a slight increase in wind speeds and in an exceedance of the hazard criterion.

Comfort

The comfort results are presented in Figure 3c and Table 2.1. Wind speeds are expected to average at 13 mph, with winds at 109 of the 169 locations tested exceeding the 11 mph criterion. Winds would exceed the applicable criterion 20□ of the time. This is an improvement compared to the 15 mph average wind speed and 163 exceedances 25□ of the time in the Existing configuration (Configuration A).

D. Existing plus Project with Increased Setbacks, Canopies and Windscreens

This configuration presents the Existing plus Project configuration including the towers setback as in Improvement Measure 1 (configuration C) with the addition of canopies on Blocks A, D, F, G and K and wind screens in the China Basin Park and on the sidewalks between Blocks A, B, C and D. The locations and details of these features are shown in Figures 2d and 3d. The canopies and wind screens were placed above or upwind of locations of ha□ard exceedance found in Configuration C with the intent of trying to reduce those ha□ard exceedances. They were placed within the limitations of the site boundaries.

Hazard

The average ha□ard wind speed is expected to remain at 27 mph as in the previous Existing plus Project *(Buildings Only)* and Existing plus Project with Increased Setback configurations (Configurations B and C respectively), but the number of exceedances is predicted to reduce to 16, compared to 23 in the Existing plus Project *(Buildings Only)* configuration (Configuration B) and 25 with Existing plus Project with Increased Setbacks configuration (Configuration C), a net reduction of 7 locations as compared to Configuration B. The number of exceedances would still be higher than in the Existing configuration (Configuration A), which is 10. There would be 419 hours of exceedance per year, compared to 335 hours in the Existing plus Project *(Buildings Only)* configuration (Configuration B) and 104 hours in the Existing configuration (Configuration A). Compared to the Existing configuration, including increased setbacks, canopies and windscreens would eliminate six (6) of the 10 existing ha□ard locations, but would add 12 new exceedance locations to the northeast of the project, in the north half of the project on the proposed Exposition Street and Bridgeview Street, China Basin Park and 3rd Street, as well as around the Public Safety Building to the south. Canopies and wind screens could help reduce the energy in wind gusts and thus eliminate the ha□ard locations locally around them. Compared to the Existing plus Project with Increased Setbacks configuration (Configuration C), nine (9) ha□ard exceedance locations would be eliminated by incorporating increased setbacks, canopies and windscreens (Locations 4, 5, 6, 20, 29, 50, 55, 61 and 168 in Figure 2c and 2d and Table 1.1).

Comfort

The depths of the canopies are limited by the design guidelines developed for the proposed project. As such, the canopies considered are anticipated to modify winds in areas close to them. While minor reductions in wind speeds were seen at some locations close to the canopies, minor increases in wind speeds were seen at other locations due to winds being redirected by the solid canopies (See Table 2.1). Average wind speed is predicted to be 13 mph, similar to Configuration C (Increased Setbacks), with winds at 107 of 169 tested locations exceeding the 11 mph criterion, compared to 109 in Configuration C (Figure

3d). Winds would exceed the applicable criterion 18□ of the time. These numbers are lower than the 15 mph average speed and 163 exceedances 25□ of the time reported for the Existing configuration.

E. Existing plus Project with Increased Setbacks, Canopies, and Proposed Onsite Landscaping

Configuration E *(Increased Setbacks, Canopies and Proposed Onsite Landscaping)* included the proposed project with increased tower setbacks and canopies on Blocks A, D and G as in Configuration D and the proposed landscaping for the project site, including trees in the China Basin Park and between the proposed buildings (see Appendices A2 and A3 and Figures 2e and 3e for details). The trees were modelled at the locations and to the maximum height range for each species (at full maturity) in the area specified in Appendices A2 and A3. Even at the minimum height specified in Appendices A2 and A3, the tree canopies are still significantly higher than average pedestrian height and therefore, they will be effective in reducing wind impacts around them, including wind impacts at the ground level. The addition of landscaping is expected to result in a substantial reduction in wind activity on and around the proposed project.

Hazard

The implementation of the proposed landscaping is expected to eliminate seven (7) of the 10 wind ha□ard locations that exist under the Existing configuration (Configuration A) and add four (4) new ha□ard exceedance locations. Thus wind speeds are expected to exceed the ha□ard criterion at a total of seven (7) locations out of the 169 tested (Figure 2e), with an average ha□ard wind speed of 21 mph. Wind control design measures in this configuration (increased setbacks, canopies and proposed onsite landscaping) would eliminate 16 wind ha□ard locations out of 23 reported in the Existing plus Project (*Buildings Only*) configuration (Configuration B). The results depict an improvement in wind conditions compared to the Existing configuration (Configuration A) with 10 exceedance locations and average ha□ard speed of 28 mph, as well as compared to Configurations B, C, and D (Table 1.1). There would be 147 hours of exceedance per year, compared to 335 hours in the Existing plus Project *(Buildings Only)* configuration (Configuration B) and 104 hours in the Existing configuration (Configuration A). Locations where ha□ard exceedances are expected are in exposed areas at the northwest portion of the project site (Locations 1, 2 and 9, which are upwind of the proposed buildings and also occur under Existing conditions) and to the south of the project on 3rd and Mission Rock Streets (Locations 68, 70, 72 and 74) (see Figure 2e and Table 1.1).

Comfort

Wind speeds which exceed the 11 mph criterion for 10□ (or more) of the time annually are expected to occur at 65 locations (out of 169 locations tested), with an average wind speed of 11 mph (Figure 3e and Table 2.1). Winds would exceed the applicable criterion 12□ of the time. This is a substantial improvement compared to the Existing configuration (Configuration A) with 163 exceedances and 15 mph average wind speed.

F. Existing plus Project with Increased Setbacks and Proposed Onsite Landscaping

Existing plus Project with *Increased Setbacks and Proposed Landscaping* included the proposed project with the increased tower setbacks similar to those included in Configurations C, D, and E and the proposed onsite landscaping for the project site (similar to Configuration E) however, did not include the proposed canopies tested in Configurations D and E (see Appendices A2 and A3 and Figures 2f and 3f for details). Similar to Configuration E, wind activity on and around the project is expected to be reduced.

Hazard

The implementation of this configuration, i.e., increased tower setbacks consistent with draft Design Controls and the proposed landscaping plan is expected to eliminate seven (7) of the 10 wind hazard locations reported for the Existing configuration (Configuration A), but would generate five (5) new hazard locations. The wind control design measures in Configuration F would eliminate 15 wind hazard locations out of 23 reported in the Existing plus Project (*Buildings Only*) configuration (Configuration B). Winds are expected to exceed the hazard criterion at a total of eight (8) locations out of the 169 tested (Figure 2f), three of which (Locations 1, 2 and 9) currently exceed the hazard criterion under Existing conditions (Configuration A). Other hazard exceedances would be on the proposed Exposition Street north of Block B (Location 49), and to the south of the project on 3rd and Mission Rock Streets (Locations 68, 70, 72 and 74) (see Figure 2f and Table 1.2). The average hazard wind speed is predicted to be 21 mph (Table 1.2). There would be 127 hours of exceedance per year, compared to 335 hours in the Existing plus Project *(Buildings Only)* configuration (Configuration B) and 104 hours in the Existing configuration (Configuration A). The results depict an overall improvement in wind conditions compared to the Existing configuration with 10 exceedance locations and average hazard speed of 28 mph, as well as all previous Existing plus Project configurations without and with wind control design measures (Table 1.1 and 1.2).

Comfort

Wind speeds which exceed the 11 mph criterion for 10 (or more) of the time annually are expected to occur at 67 locations (out of 169 locations tested), with an average wind speed of 11 mph (Figure 3f and Table 2.2). Winds would exceed the applicable criterion 12 of the time. This is a substantial improvement compared to the Existing configuration (Configuration A) with 163 exceedances 25 of the time and 15 mph average wind speed, and similar to the results from Configuration E.

G. Existing plus Project with Increased Setback, Proposed Onsite Landscaping and Additional Existing Offsite Landscaping

This configuration includes the addition of the increased tower setbacks similar to what was tested in Configurations C, D, E and F, the detailed proposed onsite landscaping plan (similar to what was tested in Configurations E and F), and additional existing offsite landscaping surrounding the development site (see Appendix A4 and Figures 2g and 3g). The existing offsite landscaping to the west of the project slows winds approaching from the westerly and northwest directions approaching along Mission Rock, Long Bridge and Channel Streets and the park to the north of Block 1.

Hazard

When the additional existing offsite landscaping is taken into account, the previous eight (8) hazard exceedances under Configuration F are expected to be reduced to five (5) hazard exceedances with the elimination of three (3) hazard exceedances (Locations 9 (northwest corner of Block A), 68 and 70 (to the south of the project site along 3rd Street)). Similarly, the total hours per year when wind speeds would exceed the hazard criterion is expected to be reduced from 127 (under Configuration F) to 67 with the additional existing offsite landscaping.

Compared to the Existing configuration (Configuration A), this configuration is expected to eliminate eight (8) hazard locations and add three (3) new exceedance locations. Configuration G eliminates 18 wind hazard locations out of 23 reported in the Existing plus Project (*Buildings Only*) configuration (Configuration B). The result is a total of five (5) of 169 locations where wind speeds would exceed the hazard criterion, compared to 10 in the Existing configuration (Configuration A) (see Figure 2g and Table 1.2). Of these five exceedances, two are in the northwestern corner of China Basin Park near Lefty O'Doul Bridge (Locations 1 and 2), both of which currently exceed the hazard criterion under Existing conditions (Configuration A). The average hazard wind speed is predicted to be further reduced to 20 mph (Table 1.2), compared to 28 mph under Existing conditions. Wind speeds at Location 2 would improve, although it would continue to exceed the hazard criterion, and at Location 1 would slightly worsen. Of the other three exceedance locations, two would be along Mission Rock Street near the corner at Third Street (Locations 72 and 74) and one would be on the proposed Exposition Street between Third Street and the proposed Shared Public Way (Location 49). There would be 67 hours of exceedance per year, a reduction compared to 335 hours in the Existing plus Project configuration (Configuration B) and 104 hours in the Existing configuration (Configuration A). On balance, the wind hazard exceedances on the project site would be improved overall compared to the Existing as well as Existing plus Project configuration.

Comfort

The average 90th percentile wind speed is predicted to be 10 mph and wind speeds at 57 locations (out of 169 tested) are expected to exceed the 11 mph criterion (Figure 3g and Table 2.2). Winds would exceed the applicable criterion 10 of the time. These are the lowest results compared to all massing and wind control design measure configurations studied, including the Existing configuration (Configuration A).

H. Project plus Cumulative (*Buildings Only*)

This configuration represents the wind impact of the proposed project in the presence of all existing and baseline buildings and proposed future buildings in the surrounding off-site area (Blocks 3E, 4E, 9 and 9A), without improvement measures. This configuration set up is similar to the Existing plus Project *(Buildings Only)* configuration, but contains cumulative buildings.

Hazard

The addition of cumulative buildings, and thereby densification of areas to the southwest of the project site, would cause the northwesterly and westerly winds to be redirected to the more open areas along Mission Rock Street from time to time. Similar to the Existing plus Project *(Building Only)* configuration (Configuration B), five (5) of the 10 existing hazard exceedances would be eliminated. However, 24 new hazard locations would be generated, primarily around the exposed buildings on Blocks A, B, C, D, F, G and K and the China Basin Park (Figure 2h and Table 1.2). A total of 29 hazard exceedances are expected for this configuration. Average hazard wind speed at 1 hr per year exceedance is predicted to be 27 mph, which is the same as in the Existing plus Project (*Buildings Only*) configuration (Configuration B) and 1 mph lower than that in the Existing configuration (Configuration A). There would be 517 hours of exceedance per year, compared to 335 hours in the Existing plus Project *(Buildings Only)* configuration (Configuration B) and 104 hours in the Existing configuration (Configuration A).

Comfort

In this configuration, results are expected to be similar to the Existing plus Project *(Buildings Only)* configuration (Configuration B). Wind speeds are expected to exceed the 11 mph criterion at 113 of 169 locations with wind speeds averaging at 14 mph, compared to 163 locations and 15 mph average speed in the Existing configuration (Configuration A) (see Figure 3h and Table 2.2). Winds would exceed the applicable criterion 20% of the time, compared to 25% of the time under the Existing configuration.

I. Project plus Cumulative with Increased Setbacks, Proposed Onsite Landscaping and Additional Existing Offsite Landscaping

This configuration represents cumulative buildings added to the Existing plus Project with Increased Setbacks, Proposed Onsite Landscaping and Additional Existing Offsite Landscaping configuration.

Hazard

The addition of cumulative buildings is predicted to result in similar conditions as presented in Configuration G. Wind speeds are expected to exceed the hazard criterion at five (5) of 169 locations compared to 10 in the Existing configuration (Configuration A), 23 in the Existing plus Project (*Buildings Only*) configuration (Configuration B) and 29 in the Project plus Cumulative (*Buildings Only*) configuration (Configuration H) (see Figure 2i and Table 1.2). The five locations were reported as wind hazard locations in the Existing plus Project (*Buildings Only*) and Project plus Cumulative (*Buildings Only*) configurations (Configurations B and H, respectively). Of these five exceedances, two are in the northwestern corner of China Basin Park near Lefty O'Doul Bridge (Locations 1 and 2), both of which currently exceed the hazard criterion under Existing conditions (Configuration A). Of the other three locations, two would be along Mission Rock Street near the corner at Third Street (Locations 72 and 74) and one would be on the proposed Exposition Street between Third Street and the proposed Shared Public Way (Location 49). Average wind speed at 1 hr per year exceedance is predicted to be 19 mph, which is 9 mph lower than that in the Existing configuration (28 mph) (Configuration A). There would be 40 hours of exceedance per year, compared to 517 hours in the Project plus Cumulative configuration (Configuration H) and 104 hours in the Existing configuration (Configuration

A). On balance, the wind hazard exceedances on the project site would be improved overall compared to the Existing, Existing plus Project (*Buildings Only*) and Project plus Cumulative (*Buildings Only*) configurations.

Comfort

The average wind speed is predicted to be 10 mph and speeds at 50 locations (out of 169) are expected to exceed the 11 mph criterion (Figure 3i and Table 2.2). Winds would exceed the applicable criterion 9% of the time. This is an improvement compared to the Existing configuration (15 mph and 163 exceedances) and all other configurations.

4.3 Conclusions and Recommendations

In addition to the standard test methodology prescribed by the Planning Code, several different configuration options were studied, including increased tower setbacks, and the addition of canopies, wind screens and landscaping as discussed and agreed with the project team. Massing changes, canopies and wind screens are measures that are included within the draft Design Control Guidelines. All of the wind control design measures tested brought about varying levels of improvements in different areas around the site. However, at a master plan level, it was the addition of landscaping that brought about the most substantial reduction.

The Existing configuration (Configuration A) included no existing landscaping, either offsite or onsite, in order to obtain a worst-case exposure baseline. For the same reason, existing landscaping was excluded from the project baseline (Configuration B) and all subsequent tests that assessed the effectiveness of the various wind control design measures (Configurations C through F). Comparison between Configurations A through F provides adequate information on the wind-related performance and wind control effectiveness of the project and wind control design measures.

Existing street trees and park landscaping are present in the vicinity of the Block 1 development and the streets to the west of the project. Landscaping typically impacts winds locally around it - the larger the tree crown and canopy, the greater the area of influence. Tall, slender palm trees have little to no impact on local winds speeds at ground level because of the height of the foliage above ground. The shorter street trees that exist around the project are spaced about 20 feet apart – they help reduce winds around them but their influence on conditions farther away is limited. Existing offsite landscaping was included in Configuration G (Existing plus Project with Increased Setbacks, Proposed Onsite Landscaping, and Additional Existing Offsite Landscaping) to understand if they would complement the wind-reduction impact of the proposed landscaping on site. It was confirmed that the existing offsite landscaping does reduce winds around them – however, with regards to conditions on the project site, its influence was found to be limited to the intersection of 3rd Street with the streets on which the existing trees are present (Channel Street, Long Bridge Street, Mission Rock Street the park north of Block 1). In the absence of the proposed Mission Rock buildings, it is expected that the offsite landscaping would have a similar limited impact on the same intersections. As such, an Existing test scenario with existing offsite landscaping present would possibly show a reduction in the severity of the hazard locations as tested in Configuration A.

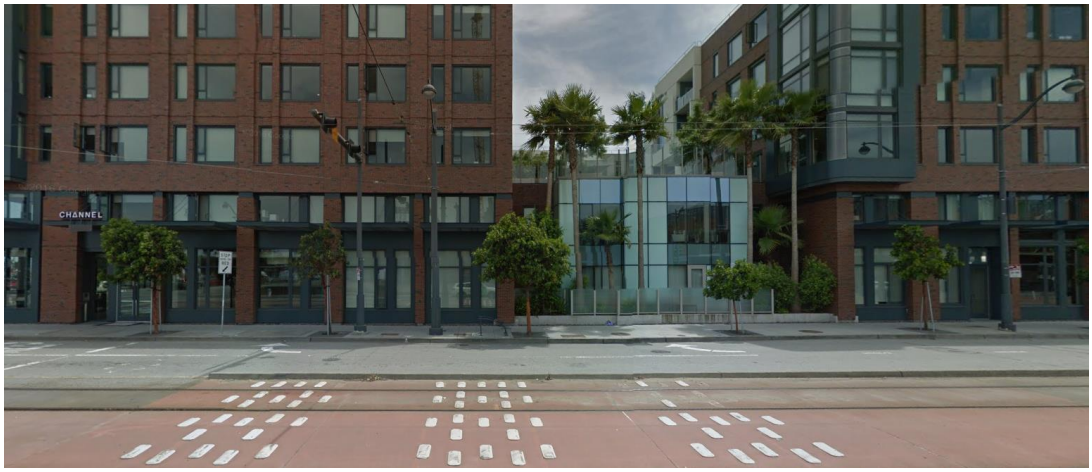


Image 10: Existing Street Trees on Channel Street

Only two of the Project configurations were studied in the presence of cumulative buildings – Project plus Cumulative (*Buildings Only*) (Configuration H) and Project plus Cumulative with Increased Setbacks, Proposed Onsite Landscaping and Additional Existing Offsite Landscaping (Configuration I) – the former representing the highest exposure to the prevailing winds and the latter representing the least. It could be inferred that the addition of the cumulative buildings, in the absence of landscaping (Configuration H – Project plus Cumulative (*Buildings Only*)), would cause an increase in the number of ha□ard locations in China Basin Park and on Channel Street (Figure 2h) compared to the Existing plus Project *(Buildings Only)* configuration (Figure 2b). This is the result of winds which would have otherwise affected the open spaces where the cumulative buildings are located, being redirected to the next largest open space (China Basin Park). For the majority of the additional ha□ard exceedances created in China Basin Park in the cumulative build scenario, increases were minimal□however, they were large enough to marginally exceed the ha□ard criteria. Due to the presence of proposed onsite and existing offsite landscaping (Configuration I), a large area of China Basin Park is protected from the prevailing winds. The impact of the cumulative buildings would be substantially negated by the more locali□ed sheltering afforded by landscaping, and therefore the number of ha□ard exceedances in Configuration I is anticipated to be the same as in Configuration G (five locations, see Figures 3g and 3i). All other Existing plus Project configurations with the addition of cumulative buildings would generate wind results that would be similar to one of the two tested cumulative configurations and their corresponding Project configurations, depending on the presence or absence of landscaping.

It is anticipated that the Mission Rock project wind hazard conditions would be evaluated on a District-wide basis again, as individual buildings are designed, with the model updated to reflect the design of approved buildings. Individual building designs could incorporate design elements consistent with the proposed Mission Rock Special Use District and Design Controls to achieve the most effective feasible reduction in wind hazards consistent with results of this study, in addition to proposing specific site landscaping features. The proposed Mission Rock Special Use District and/or Design Controls identify measures that could be considered in building and individual site design to address wind hazards:

- Large scale measures like tower re-shaping and refinement – rounded, re-entrant or chamfered building corners are more aerodynamic than sharp 90-degree corners, in that the modified corner profiles disrupts wind acceleration at building corners.

- Stepped facades – vertical steps in the massing to help disrupt downwashing flows.

- Localized wind screens or street art that slows winds along sidewalks and protects places where pedestrians are expected to gather or linger.

- Installation of wind-tolerant trees and modifications to the landscaping as the design of frequent pedestrian use areas adjacent to buildings are refined.

- Covered walkways or colonnades that would provide a sheltered area for pedestrians to walk.

- Staggered arrangement of balcony slabs that project out of the main tower facade – a uniform arrangement of balconies is ineffective against strong winds as the balconies get pressurized and the uniform pockets of air would in effect behave like a solid wall. A staggered arrangement would be more beneficial in disrupting vertical wind flows along tower facades.

Examples of the features listed are provided in Images 11 and 12.

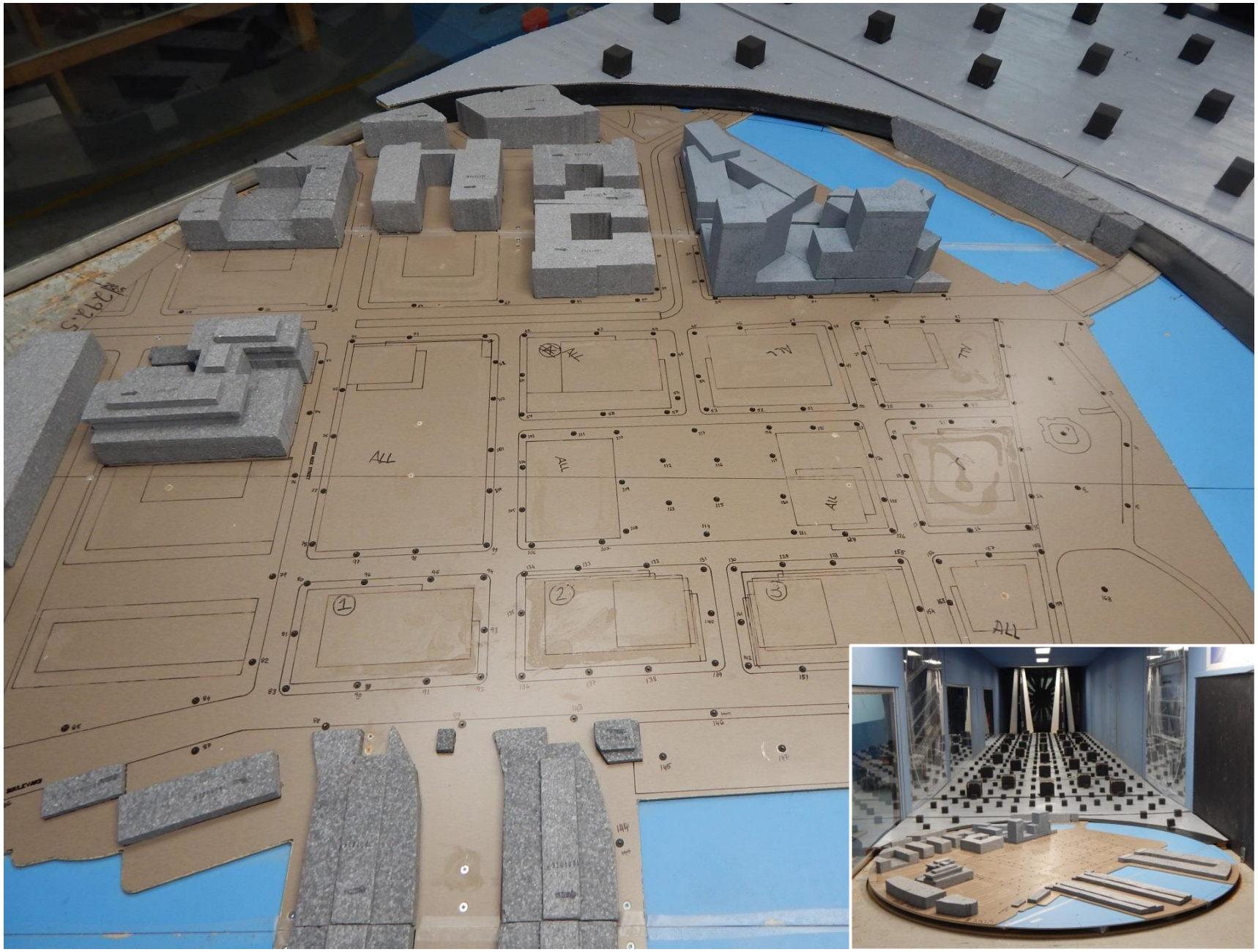
Image 11: Examples of Stepped facades and Modified Building Corners

Image 12: Examples of Walkways Sheltered by a Canopy, Overhang or Street Art

5. APPLICABILITY OF RESULTS

The results presented in this report pertain to the model of the proposed Mission Rock Development constructed using the architectural design drawings listed in Appendix A. Should there be design changes that deviate from this list of drawings, the results presented may change. Therefore, if substantial changes in the design are made prior to completion of the EIR, it is recommended that RWDI be contacted and requested to review their potential effects on wind conditions.

FIGURES



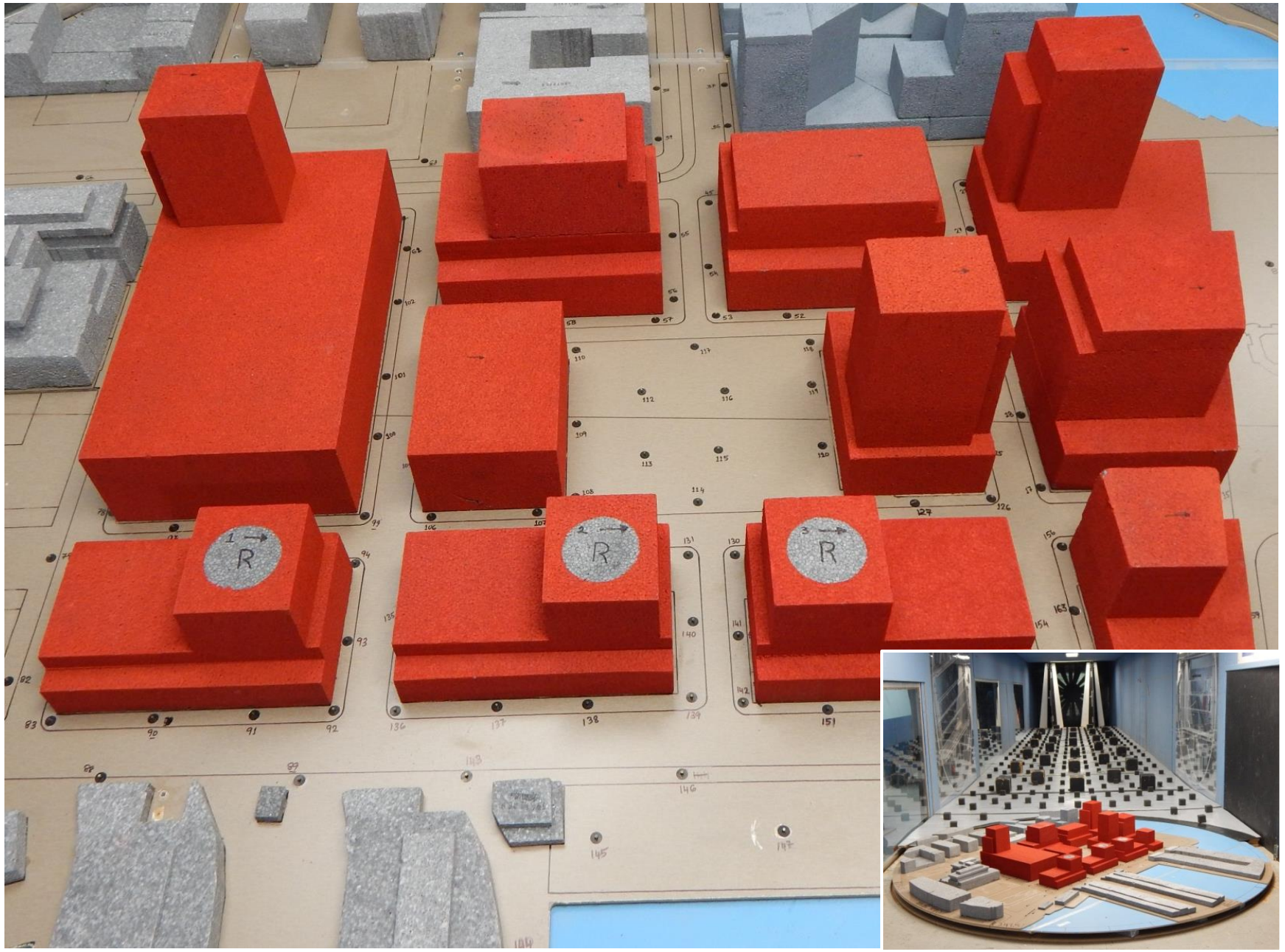
Wind Tunnel Study Model
Existing

Figure No. 1a

Mission Rock – San Francisco, California

Project #1301926

Date: Jan. 25 2017



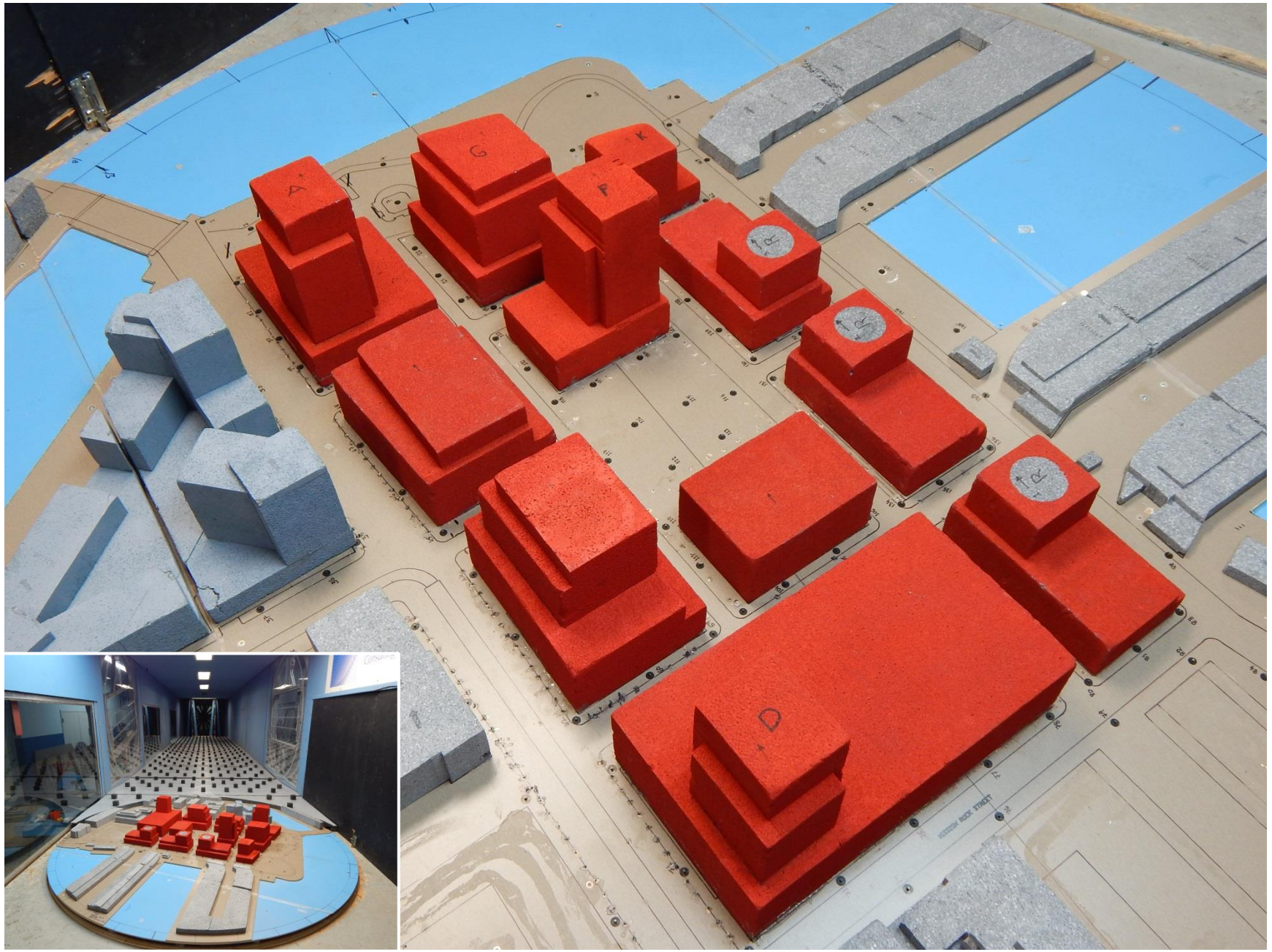
Wind Tunnel Study Model
Existing plus Project *(Buildings Only)*

Mission Rock – San Francisco, California

Project #1301926

Figure No. 1b

Date: Jan. 25 2017



Wind Tunnel Study Model
Existing plus Project with Increased Setbacks

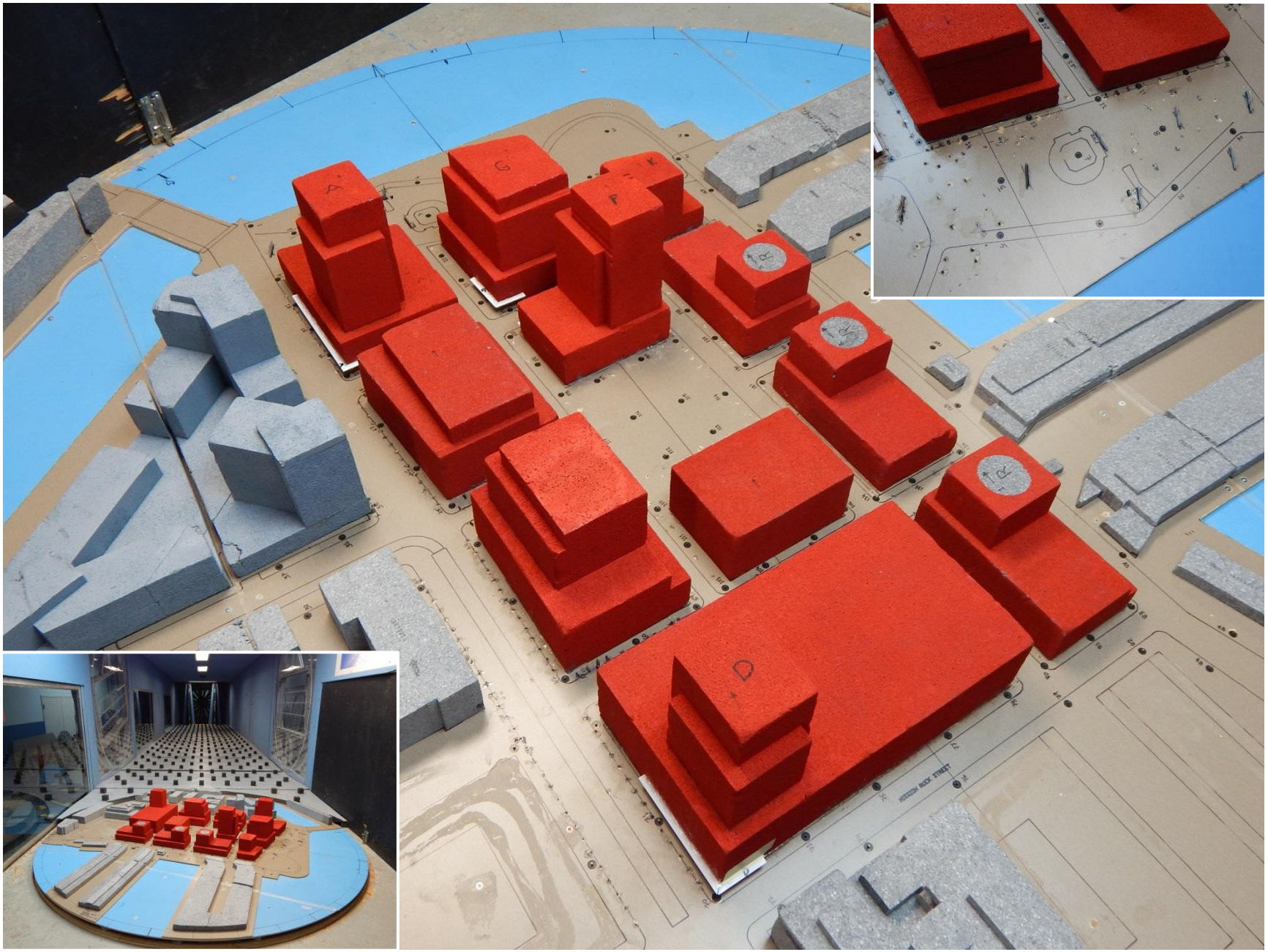
Figure No. 1c

Mission Rock – San Francisco, California

Project #1301926

Date:Jan. 25 2017

RWDI



Wind Tunnel Study Model
Existing plus Project with Increased Setbacks, Canopies and Windscreens

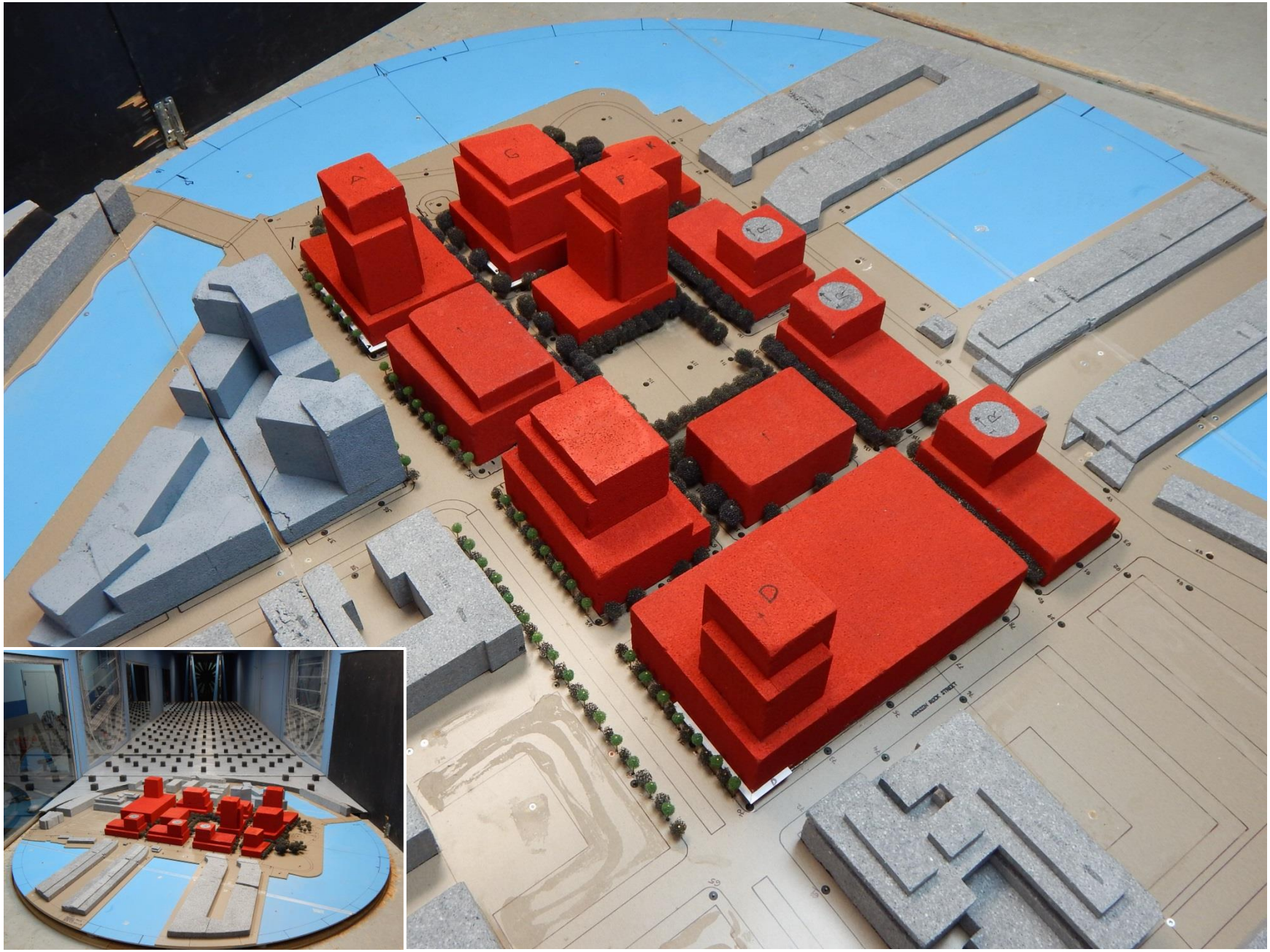
Figure No. 1d

Mission Rock – San Francisco, California

Project #1301926

Date: Jan. 25 2017

RWDI



Wind Tunnel Study Model
Existing plus Project with Increased Setbacks, Canopies and Proposed Onsite Landscaping

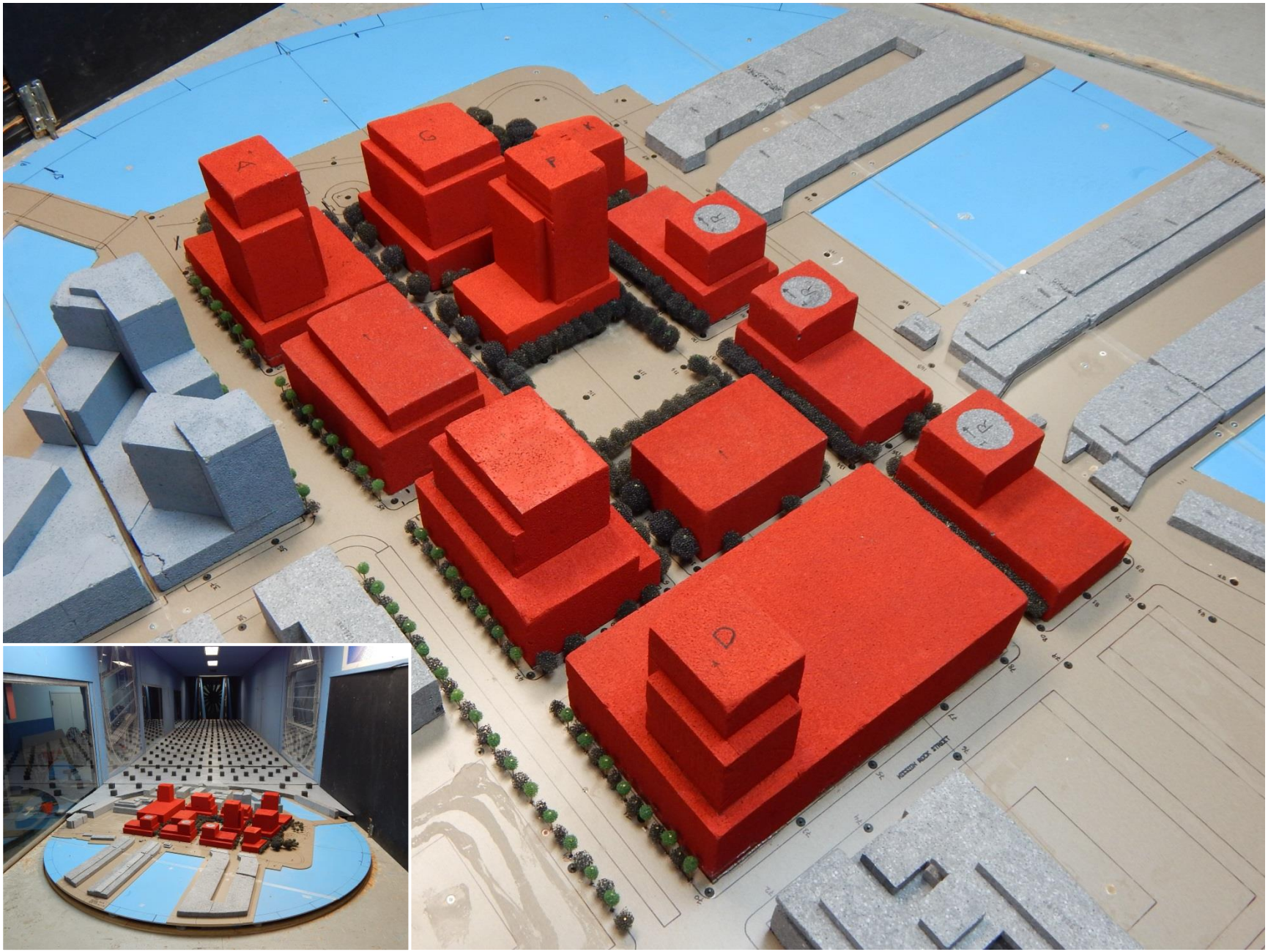
Figure No. 1e

Mission Rock – San Francisco, California

Project #1301926

Date: Jan. 25 2017

RWDI



Wind Tunnel Study Model
Existing plus Project with Increased Setbacks and Proposed Onsite Landscaping

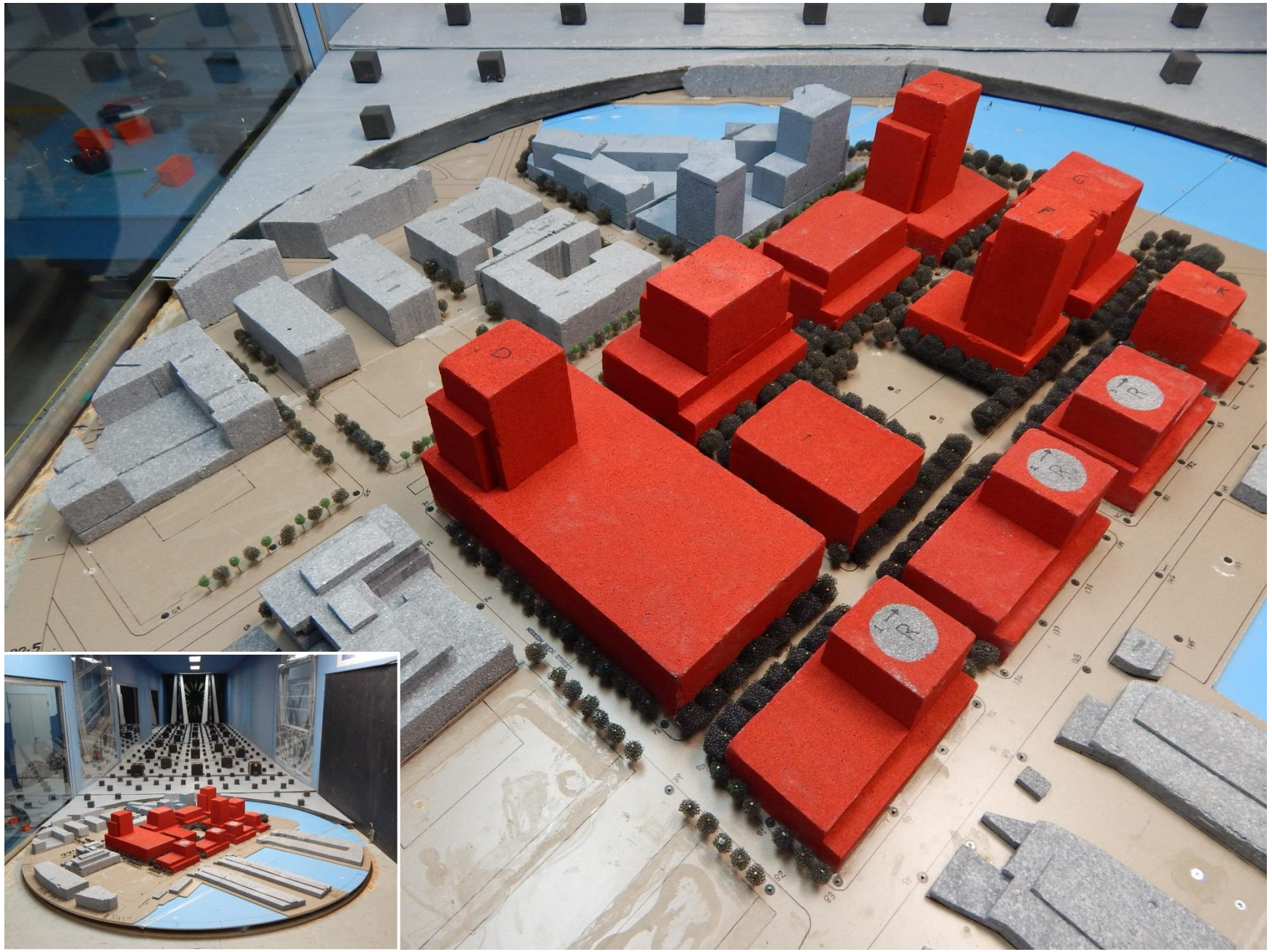
Figure No. 1f

Mission Rock – San Francisco, California

Project #1301926

Date: Jan. 25 2017

RWDI



Wind Tunnel Study Model

Existing plus Project with Increased Setbacks, Proposed Onsite Landscaping and Additional Existing Offsite Landscaping

Figure No. 1g

Mission Rock – San Francisco, California

Project #1301926

Date: Jan. 25 2017

RWDI

Wind Tunnel Study Model
Project plus Cumulative *(Buildings Only)*

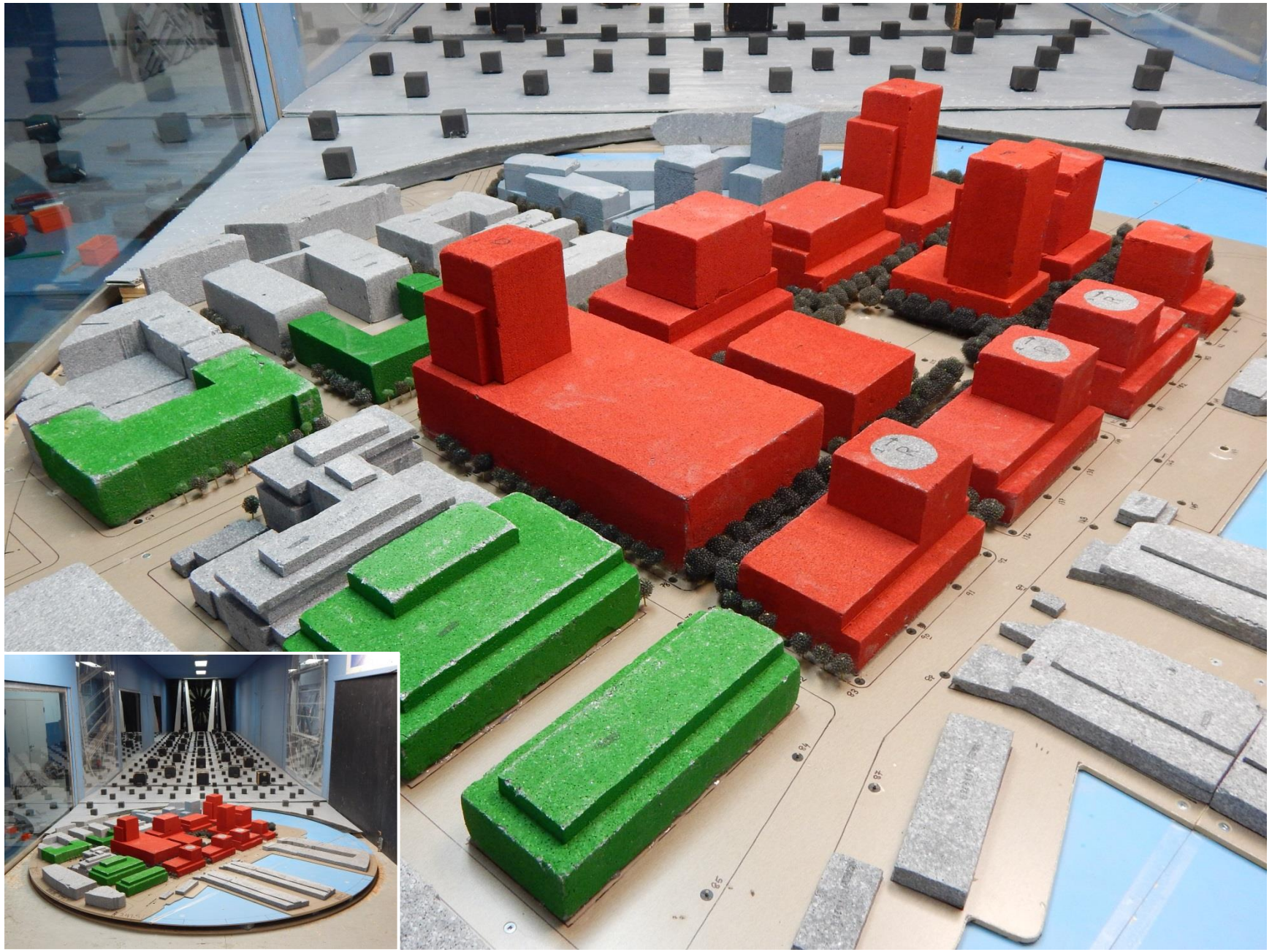
Mission Rock – San Francisco, California

Project #1301926

Figure No. 1h

Date: Jan. 25, 2016

RWDI



Wind Tunnel Study Model
Project plus Cumulative with Increased Setbacks, Proposed Onsite Landscaping and Additional Existing Offsite Landscaping

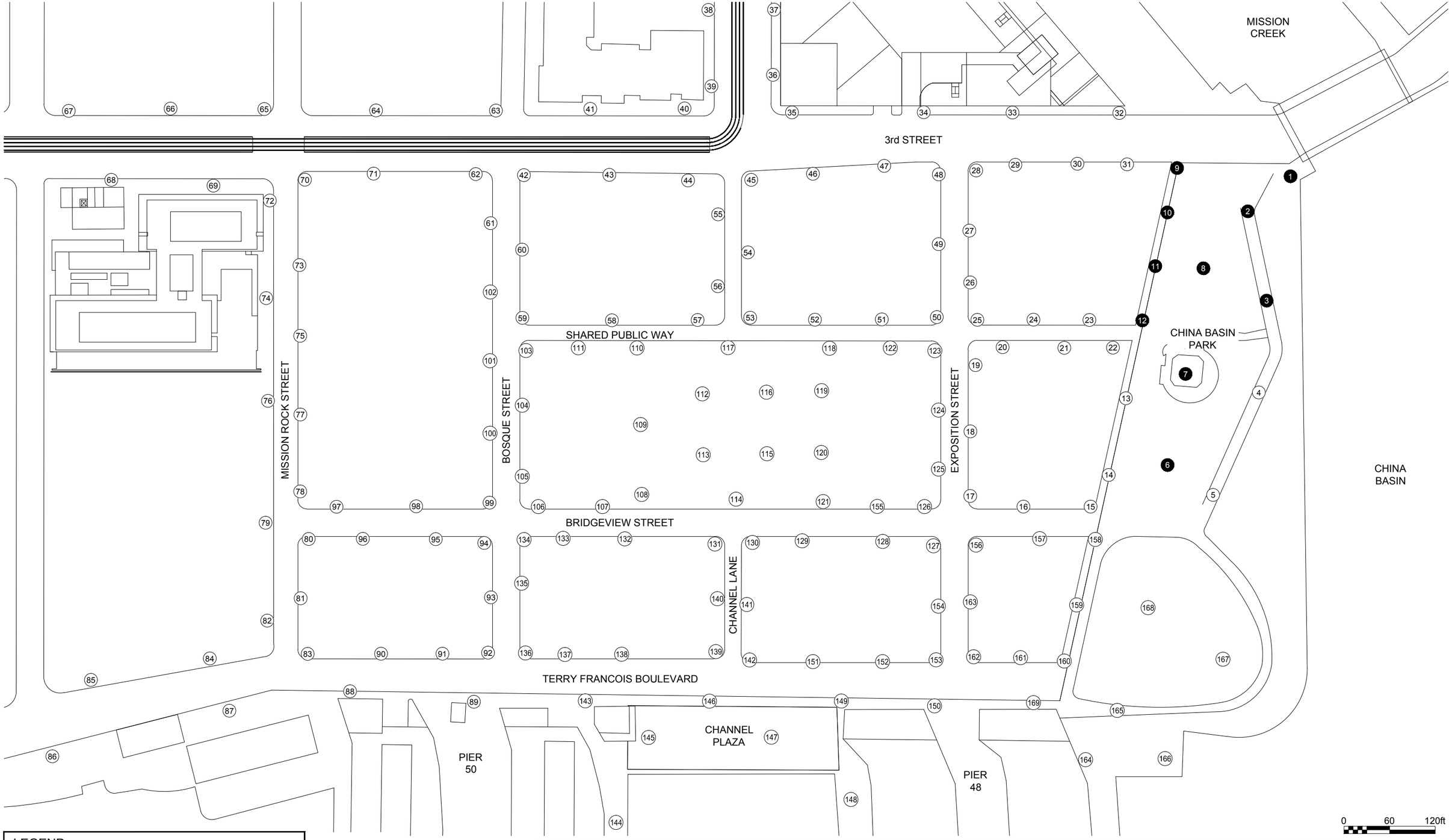
Figure No. 1i

Mission Rock – San Francisco, California

Project #1301926

Date: Jan. 25 2017

RWDI



LEGEND:

HAZARD CATEGORIES:

Pass

Exceeded

SENSOR LOCATION:

Grade Level

Pedestrian Wind Ha□ard Condition
Existing
Annual (January to December)

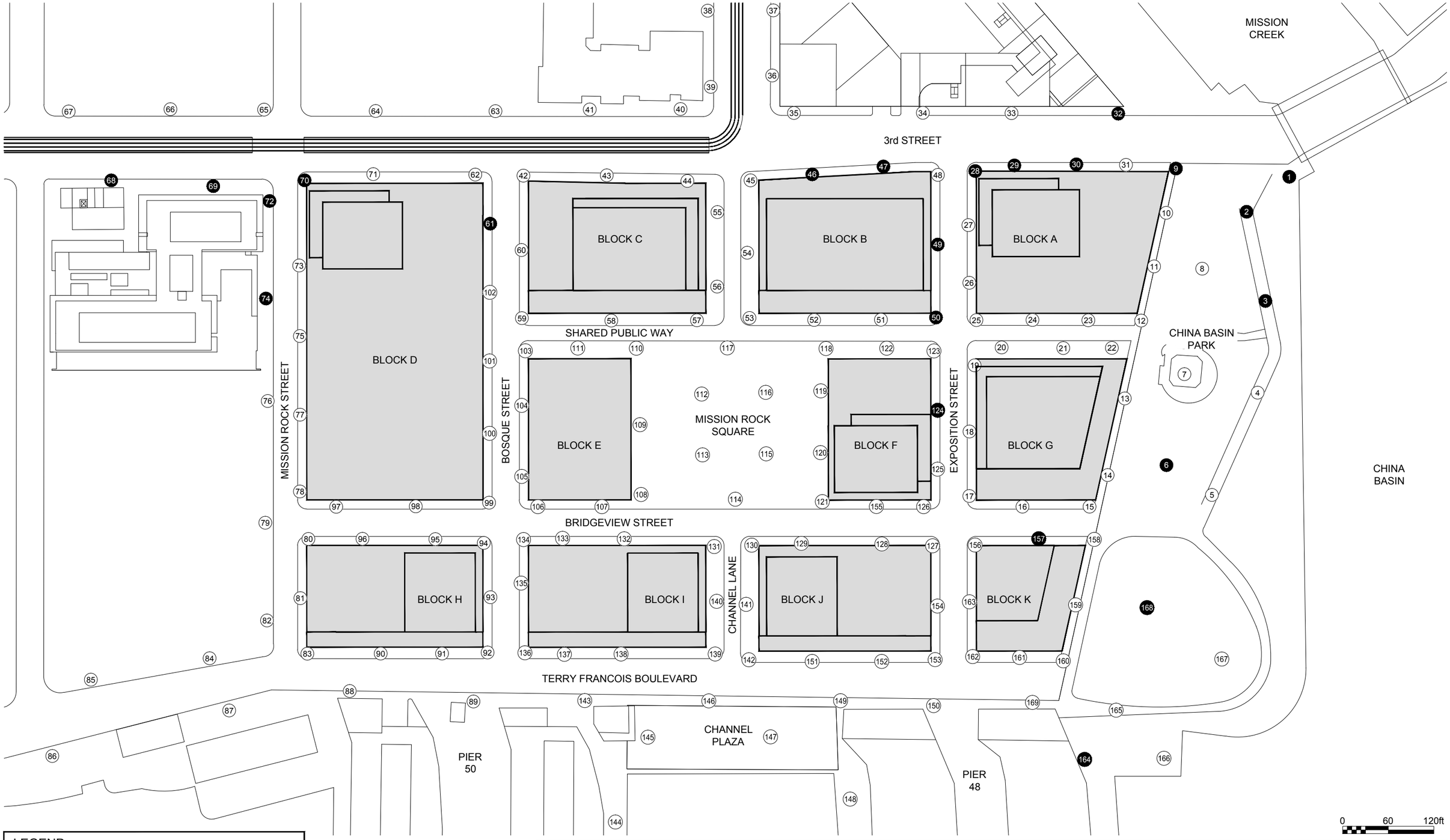
Mission Rock - San Francisco, CA

True North

Project #1301926

0 60 120ft

Drawn by: ESM	Figure: 2a	RWDI
Approx. Scale: 1"=120'		
Date Revised: Jan. 25 2017		



LEGEND:

HAZARD CATEGORIES:

Pass

Exceeded

SENSOR LOCATION:

Grade Level

0 60 120ft

Pedestrian Wind Ha□ard Conditions
Existing plus Project (Buildings Only)
Annual (January to December)

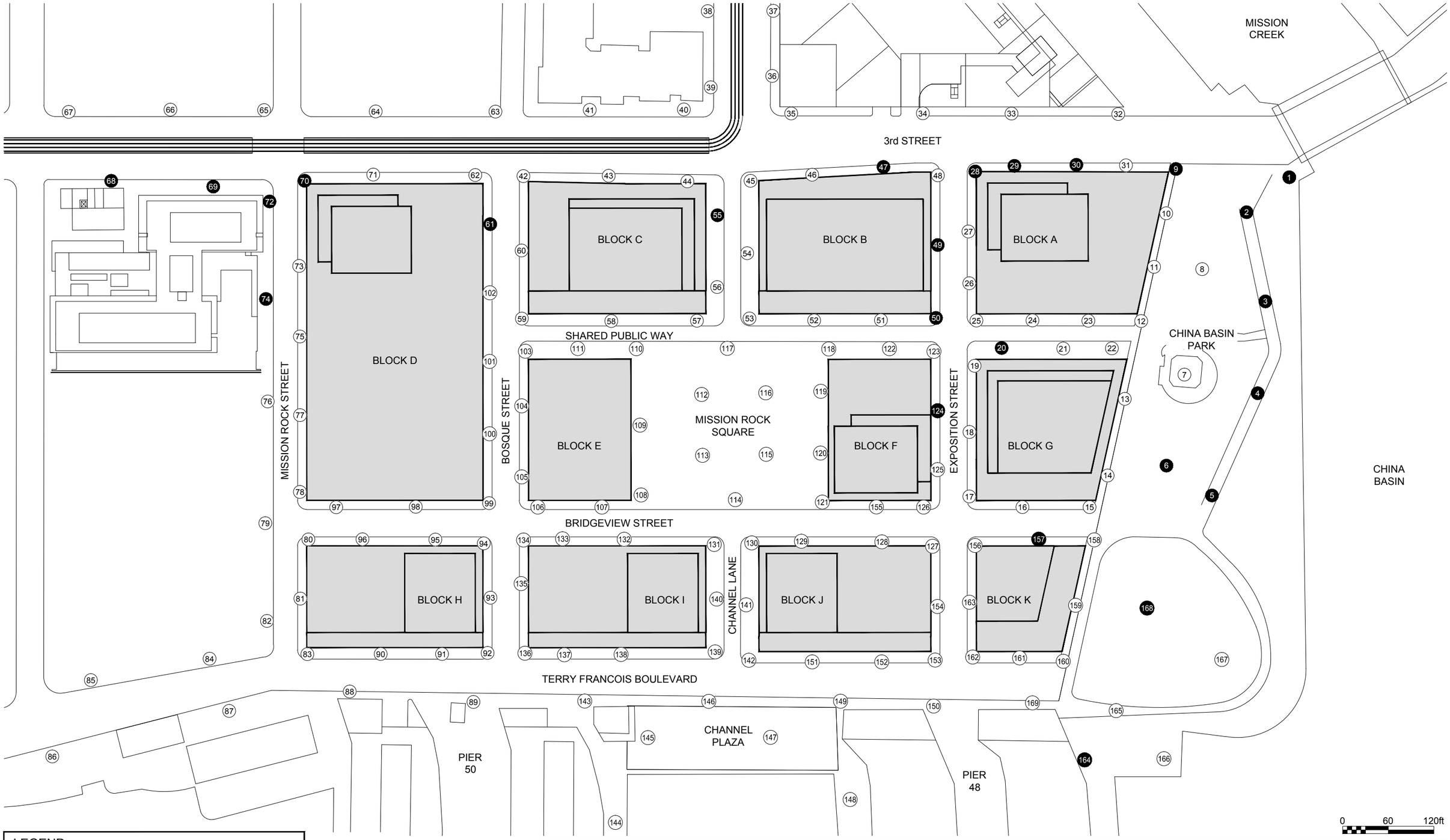
Mission Rock - San Francisco, CA

True North

Project #1301926

Drawn by:	ESM	Figure:	2b
Approx. Scale:			1"=120'
Date Revised:			Jan. 25 2017

RWDI



LEGEND:

HAZARD CATEGORIES:

Pass

Exceeded

SENSOR LOCATION:

Grade Level

0 60 120ft

Pedestrian Wind Ha□ard Condition
Existing plus Project with Increased Setbacks
Annual (January to December)

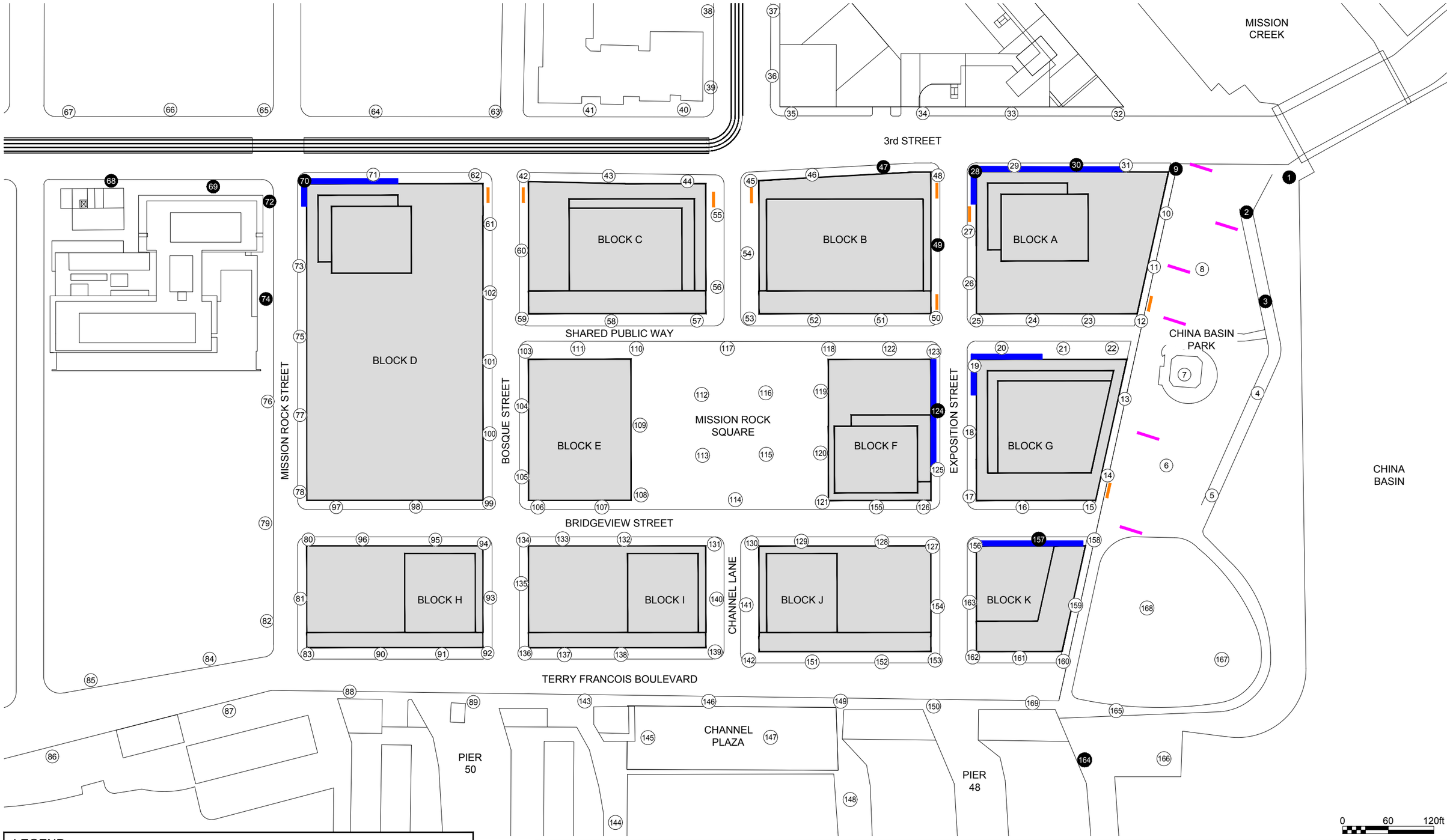
Mission Rock - San Francisco, CA

True North

Project #1301926

Drawn by:	ESM	Figure:	2c
Approx. Scale:			1"=120'
Date Revised:			Jan. 25 2017

RWDI



LEGEND:

HAZARD CATEGORIES:
- Pass
- Exceeded

SENSOR LOCATION:
- Grade Level

MITIGATION
- 7 ft Deep Canopy
- 4' x 6' Wind Screens, 3 at 10' Intervals
- 30' x 10' Wind Screens

0 60 120ft

Pedestrian Wind Hazard Conditions

Existing plus Project with Improvement Measure 2 (Increaded Setback, Canopies and Wind Screens)

Annual (January to December)

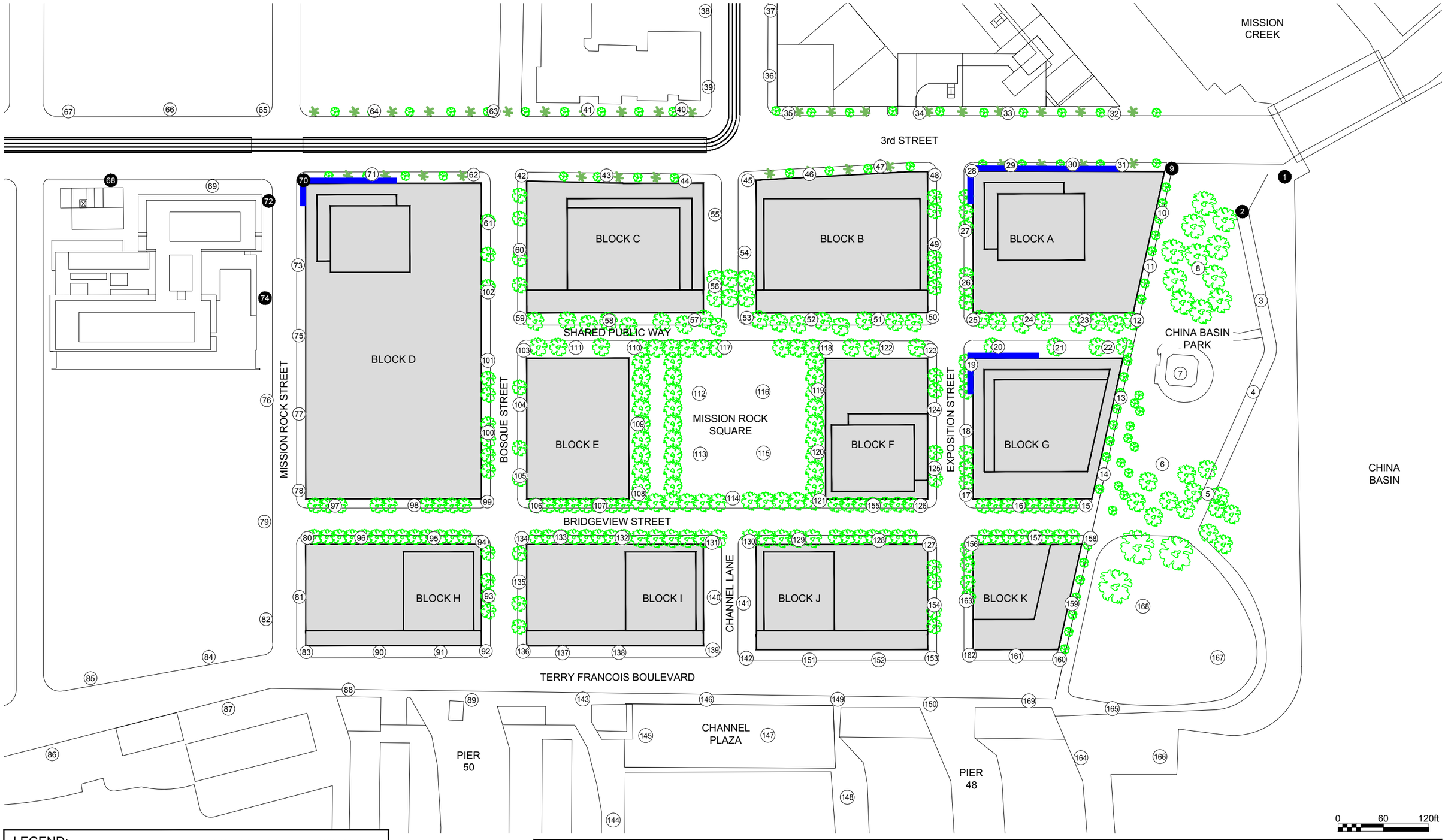
Mission Rock - San Francisco, CA

True North

Project #1301926

Drawn by: ESM	Figure: 2d
Approx. Scale:	1"=120'
Date Revised:	Aug. 12, 2016

RWDI



LEGEND:

HAZARD CATEGORIES:
- Pass
- Exceeded

SENSOR LOCATION:
- Grade Level

MITIGATION
- 7 ft Deep Canopy

LANDSCAPING:
- Deciduous Trees
- Palm Trees

0 60 120ft

Pedestrian Wind Hazard Conditions

Existing plus Project with Increased Setbacks, Canopies and Proposed Onsite Landscaping
Annual (January to December)

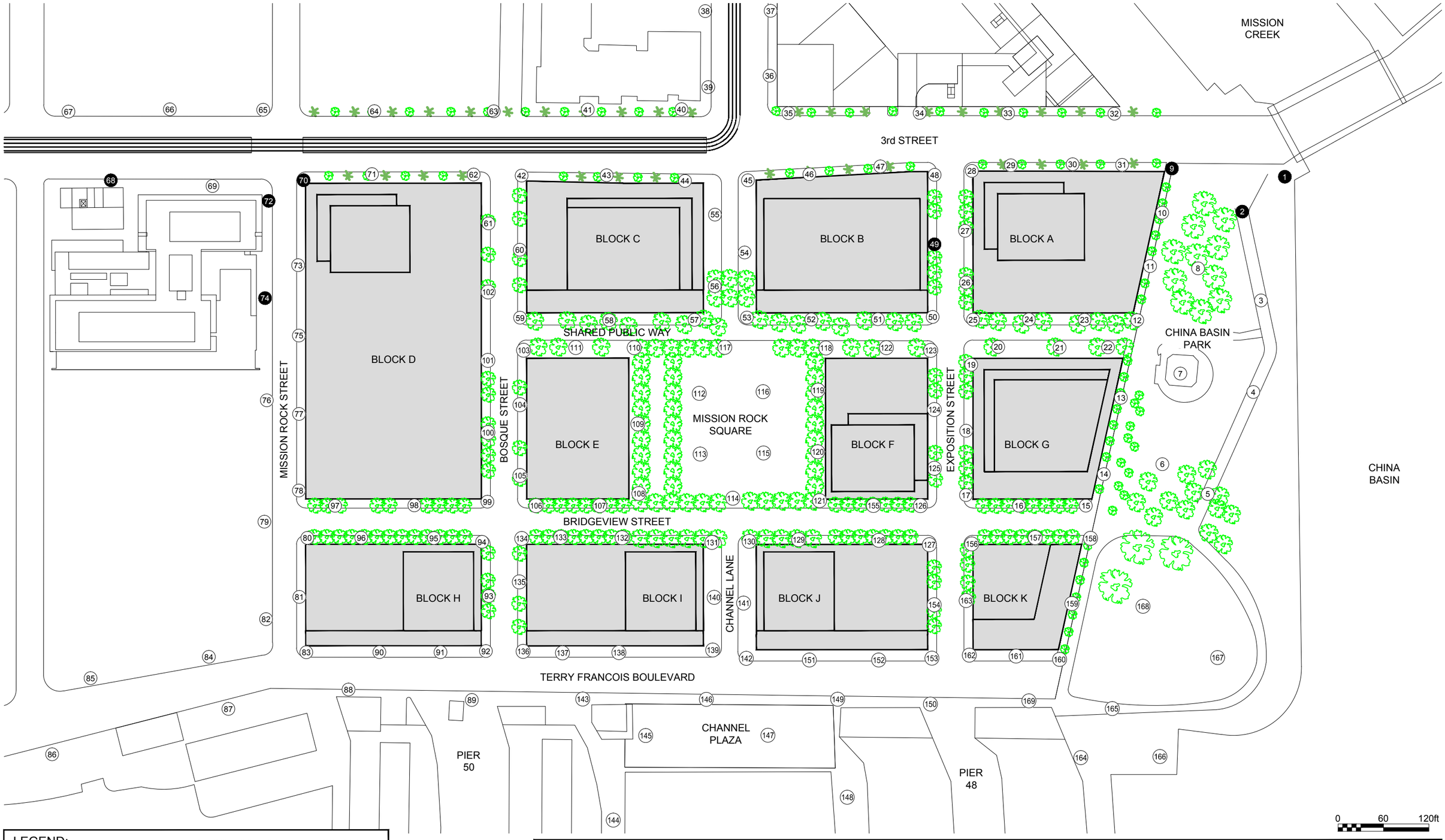
Mission Rock - San Francisco, CA

True North

Project #1301926

Drawn by: ESM	Figure: 2e
Approx. Scale:	1"=120'
Date Revised:	Jan. 25 2017

RWDI



LEGEND:

HAZARD CATEGORIES:
- Pass
- Exceeded

SENSOR LOCATION:
- Grade Level

LANDSCAPING:
- Deciduous Trees
- Palm Trees

0 60 120ft

Pedestrian Wind Hazard Conditions

Existing plus Project with Increased Setbacks and Proposed Onsite Landscaping
Annual (January to December)

Mission Rock - San Francisco, CA

Project #1301926

True North

Drawn by:	ESM	Figure:	2f
Approx. Scale:			1"=120'
Date Revised:			Jan. 25 2017

RWDI

LEGEND:

HAZARD CATEGORIES:
- Pass
- Exceeded

SENSOR LOCATION:
- Grade Level

LANDSCAPING:
- Deciduous Trees
- Palm Trees
- Additional Landscaping

0 60 120ft

Pedestrian Wind Hazard Conditions - Existing + Project with Mitigation 5

Existing plus Project with Increased Setbacks, Proposed Onsite Landscaping and Additional Existing Offsite Landscaping

Annual (January to December)

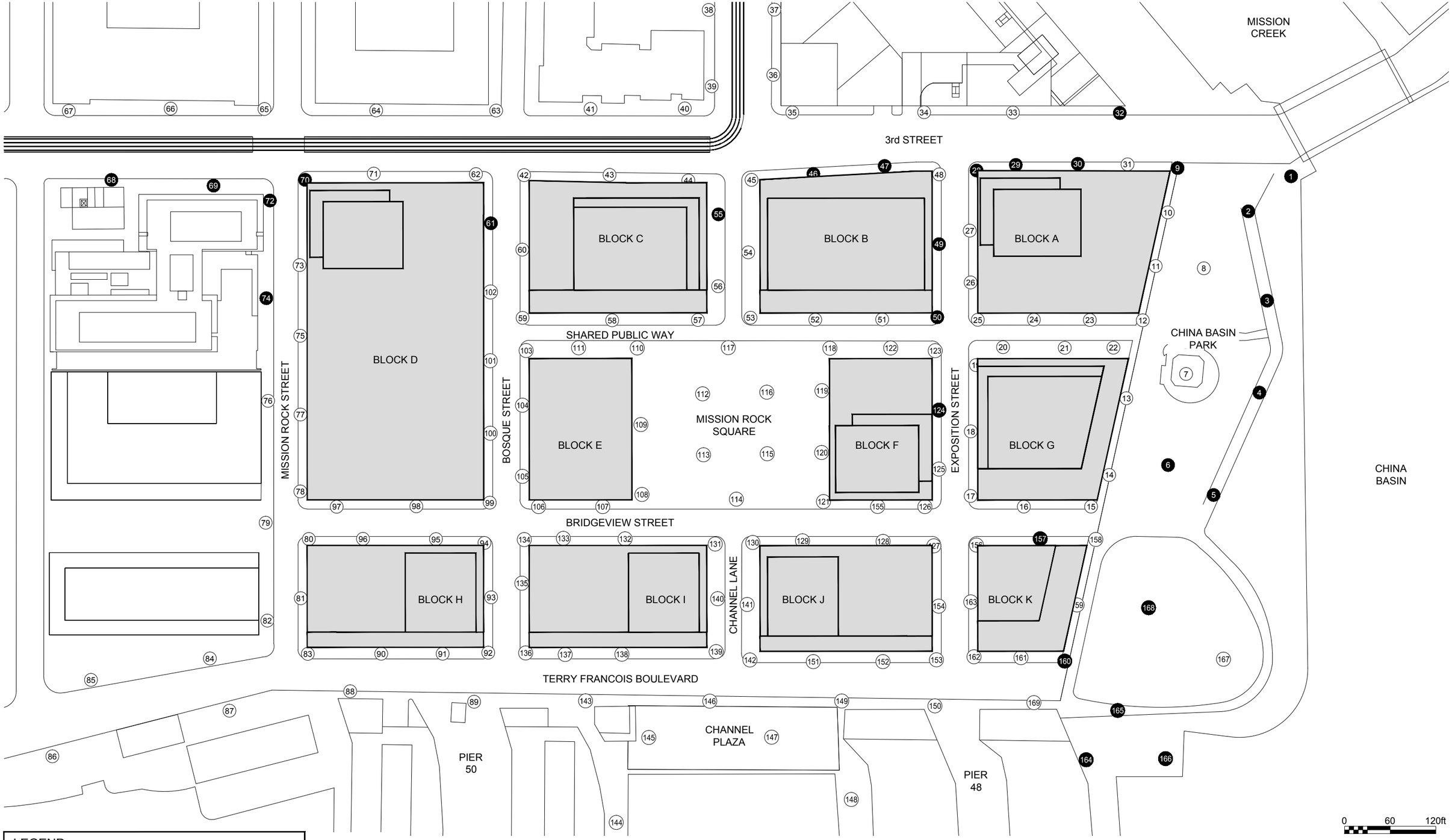
Mission Rock - San Francisco, CA

Project #1301926

True North

Drawn by: ESM	Figure: 2g
Approx. Scale:	1"=120'
Date Revised:	Jan. 25 2017

RWDI



LEGEND:

HAZARD CATEGORIES:

Pass

Exceeded

SENSOR LOCATION:

Grade Level

0 60 120ft

Pedestrian Wind Ha□ard Conditions
Project plus Cumulative (Buildings Only)
Annual (January to December)

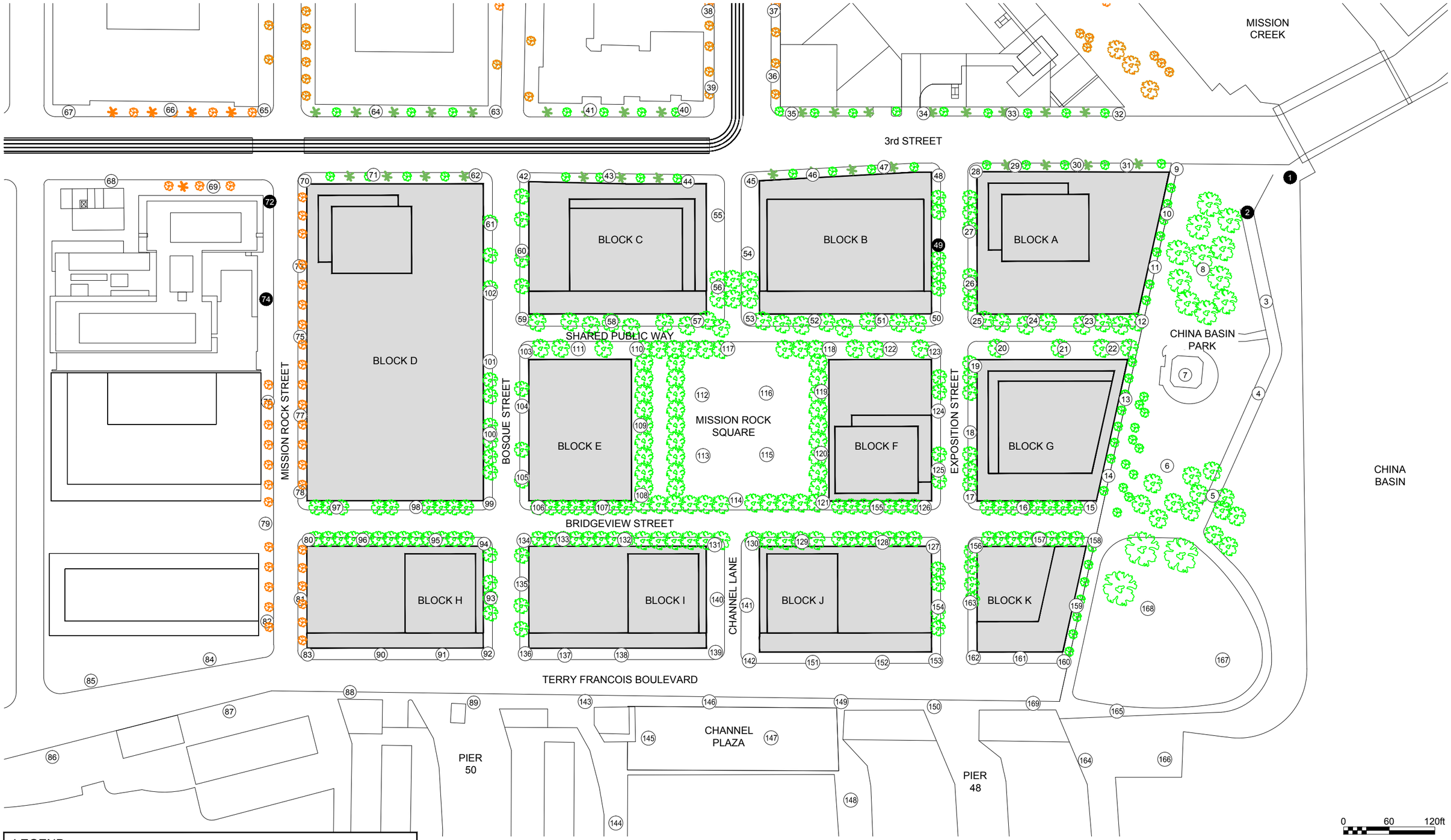
Mission Rock - San Francisco, CA

True North

Project #1301926

Drawn by:	ESM	Figure:	2h
Approx. Scale:			1"=120'
Date Revised:			Jan. 25, 2017

RWDI



LEGEND:

HAZARD CATEGORIES:
- Pass
- Exceeded

SENSOR LOCATION:
- Grade Level

LANDSCAPING:
- Deciduous Trees
- Palm Trees
- Additional Landscaping

0 60 120ft

Pedestrian Wind Hazard Conditions

Project plus Cumulative with Increased Setbacks, Proposed Onsite Landscaping and Additional Existing Offsite Landscaping
Annual (January to December)

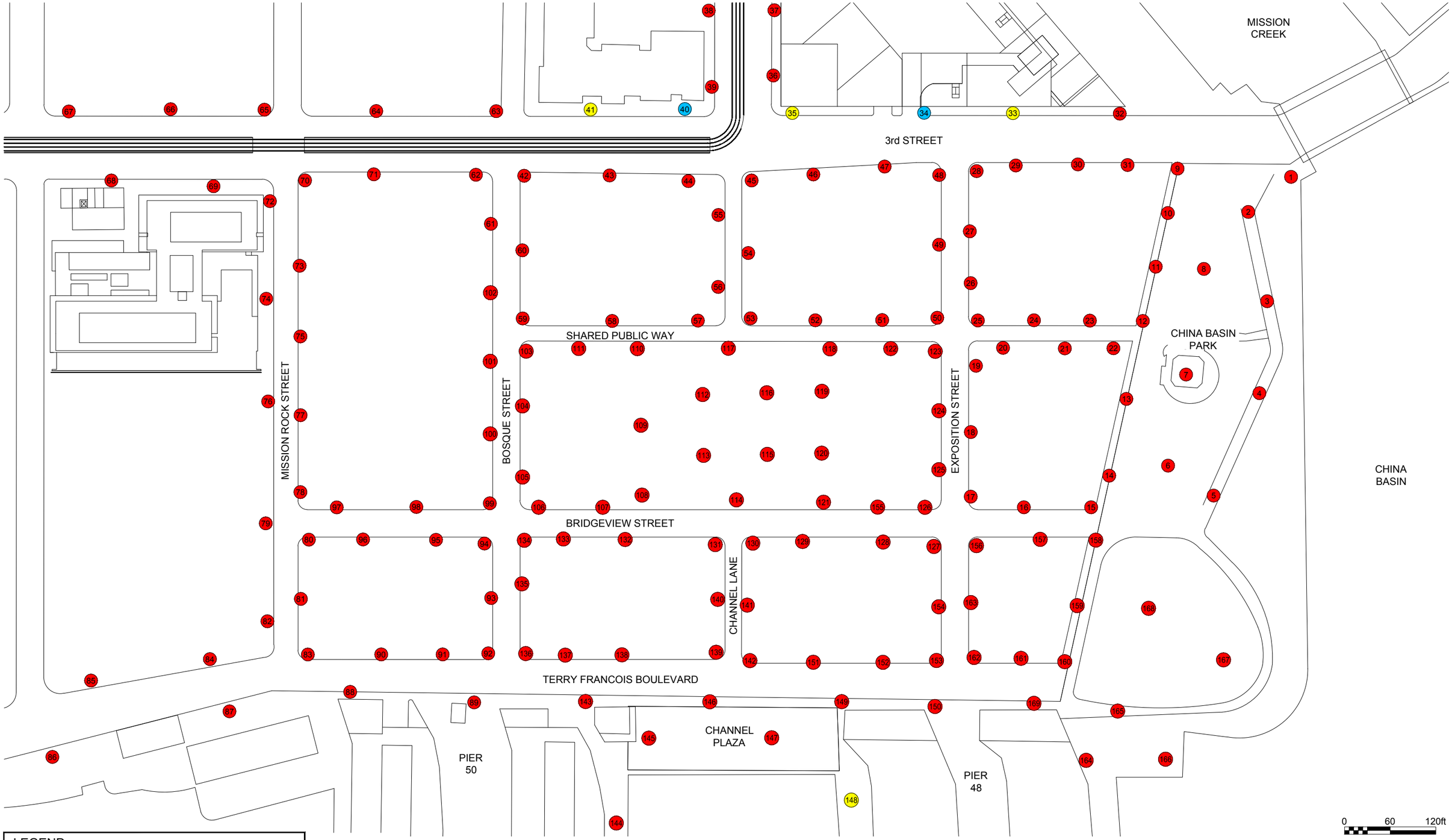
Mission Rock - San Francisco, CA

Project #1301926

True North

Drawn by:	ESM	Figure:	2i
Approx. Scale:			1"=120'
Date Revised:			Jan. 25, 2017

RWDI



LEGEND:

COMFORT CATEGORIES:
- 1 - 7 mph
- 8 - 11 mph
- > 11 mph

SENSOR LOCATION:
- Grade Level

0 60 120ft

Pedestrian Wind Comfort Conditions
Existing
Annual (January to December)

Mission Rock - San Francisco, CA

True North

Project #1301926

Drawn by:	ESM	Figure:	3a
Approx. Scale:			1"=120'
Date Revised:			Jan. 25 2017

RWDI

LEGEND:

COMFORT CATEGORIES:

1 - 7 mph

8 - 11 mph

> 11 mph

SENSOR LOCATION:

Grade Level

0 60 120ft

Pedestrian Wind Comfort Conditions

Existing plus Project (Buildings Only)

Annual (January to December)

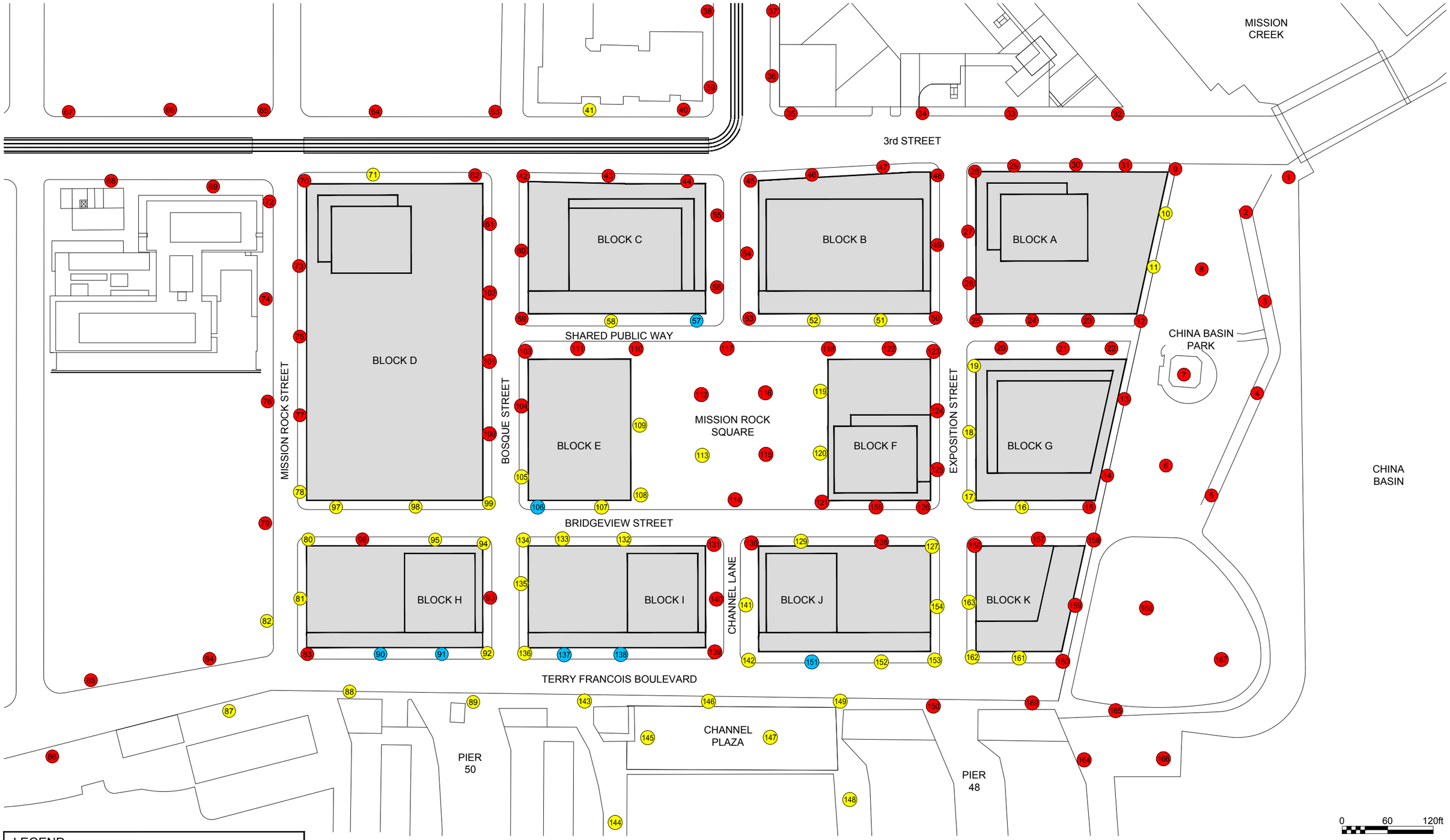
Mission Rock - San Francisco, CA

True North

Project #1301926

Drawn by:	ESM	Figure:	3b
Approx. Scale:			1"=120'
Date Revised:			Jan. 25 2017

RWDI



LEGEND:

COMFORT CATEGORIES:

1 - 7 mph

8 - 11 mph

> 11 mph

SENSOR LOCATION:

Grade Level

0 60 120ft

Pedestrian Wind Comfort Conditions

Existing plus Project with Increased Setbacks

Annual (January to December)

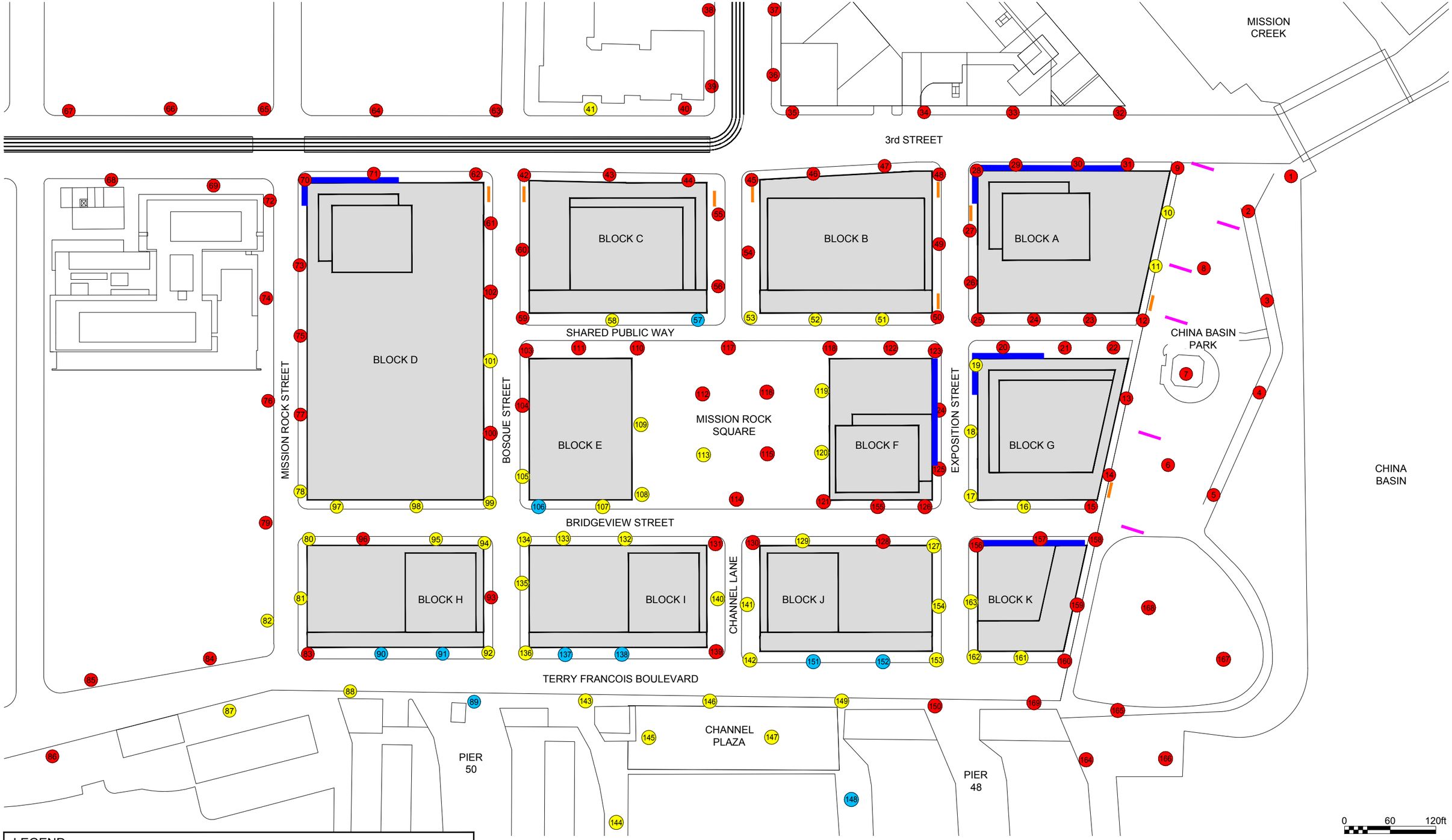
Mission Rock - San Francisco, CA

True North

Project #1301926

Drawn by:	ESM	Figure:	3c
Approx. Scale:			1"=120'
Date Revised:			Jan. 25 2017

RWDI



LEGEND:

COMFORT CATEGORIES:
- 1 - 7 mph
- 8 - 11 mph
- > 11 mph

SENSOR LOCATION:
- Grade Level

MITIGATION
- 7 ft Deep Canopy
- 4' x 6' Wind Screens, 3 at 10' Intervals
- 30' x 10' Wind Screens

0 60 120ft

Pedestrian Wind Comfort Conditions

Existing plus Project with Improvement Measure 2 (Increaded Setback, Canopies and Wind Screens)

Annual (January to December)

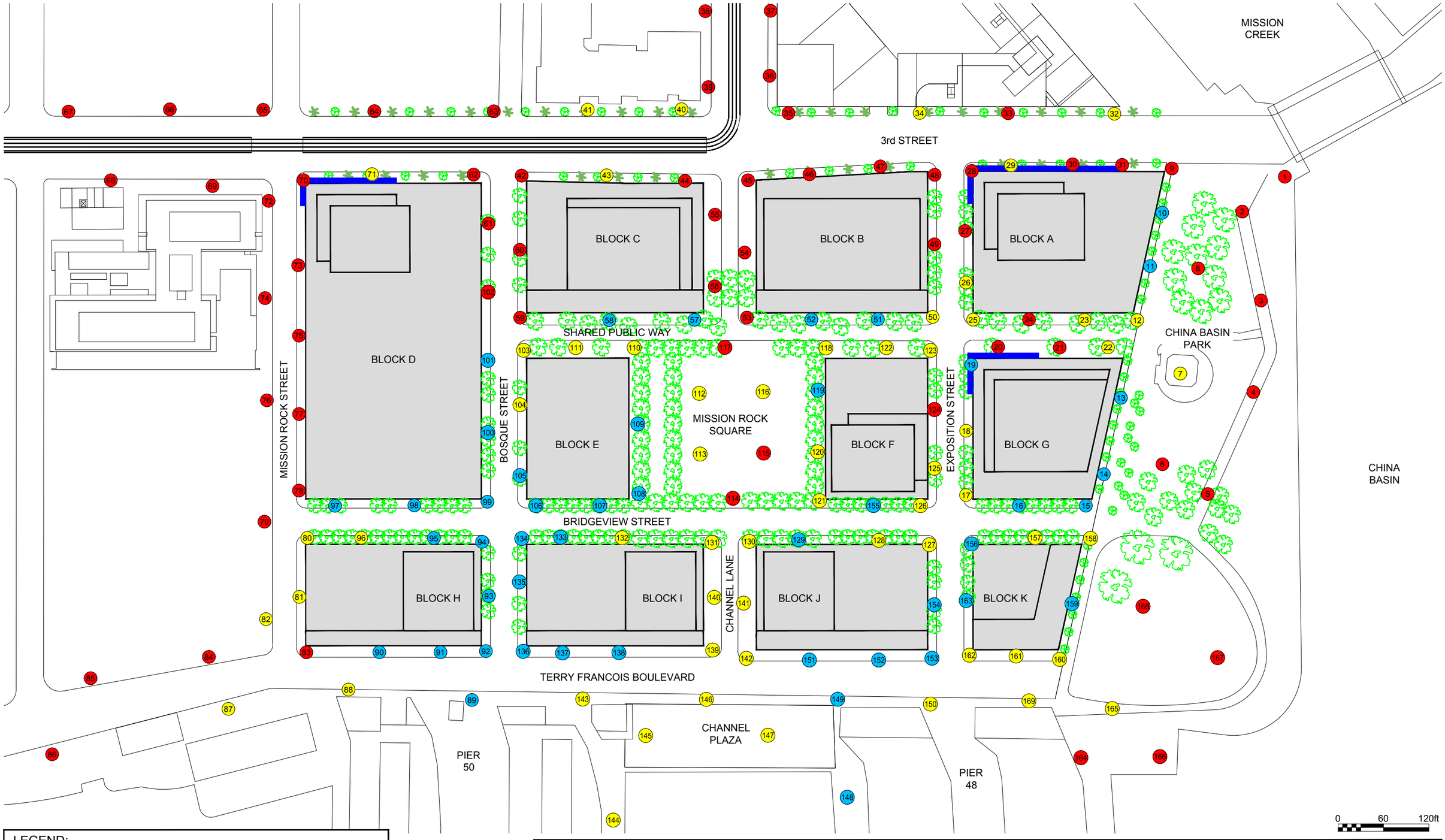
Mission Rock - San Francisco, CA

True North

Project #1301926

Drawn by:	ESM	Figure:	3d
Approx. Scale:			1"=120'
Date Revised:			Aug. 12, 2016

RWDI



LEGEND:

COMFORT CATEGORIES:
- 1 - 7 mph
- 8 - 11 mph
- > 11 mph

SENSOR LOCATION:
- Grade Level

MITIGATION
- 7 ft Deep Canopy

LANDSCAPING:
- Deciduous Trees
- Palm Trees

0 60 120ft

Pedestrian Wind Comfort Conditions

Existing plus Project with Increased Setbacks, Canopies and Proposed Onsite Landscaping
Annual (January to December)

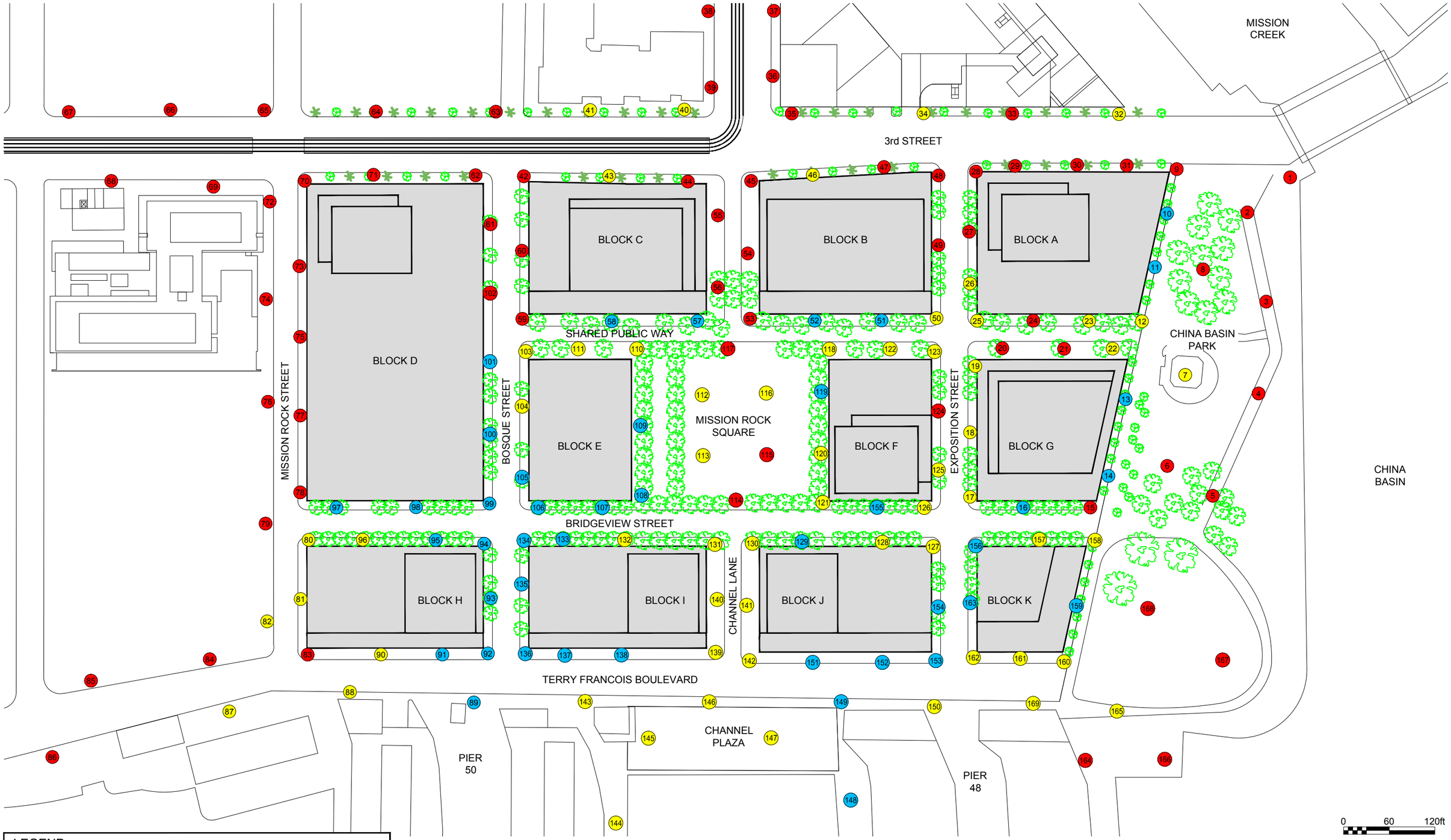
Mission Rock - San Francisco, CA

True North

Project #1301926

Drawn by:	ESM	Figure:	3e
Approx. Scale:			1"=120'
Date Revised:			Jan. 25 2017

RWDI



LEGEND:

COMFORT CATEGORIES:
- 1 - 7 mph
- 8 - 11 mph
- > 11 mph

SENSOR LOCATION:
- Grade Level

LANDSCAPING:
- Deciduous Trees
- Palm Trees

0 60 120ft

Pedestrian Wind Comfort Conditions - Existing + Project with Mitigation 4

Existing plus Project with Increased Setbacks and Proposed Onsite Landscaping
Annual (January to December)

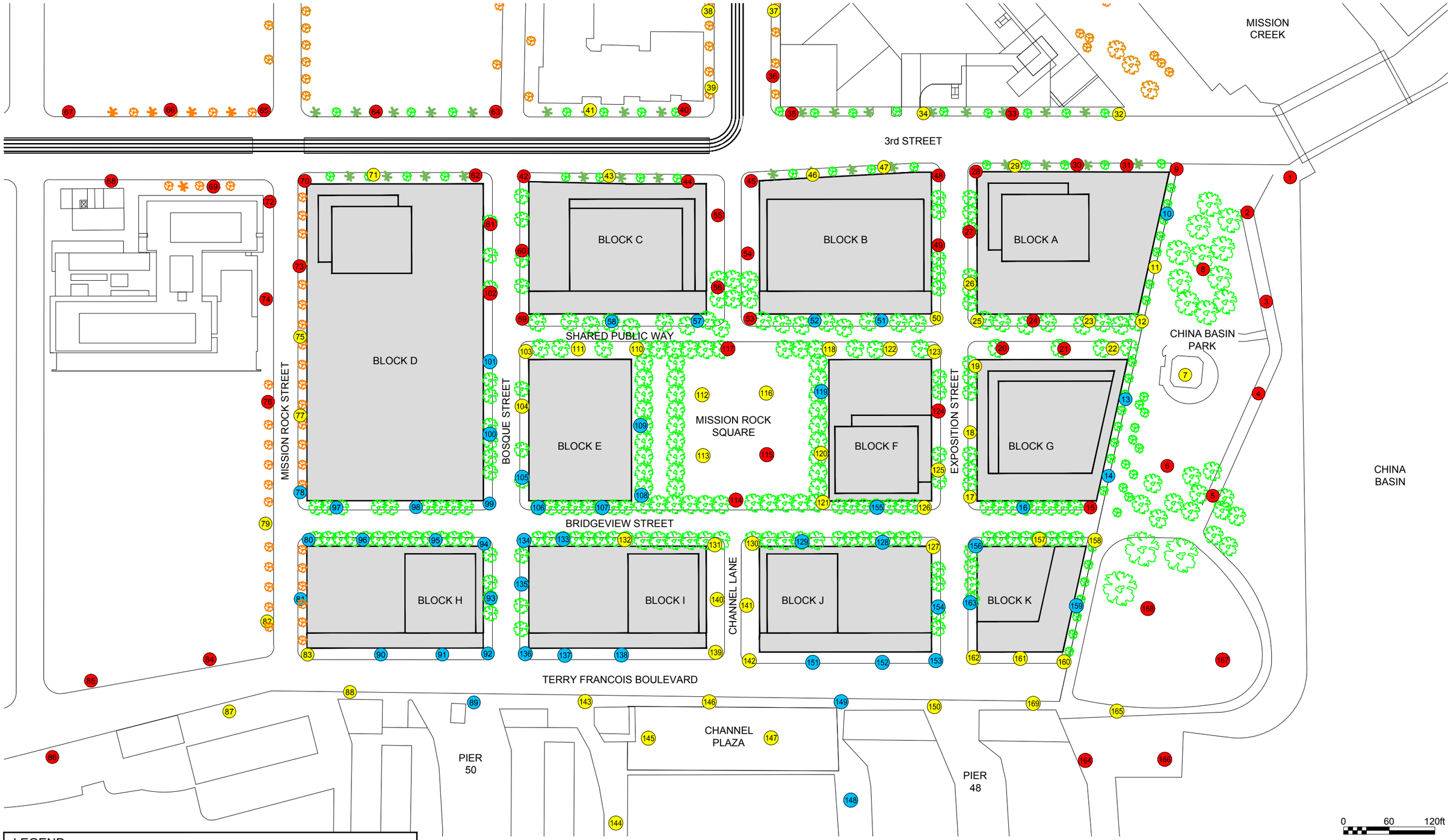
Mission Rock - San Francisco, CA

Project #1301926

True North

Drawn by:	ESM	Figure:	3f
Approx. Scale:			1"=120'
Date Revised:			Jan. 25, 2017

RWDI



LEGEND:

COMFORT CATEGORIES:
- 1 - 7 mph
- 8 - 11 mph
- > 11 mph

SENSOR LOCATION:
- Grade Level

LANDSCAPING:
- Deciduous Trees
- Palm Trees
- Additional Landscaping

Pedestrian Wind Comfort Conditions

Existing plus Project with Increased Setbacks, Proposed Onsite Landscaping and Additional Existing Offsite Landscaping
Annual (January to December)

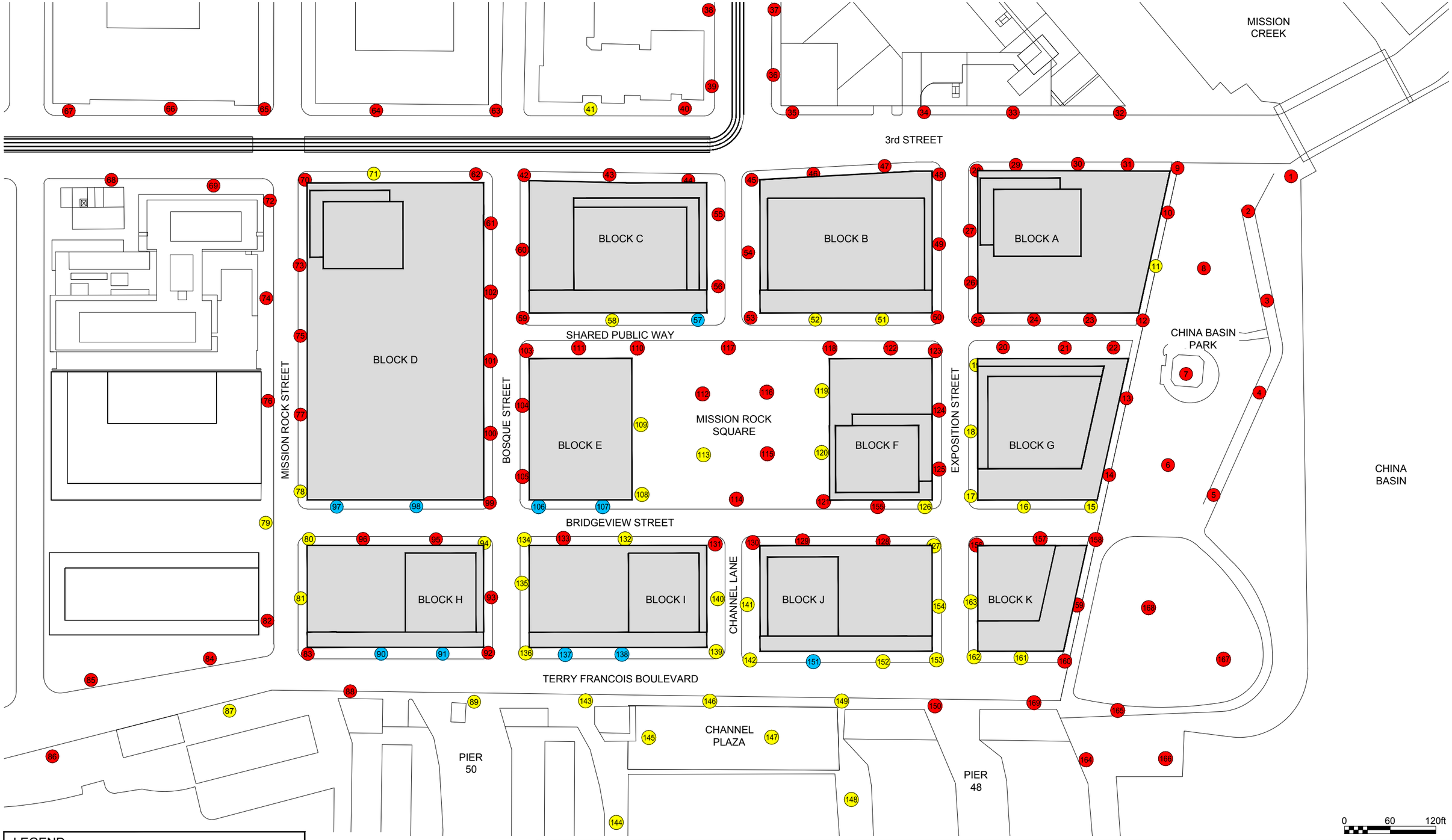
Mission Rock - San Francisco, CA

Project #1301926

True North

Drawn by:	ESM	Figure:	3g
Approx. Scale:			1"=120'
Date Revised:			Jan. 25 2017

RWDI



LEGEND:

COMFORT CATEGORIES:

- 1 - 7 mph
- 8 - 11 mph
- > 11 mph

SENSOR LOCATION:

- Grade Level

0 60 120ft

Pedestrian Wind Comfort Conditions

Project plus Cumulative (Buildings Only)

Annual (January to December)

Mission Rock - San Francisco, CA

True North

Project #1301926

Drawn by:	ESM	Figure:	3h
Approx. Scale:			1"=120'
Date Revised:			Jan. 25, 2017

RWDI

LEGEND:

COMFORT CATEGORIES:
- 1 - 7 mph
- 8 - 11 mph
- > 11 mph

SENSOR LOCATION:
- Grade Level

LANDSCAPING:
- Deciduous Trees
- Palm Trees
- Additional Landscaping

0 60 120ft

Pedestrian Wind Comfort Conditions

Project plus Cumulative with Increased Setbacks, Proposed Onsite Landscaping and Additional Existing Offsite Landscaping
Annual (January to December)

Mission Rock - San Francisco, CA

Project #1301926

True North

Drawn by:	ESM	Figure:	3i
Approx. Scale:			1"=120'
Date Revised:			Jan. 25, 2017

RWDI

TABLES

Table 1.1: Wind Ha□ard Results – Configurations A through E

References	A Existing			B Existing plus Project *(Buildings Only)*				C Existing plus Project with Improvement Measure 1 *(Increased Setback)*				D Existing plus Project with Improvement Measure 2 *(Increased Setback, Canopies and Windscreens)*				E Existing plus Project with Improvement Measure 3 *(Increased Setback, Canopies and Proposed Landscaping)*			
Location Number	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds
1	40	7	e	42	19	12	e	44	27	20	e	44	28	21	e	45	33	26	e
2	43	21	e	42	21	0	e	42	17	-4	e	40	7	-14	e	44	27	6	e
3	40	6	e	40	7	1	e	41	16	10	e	41	12	6	e	31	0	-6	
4	33	0		35	0	0		37	1	1	e	35	0	0		31	0	0	
5	32	0		36	0	0		37	1	1	e	35	0	0		34	0	0	
6	37	1	e	37	2	1	e	39	4	3	e	34	0	-1		28	0	-1	
7	37	1	e	34	0	-1		35	0	-1		24	0	-1		23	0	-1	
8	42	19	e	32	0	-19		33	0	-19		25	0	-19		26	0	-19	
9	46	42	e	46	43	1	e	45	33	-9	e	45	32	-10	e	39	5	-37	e
10	38	3	e	23	0	-3		22	0	-3		22	0	-3		12	0	-3	
11	38	2	e	21	0	-2		21	0	-2		20	0	-2		10	0	-2	
12	38	2	e	29	0	-2		34	0	-2		35	0	-2		28	0	-2	
13	35	0		28	0	0		32	0	0		32	0	0		13	0	0	
14	35	0		29	0	0		31	0	0		30	0	0		14	0	0	
15	33	0		22	0	0		31	0	0		28	0	0		23	0	0	
16	31	0		23	0	0		20	0	0		20	0	0		12	0	0	
17	30	0		22	0	0		21	0	0		20	0	0		18	0	0	
18	24	0		18	0	0		18	0	0		19	0	0		15	0	0	

Table 1.1: Wind Ha□ard Results – Configurations A through E

References	A Existing			B Existing plus Project *(Buildings Only)*				C Existing plus Project with Improvement Measure 1 *(Increased Setback)*				D Existing plus Project with Improvement Measure 2 *(Increased Setback, Canopies and Windscreens)*				E Existing plus Project with Improvement Measure 3 *(Increased Setback, Canopies and Proposed Landscaping)*			
Location Number	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds
19	30	0		19	0	0		23	0	0		23	0	0		17	0	0	
20	30	0		35	0	0		38	2	2	e	36	0	0		29	0	0	
21	32	0		27	0	0		31	0	0		30	0	0		28	0	0	
22	36	0		23	0	0		25	0	0		25	0	0		18	0	0	
23	29	0		28	0	0		30	0	0		30	0	0		27	0	0	
24	30	0		31	0	0		31	0	0		31	0	0		32	0	0	
25	29	0		25	0	0		23	0	0		23	0	0		23	0	0	
26	27	0		28	0	0		30	0	0		30	0	0		24	0	0	
27	26	0		25	0	0		28	0	0		28	0	0		28	0	0	
28	27	0		42	20	20	e	43	24	24	e	44	29	29	e	27	0	0	
29	27	0		37	1	1	e	38	2	2	e	35	0	0		22	0	0	
30	27	0		41	14	14	e	41	13	13	e	41	12	12	e	27	0	0	
31	30	0		29	0	0		29	0	0		30	0	0		26	0	0	
32	36	0		37	2	2	e	36	0	0		35	0	0		19	0	0	
33	20	0		22	0	0		26	0	0		27	0	0		23	0	0	
34	13	0		32	0	0		30	0	0		30	0	0		21	0	0	
35	20	0		23	0	0		22	0	0		22	0	0		24	0	0	
36	35	0		27	0	0		27	0	0		28	0	0		27	0	0	

Table 1.1: Wind Ha□ard Results – Configurations A through E

References	A Existing			B Existing plus Project *(Buildings Only)*				C Existing plus Project with Improvement Measure 1 *(Increased Setback)*				D Existing plus Project with Improvement Measure 2 *(Increased Setback, Canopies and Windscreens)*				E Existing plus Project with Improvement Measure 3 *(Increased Setback, Canopies and Proposed Landscaping)*			
Location Number	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds
37	30	0		25	0	0		25	0	0		25	0	0		25	0	0	
38	34	0		31	0	0		31	0	0		31	0	0		32	0	0	
39	34	0		28	0	0		28	0	0		28	0	0		28	0	0	
40	12	0		22	0	0		21	0	0		21	0	0		19	0	0	
41	13	0		20	0	0		18	0	0		18	0	0		14	0	0	
42	23	0		36	0	0		36	0	0		35	0	0		24	0	0	
43	24	0		25	0	0		26	0	0		25	0	0		17	0	0	
44	28	0		31	0	0		30	0	0		30	0	0		22	0	0	
45	35	0		35	0	0		34	0	0		32	0	0		31	0	0	
46	23	0		39	4	4	e	36	0	0		35	0	0		21	0	0	
47	23	0		40	5	5	e	39	5	5	e	39	3	3	e	34	0	0	
48	27	0		27	0	0		27	0	0		27	0	0		25	0	0	
49	25	0		42	17	17	e	41	12	12	e	40	7	7	e	36	0	0	
50	27	0		41	12	12	e	43	21	21	e	27	0	0		21	0	0	
51	25	0		19	0	0		16	0	0		16	0	0		12	0	0	
52	25	0		20	0	0		19	0	0		20	0	0		14	0	0	
53	24	0		24	0	0		23	0	0		22	0	0		25	0	0	
54	27	0		29	0	0		29	0	0		27	0	0		22	0	0	

Table 1.1: Wind Ha□ard Results – Configurations A through E

References	A Existing			B Existing plus Project *(Buildings Only)*				C Existing plus Project with Improvement Measure 1 *(Increased Setback)*				D Existing plus Project with Improvement Measure 2 *(Increased Setback, Canopies and Windscreens)*				E Existing plus Project with Improvement Measure 3 *(Increased Setback, Canopies and Proposed Landscaping)*			
Location Number	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds
55	29	0		35	0	0		37	2	2	e	36	0	0		33	0	0	
56	24	0		28	0	0		28	0	0		28	0	0		24	0	0	
57	25	0		13	0	0		13	0	0		13	0	0		10	0	0	
58	24	0		19	0	0		18	0	0		18	0	0		12	0	0	
59	24	0		31	0	0		32	0	0		31	0	0		23	0	0	
60	22	0		33	0	0		31	0	0		29	0	0		22	0	0	
61	24	0		41	11	11	e	40	6	6	e	36	0	0		32	0	0	
62	22	0		36	0	0		33	0	0		32	0	0		27	0	0	
63	24	0		31	0	0		30	0	0		29	0	0		24	0	0	
64	22	0		33	0	0		33	0	0		33	0	0		30	0	0	
65	22	0		35	0	0		35	0	0		36	0	0		33	0	0	
66	24	0		36	0	0		35	0	0		35	0	0		34	0	0	
67	26	0		33	0	0		31	0	0		31	0	0		32	0	0	
68	33	0		40	7	7	e	39	5	0	e	39	4	4	e	39	4	4	e
69	24	0		38	2	2	e	37	1	1	e	38	2	2	e	35	0	0	
70	32	0		41	19	19	e	43	36	36	e	52	180	180	e	41	14	14	e
71	24	0		20	0	0		21	0	0		22	0	0		15	0	0	
72	28	0		47	82	82	e	46	64	64	e	45	49	49	e	43	23	23	e

Table 1.1: Wind Ha□ard Results – Configurations A through E

References	A Existing			B Existing plus Project *(Buildings Only)*				C Existing plus Project with Improvement Measure 1 *(Increased Setback)*				D Existing plus Project with Improvement Measure 2 *(Increased Setback, Canopies and Windscreens)*				E Existing plus Project with Improvement Measure 3 *(Increased Setback, Canopies and Proposed Landscaping)*			
Location Number	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds
73	30	0		32	0	0		34	0	0		34	0	0		35	0	0	
74	31	0		45	32	32	e	45	34	34	e	46	38	38	e	46	41	41	e
75	29	0		26	0	0		27	0	0		26	0	0		28	0	0	
76	35	0		32	0	0		33	0	0		33	0	0		34	0	0	
77	31	0		23	0	0		22	0	0		22	0	0		24	0	0	
78	29	0		19	0	0		18	0	0		18	0	0		23	0	0	
79	27	0		21	0	0		23	0	0		23	0	0		22	0	0	
80	30	0		18	0	0		18	0	0		17	0	0		16	0	0	
81	26	0		17	0	0		17	0	0		17	0	0		19	0	0	
82	25	0		20	0	0		19	0	0		19	0	0		19	0	0	
83	29	0		24	0	0		23	0	0		22	0	0		23	0	0	
84	29	0		22	0	0		24	0	0		23	0	0		23	0	0	
85	29	0		25	0	0		26	0	0		26	0	0		26	0	0	
86	28	0		26	0	0		26	0	0		26	0	0		27	0	0	
87	24	0		18	0	0		17	0	0		17	0	0		18	0	0	
88	27	0		18	0	0		18	0	0		18	0	0		18	0	0	
89	25	0		16	0	0		15	0	0		15	0	0		12	0	0	
90	22	0		10	0	0		12	0	0		11	0	0		13	0	0	

Table 1.1: Wind Ha□ard Results – Configurations A through E

References	A Existing			B Existing plus Project *(Buildings Only)*				C Existing plus Project with Improvement Measure 1 *(Increased Setback)*				D Existing plus Project with Improvement Measure 2 *(Increased Setback, Canopies and Windscreens)*				E Existing plus Project with Improvement Measure 3 *(Increased Setback, Canopies and Proposed Landscaping)*			
Location Number	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds
91	26	0		12	0	0		12	0	0		12	0	0		12	0	0	
92	26	0		23	0	0		23	0	0		23	0	0		12	0	0	
93	26	0		24	0	0		25	0	0		25	0	0		10	0	0	
94	26	0		19	0	0		19	0	0		19	0	0		12	0	0	
95	25	0		25	0	0		25	0	0		24	0	0		9	0	0	
96	28	0		22	0	0		22	0	0		22	0	0		17	0	0	
97	27	0		17	0	0		17	0	0		17	0	0		11	0	0	
98	28	0		16	0	0		14	0	0		14	0	0		10	0	0	
99	26	0		25	0	0		23	0	0		23	0	0		14	0	0	
100	25	0		25	0	0		26	0	0		25	0	0		16	0	0	
101	22	0		23	0	0		23	0	0		23	0	0		13	0	0	
102	23	0		31	0	0		31	0	0		30	0	0		26	0	0	
103	24	0		23	0	0		23	0	0		22	0	0		16	0	0	
104	24	0		27	0	0		28	0	0		27	0	0		16	0	0	
105	23	0		23	0	0		23	0	0		23	0	0		13	0	0	
106	25	0		11	0	0		11	0	0		11	0	0		11	0	0	
107	26	0		15	0	0		16	0	0		16	0	0		13	0	0	
108	26	0		18	0	0		19	0	0		18	0	0		15	0	0	

Table 1.1: Wind Ha□ard Results – Configurations A through E

References	A Existing			B Existing plus Project *(Buildings Only)*				C Existing plus Project with Improvement Measure 1 *(Increased Setback)*				D Existing plus Project with Improvement Measure 2 *(Increased Setback, Canopies and Windscreens)*				E Existing plus Project with Improvement Measure 3 *(Increased Setback, Canopies and Proposed Landscaping)*			
Location Number	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds
109	26	0		16	0	0		17	0	0		17	0	0		12	0	0	
110	24	0		27	0	0		25	0	0		25	0	0		17	0	0	
111	24	0		31	0	0		33	0	0		32	0	0		19	0	0	
112	26	0		25	0	0		26	0	0		24	0	0		17	0	0	
113	26	0		21	0	0		22	0	0		23	0	0		21	0	0	
114	28	0		25	0	0		26	0	0		27	0	0		25	0	0	
115	27	0		27	0	0		28	0	0		28	0	0		25	0	0	
116	25	0		24	0	0		24	0	0		25	0	0		21	0	0	
117	25	0		27	0	0		26	0	0		25	0	0		28	0	0	
118	24	0		25	0	0		25	0	0		26	0	0		18	0	0	
119	25	0		23	0	0		25	0	0		25	0	0		15	0	0	
120	28	0		19	0	0		20	0	0		21	0	0		16	0	0	
121	31	0		22	0	0		24	0	0		24	0	0		22	0	0	
122	25	0		33	0	0		34	0	0		33	0	0		18	0	0	
123	25	0		24	0	0		30	0	0		30	0	0		16	0	0	
124	29	0		37	1	1	e	38	2	2	e	39	4	4	e	27	0	0	
125	31	0		24	0	0		28	0	0		31	0	0		21	0	0	
126	27	0		21	0	0		26	0	0		27	0	0		20	0	0	

Table 1.1: Wind Ha□ard Results – Configurations A through E

References	A Existing			B Existing plus Project *(Buildings Only)*				C Existing plus Project with Improvement Measure 1 *(Increased Setback)*				D Existing plus Project with Improvement Measure 2 *(Increased Setback, Canopies and Windscreens)*				E Existing plus Project with Improvement Measure 3 *(Increased Setback, Canopies and Proposed Landscaping)*			
Location Number	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds
127	32	0		20	0	0		19	0	0		20	0	0		16	0	0	
128	33	0		28	0	0		28	0	0		29	0	0		16	0	0	
129	28	0		25	0	0		27	0	0		28	0	0		13	0	0	
130	30	0		27	0	0		27	0	0		28	0	0		23	0	0	
131	28	0		23	0	0		23	0	0		23	0	0		23	0	0	
132	26	0		22	0	0		24	0	0		24	0	0		21	0	0	
133	25	0		26	0	0		22	0	0		22	0	0		17	0	0	
134	26	0		22	0	0		22	0	0		22	0	0		11	0	0	
135	26	0		16	0	0		17	0	0		17	0	0		8	0	0	
136	25	0		19	0	0		19	0	0		19	0	0		11	0	0	
137	26	0		10	0	0		12	0	0		11	0	0		11	0	0	
138	27	0		11	0	0		14	0	0		14	0	0		13	0	0	
139	31	0		27	0	0		28	0	0		29	0	0		26	0	0	
140	29	0		24	0	0		24	0	0		25	0	0		22	0	0	
141	30	0		20	0	0		23	0	0		24	0	0		21	0	0	
142	32	0		22	0	0		25	0	0		25	0	0		24	0	0	
143	25	0		16	0	0		16	0	0		16	0	0		16	0	0	
144	22	0		18	0	0		18	0	0		17	0	0		16	0	0	

Table 1.1: Wind Ha□ard Results – Configurations A through E

References	A Existing			B Existing plus Project *(Buildings Only)*				C Existing plus Project with Improvement Measure 1 *(Increased Setback)*				D Existing plus Project with Improvement Measure 2 *(Increased Setback, Canopies and Windscreens)*				E Existing plus Project with Improvement Measure 3 *(Increased Setback, Canopies and Proposed Landscaping)*			
Location Number	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds
145	28	0		16	0	0		16	0	0		17	0	0		16	0	0	
146	31	0		25	0	0		27	0	0		28	0	0		26	0	0	
147	33	0		17	0	0		19	0	0		20	0	0		19	0	0	
148	21	0		16	0	0		17	0	0		17	0	0		14	0	0	
149	32	0		19	0	0		18	0	0		18	0	0		15	0	0	
150	28	0		33	0	0		35	0	0		35	0	0		25	0	0	
151	32	0		15	0	0		13	0	0		13	0	0		11	0	0	
152	28	0		18	0	0		17	0	0		16	0	0		9	0	0	
153	28	0		21	0	0		19	0	0		19	0	0		14	0	0	
154	30	0		28	0	0		19	0	0		19	0	0		13	0	0	
155	30	0		27	0	0		24	0	0		25	0	0		13	0	0	
156	30	0		31	0	0		29	0	0		27	0	0		15	0	0	
157	31	0		40	6	6	e	40	6	6	e	38	3	3	e	17	0	0	
158	32	0		28	0	0		28	0	0		28	0	0		20	0	0	
159	31	0		33	0	0		32	0	0		31	0	0		15	0	0	
160	28	0		36	0	0		32	0	0		31	0	0		18	0	0	
161	26	0		23	0	0		22	0	0		23	0	0		18	0	0	
162	28	0		21	0	0		21	0	0		21	0	0		18	0	0	

Table 1.1: Wind Ha□ard Results – Configurations A through E

References	A Existing			B Existing plus Project *(Buildings Only)*				C Existing plus Project with Improvement Measure 1 *(Increased Setback)*				D Existing plus Project with Improvement Measure 2 *(Increased Setback, Canopies and Windscreens)*				E Existing plus Project with Improvement Measure 3 *(Increased Setback, Canopies and Proposed Landscaping)*			
Location Number	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds
163	31	0		21	0	0		22	0	0		23	0	0		13	0	0	
164	32	0		40	7	7	e	41	13	13	e	40	9	9	e	30	0	0	
165	29	0		36	0	0		35	0	0		35	0	0		20	0	0	
166	29	0		35	0	0		35	0	0		34	0	0		24	0	0	
167	29	0		32	0	0		33	0	0		32	0	0		28	0	0	
168	31	0		37	1	1	e	39	5	5	e	28	0	0		32	0	0	
169	24	0		33	0	0		32	0	0		32	0	0		23	0	0	
Average speed, Total hours and Total exceedances	**28 mph**	**104 Hours**	**10 of 169**	**27 mph**	**335 Hours**	**231 Hours**	**23 of 169**	**27 mph**	**352 Hours**	**248 Hours**	**25 of 169**	**27 mph**	**419 Hours**	**315 Hours**	**16 of 169**	**21 mph**	**147 Hours**	**43 Hours**	**7 of 169**

Table 1.2: Wind Hazard Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
Location Number	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds
1	40	7	e	45	30	23	e	41	10	3	e	45	32	25	e	40	9	2	e
2	43	21	e	43	22	1	e	37	2	-19	e	44	30	9	e	37	1	-20	e
3	40	6	e	31	0	-6		31	0	-6		42	18	12	e	31	0	-6	
4	33	0		31	0	0		30	0	0		37	1	1	e	30	0	0	
5	32	0		34	0	0		31	0	0		38	2	2	e	31	0	0	
6	37	1	e	28	0	-1		27	0	0		39	4	4	e	26	0	0	
7	37	1	e	23	0	-1		21	0	-1		35	0	-1		20	0	-1	
8	42	19	e	26	0	-19		28	0	-19		32	0	-19		28	0	-19	
9	46	42	e	38	3	-39	e	35	0	-42		48	62	20	e	35	0	-42	
10	38	3	e	13	0	-3		14	0	-3		23	0	-3		13	0	-3	
11	38	2	e	10	0	-2		14	0	-2		22	0	-2		14	0	-2	
12	38	2	e	28	0	-2		27	0	-2		30	0	-2		26	0	-2	
13	35	0		12	0	0		12	0	0		30	0	0		12	0	0	
14	35	0		14	0	0		14	0	0		31	0	0		13	0	0	
15	33	0		24	0	0		24	0	0		21	0	0		14	0	0	
16	31	0		12	0	0		11	0	0		22	0	0		10	0	0	
17	30	0		18	0	0		15	0	0		22	0	0		16	0	0	

Table 1.2: Wind Ha□ard Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
Location Number	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceed-ed 1hr□year (mph)	Hours per Year Wind Speeds Exceed Ha□ard Criteria	Hours Change Relative to Existing	Exceeds
18	24	0		14	0	0		14	0	0		19	0	0		14	0	0	
19	30	0		18	0	0		18	0	0		19	0	0		18	0	0	
20	30	0		30	0	0		33	0	0		36	0	0		31	0	0	
21	32	0		28	0	0		27	0	0		28	0	0		26	0	0	
22	36	0		18	0	0		16	0	0		24	0	0		16	0	0	
23	29	0		27	0	0		26	0	0		29	0	0		25	0	0	
24	30	0		33	0	0		34	0	0		32	0	0		33	0	0	
25	29	0		23	0	0		27	0	0		25	0	0		26	0	0	
26	27	0		24	0	0		24	0	0		30	0	0		24	0	0	
27	26	0		30	0	0		30	0	0		27	0	0		29	0	0	
28	27	0		31	0	0		31	0	0		44	29	29	e	30	0	0	
29	27	0		28	0	0		26	0	0		38	3	3	e	26	0	0	
30	27	0		31	0	0		28	0	0		43	22	22	e	28	0	0	
31	30	0		23	0	0		23	0	0		29	0	0		22	0	0	
32	36	0		18	0	0		18	0	0		40	7	7	e	18	0	0	
33	20	0		24	0	0		22	0	0		24	0	0		22	0	0	
34	13	0		21	0	0		21	0	0		32	0	0		21	0	0	

Table 1.2: Wind Hazard Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
Location Number	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds
35	20	0		24	0	0		21	0	0		23	0	0		22	0	0	
36	35	0		27	0	0		21	0	0		27	0	0		20	0	0	
37	30	0		24	0	0		19	0	0		25	0	0		19	0	0	
38	34	0		31	0	0		19	0	0		32	0	0		19	0	0	
39	34	0		28	0	0		18	0	0		28	0	0		18	0	0	
40	12	0		19	0	0		22	0	0		21	0	0		22	0	0	
41	13	0		14	0	0		15	0	0		19	0	0		15	0	0	
42	23	0		23	0	0		27	0	0		36	0	0		26	0	0	
43	24	0		17	0	0		17	0	0		25	0	0		16	0	0	
44	28	0		22	0	0		24	0	0		31	0	0		24	0	0	
45	35	0		32	0	0		28	0	0		35	0	0		28	0	0	
46	23	0		21	0	0		19	0	0		41	12	12	e	21	0	0	
47	23	0		35	0	0		26	0	0		40	8	8	e	26	0	0	
48	27	0		25	0	0		25	0	0		28	0	0		25	0	0	
49	25	0		37	1	1	e	37	2	2	e	43	22	22	e	37	1	1	e
50	27	0		20	0	0		20	0	0		43	22	22	e	20	0	0	
51	25	0		12	0	0		14	0	0		18	0	0		14	0	0	

Table 1.2: Wind Hazard Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
Location Number	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds
52	25	0		14	0	0		14	0	0		19	0	0		14	0	0	
53	24	0		25	0	0		25	0	0		24	0	0		25	0	0	
54	27	0		22	0	0		21	0	0		29	0	0		21	0	0	
55	29	0		33	0	0		33	0	0		37	2	2	e	33	0	0	
56	24	0		24	0	0		26	0	0		29	0	0		26	0	0	
57	25	0		10	0	0		11	0	0		13	0	0		11	0	0	
58	24	0		12	0	0		11	0	0		19	0	0		10	0	0	
59	24	0		23	0	0		23	0	0		31	0	0		22	0	0	
60	22	0		22	0	0		23	0	0		32	0	0		22	0	0	
61	24	0		31	0	0		35	0	0		42	18	18	e	32	0	0	
62	22	0		27	0	0		32	0	0		35	0	0		29	0	0	
63	24	0		23	0	0		27	0	0		29	0	0		21	0	0	
64	22	0		30	0	0		31	0	0		34	0	0		15	0	0	
65	22	0		32	0	0		34	0	0		35	0	0		20	0	0	
66	24	0		33	0	0		29	0	0		36	0	0		19	0	0	
67	26	0		31	0	0		24	0	0		34	0	0		12	0	0	
68	33	0		38	3	3	e	32	0	0		40	9	9	e	27	0	0	

Table 1.2: Wind Hazard Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
Location Number	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds
69	24	0		34	0	0		33	0	0		38	3	3	e	32	0	0	
70	32	0		41	15	15	e	34	0	0		42	33	33	e	32	0	0	
71	24	0		24	0	0		17	0	0		21	0	0		16	0	0	
72	28	0		42	20	20	e	42	20	20	e	48	95	95	e	38	3	3	e
73	30	0		30	0	0		29	0	0		33	0	0		31	0	0	
74	31	0		45	33	33	e	45	33	33	e	46	40	40	e	44	26	26	e
75	29	0		24	0	0		22	0	0		26	0	0		20	0	0	
76	35	0		33	0	0		34	0	0		32	0	0		29	0	0	
77	31	0		22	0	0		17	0	0		23	0	0		17	0	0	
78	29	0		21	0	0		13	0	0		20	0	0		12	0	0	
79	27	0		21	0	0		16	0	0		21	0	0		18	0	0	
80	30	0		15	0	0		12	0	0		18	0	0		12	0	0	
81	26	0		18	0	0		11	0	0		18	0	0		12	0	0	
82	25	0		18	0	0		16	0	0		23	0	0		11	0	0	
83	29	0		23	0	0		16	0	0		24	0	0		10	0	0	
84	29	0		23	0	0		21	0	0		23	0	0		13	0	0	
85	29	0		25	0	0		24	0	0		26	0	0		16	0	0	

Table 1.2: Wind Hazard Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
Location Number	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds
86	28	0		26	0	0		26	0	0		26	0	0		21	0	0	
87	24	0		18	0	0		18	0	0		18	0	0		16	0	0	
88	27	0		18	0	0		19	0	0		20	0	0		14	0	0	
89	25	0		12	0	0		13	0	0		15	0	0		14	0	0	
90	22	0		13	0	0		12	0	0		11	0	0		10	0	0	
91	26	0		13	0	0		12	0	0		9	0	0		11	0	0	
92	26	0		12	0	0		11	0	0		22	0	0		12	0	0	
93	26	0		10	0	0		9	0	0		24	0	0		10	0	0	
94	26	0		12	0	0		10	0	0		19	0	0		9	0	0	
95	25	0		9	0	0		7	0	0		27	0	0		7	0	0	
96	28	0		17	0	0		9	0	0		23	0	0		9	0	0	
97	27	0		10	0	0		7	0	0		12	0	0		8	0	0	
98	28	0		9	0	0		6	0	0		11	0	0		7	0	0	
99	26	0		15	0	0		10	0	0		26	0	0		10	0	0	
100	25	0		16	0	0		16	0	0		25	0	0		16	0	0	
101	22	0		12	0	0		11	0	0		23	0	0		11	0	0	
102	23	0		26	0	0		26	0	0		32	0	0		23	0	0	

Table 1.2: Wind Hazard Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
Location Number	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds
103	24	0		16	0	0		16	0	0		23	0	0		16	0	0	
104	24	0		17	0	0		17	0	0		27	0	0		16	0	0	
105	23	0		13	0	0		12	0	0		23	0	0		10	0	0	
106	25	0		11	0	0		8	0	0		11	0	0		8	0	0	
107	26	0		13	0	0		14	0	0		15	0	0		13	0	0	
108	26	0		15	0	0		13	0	0		18	0	0		13	0	0	
109	26	0		12	0	0		11	0	0		17	0	0		11	0	0	
110	24	0		17	0	0		16	0	0		26	0	0		16	0	0	
111	24	0		19	0	0		18	0	0		32	0	0		17	0	0	
112	26	0		17	0	0		15	0	0		26	0	0		15	0	0	
113	26	0		21	0	0		17	0	0		22	0	0		17	0	0	
114	28	0		24	0	0		25	0	0		26	0	0		24	0	0	
115	27	0		25	0	0		24	0	0		27	0	0		24	0	0	
116	25	0		21	0	0		17	0	0		24	0	0		17	0	0	
117	25	0		28	0	0		26	0	0		27	0	0		26	0	0	
118	24	0		18	0	0		18	0	0		24	0	0		17	0	0	
119	25	0		15	0	0		12	0	0		23	0	0		12	0	0	

Table 1.2: Wind Hazard Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
Location Number	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds
120	28	0		15	0	0		13	0	0		19	0	0		13	0	0	
121	31	0		21	0	0		20	0	0		21	0	0		20	0	0	
122	25	0		18	0	0		17	0	0		34	0	0		17	0	0	
123	25	0		16	0	0		17	0	0		25	0	0		16	0	0	
124	29	0		27	0	0		27	0	0		37	2	2	e	27	0	0	
125	31	0		21	0	0		21	0	0		26	0	0		21	0	0	
126	27	0		19	0	0		19	0	0		21	0	0		19	0	0	
127	32	0		16	0	0		16	0	0		19	0	0		10	0	0	
128	33	0		16	0	0		13	0	0		26	0	0		13	0	0	
129	28	0		15	0	0		17	0	0		24	0	0		17	0	0	
130	30	0		22	0	0		21	0	0		26	0	0		21	0	0	
131	28	0		23	0	0		24	0	0		23	0	0		24	0	0	
132	26	0		20	0	0		17	0	0		24	0	0		16	0	0	
133	25	0		17	0	0		13	0	0		26	0	0		12	0	0	
134	26	0		10	0	0		9	0	0		23	0	0		9	0	0	
135	26	0		8	0	0		9	0	0		16	0	0		8	0	0	
136	25	0		10	0	0		11	0	0		19	0	0		11	0	0	

Table 1.2: Wind Hazard Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
Location Number	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds
137	26	0		11	0	0		11	0	0		10	0	0		10	0	0	
138	27	0		12	0	0		14	0	0		10	0	0		14	0	0	
139	31	0		25	0	0		26	0	0		28	0	0		25	0	0	
140	29	0		21	0	0		21	0	0		25	0	0		21	0	0	
141	30	0		21	0	0		22	0	0		22	0	0		21	0	0	
142	32	0		24	0	0		25	0	0		24	0	0		24	0	0	
143	25	0		17	0	0		18	0	0		18	0	0		18	0	0	
144	22	0		16	0	0		17	0	0		16	0	0		17	0	0	
145	28	0		15	0	0		16	0	0		15	0	0		16	0	0	
146	31	0		25	0	0		25	0	0		25	0	0		25	0	0	
147	33	0		19	0	0		18	0	0		19	0	0		18	0	0	
148	21	0		14	0	0		14	0	0		16	0	0		14	0	0	
149	32	0		15	0	0		16	0	0		18	0	0		15	0	0	
150	28	0		25	0	0		27	0	0		34	0	0		26	0	0	
151	32	0		10	0	0		12	0	0		17	0	0		11	0	0	
152	28	0		12	0	0		12	0	0		20	0	0		12	0	0	
153	28	0		14	0	0		15	0	0		21	0	0		15	0	0	

Table 1.2: Wind Hazard Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
Location Number	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr/year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds
154	30	0		14	0	0		13	0	0		27	0	0		12	0	0	
155	30	0		13	0	0		12	0	0		28	0	0		12	0	0	
156	30	0		16	0	0		16	0	0		32	0	0		16	0	0	
157	31	0		17	0	0		17	0	0		41	14	14	e	17	0	0	
158	32	0		19	0	0		19	0	0		29	0	0		19	0	0	
159	31	0		15	0	0		15	0	0		35	0	0		15	0	0	
160	28	0		18	0	0		18	0	0		38	2	2	e	18	0	0	
161	26	0		19	0	0		19	0	0		23	0	0		19	0	0	
162	28	0		19	0	0		19	0	0		22	0	0		18	0	0	
163	31	0		13	0	0		12	0	0		21	0	0		13	0	0	
164	32	0		30	0	0		28	0	0		42	18	18	e	28	0	0	
165	29	0		20	0	0		20	0	0		38	2	2	e	20	0	0	
166	29	0		25	0	0		26	0	0		37	1	1	e	26	0	0	
167	29	0		29	0	0		29	0	0		34	0	0		28	0	0	
168	31	0		32	0	0		32	0	0		39	4	4	e	32	0	0	
169	24	0		24	0	0		24	0	0		34	0	0		24	0	0	

Table 1.2: Wind Hazard Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
Location Number	Wind Speed Exceeded 1hr year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Exceeds	Wind Speed Exceeded 1hr year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1hr year (mph)	Hours per Year Wind Speeds Exceed Hazard Criteria	Hours Change Relative to Existing	Exceeds
Average speed, Total hours and Total exceedances	**28 mph**	**104 Hours**	**10 of 169**	**21 mph**	**127 Hours**	**23 Hours**	**8 of 169**	**20 mph**	**67 Hours**	**-37 Hours**	**5 of 169**	**27 mph**	**517 Hours**	**413 Hours**	**29 of 169**	**19 mph**	**40 Hours**	**-64 Hours**	**5 of 169**

Table 2.1: Wind Comfort Results – Configurations A through E

References	A Existing			B Existing plus Project *(Buildings Only)*				C Existing plus Project with Improvement Measure 1 *(Increased Setback)*				D Existing plus Project with Improvement Measure 2 *(Increased Setback, Canopies and Windscreens)*				E Existing plus Project with Improvement Measure 3 *(Increased Setback, Canopies and Proposed Landscaping)*			
Location Number	Wind Speed Exceeded 10□ of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Exceeds	Wind Speed Exceeded 10□ of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10□ of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10□ of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10□ of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds
1	21	46	e	22	47	1	e	22	47	1	e	22	47	1	e	22	47	1	e
2	21	47	e	21	48	0	e	21	45	0	e	20	43	-1	e	22	47	1	e
3	21	46	e	21	45	0	e	21	46	0	e	20	44	-1	e	18	38	-3	e
4	19	42	e	19	42	0	e	20	42	1	e	18	35	-1	e	18	38	-1	e
5	18	38	e	20	41	2	e	19	41	1	e	19	39	1	e	17	32	-1	e
6	19	41	e	20	43	1	e	20	43	1	e	14	17	-5	e	13	20	-6	e
7	19	42	e	19	40	0	e	19	41	0	e	13	20	-6	e	11	10	-8	
8	21	47	e	19	39	-2	e	19	40	-2	e	12	12	-9	e	15	28	-6	e
9	24	56	e	23	51	-1	e	22	49	-2	e	22	48	-2	e	19	43	-5	e
10	20	46	e	12	14	-8	e	11	10	-9		11	10	-9		7	0	-13	
11	20	43	e	11	10	-9		10	7	-10		9	6	-11		5	0	-15	
12	19	42	e	15	24	-4	e	16	28	-3	e	15	25	-4	e	11	10	-8	
13	17	35	e	14	21	-3	e	14	23	-3	e	14	24	-3	e	6	0	-11	
14	18	37	e	15	25	-3	e	15	25	-3	e	14	23	-4	e	6	0	-12	
15	16	31	e	9	5	-7		13	15	-3	e	12	12	-4	e	6	3	-10	
16	15	27	e	10	6	-5		9	5	-6		9	5	-6		5	0	-10	
17	14	20	e	11	10	-3		11	10	-3		10	7	-4		8	1	-6	
18	12	12	e	9	4	-3		9	4	-3		10	6	-2		8	1	-4	

Table 2.1: Wind Comfort Results – Configurations A through E

References	A Existing			B Existing plus Project *(Buildings Only)*				C Existing plus Project with Improvement Measure 1 *(Increased Setback)*				D Existing plus Project with Improvement Measure 2 *(Increased Setback, Canopies and Windscreens)*				E Existing plus Project with Improvement Measure 3 *(Increased Setback, Canopies and Proposed Landscaping)*			
Location Number	Wind Speed Exceeded 10□ of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Exceeds	Wind Speed Exceeded 10□ of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10□ of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10□ of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10□ of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds
19	14	18	e	9	4	-5		10	8	-4		11	10	-3		7	2	-7	
20	14	20	e	16	27	2	e	17	31	3	e	16	28	2	e	13	16	-1	e
21	15	25	e	14	21	-1	e	15	26	0	e	15	26	0	e	12	12	-3	e
22	17	34	e	12	15	-5	e	13	16	-4	e	13	16	-4	e	9	4	-8	
23	13	20	e	12	12	-1	e	13	16	0	e	13	17	0	e	11	10	-2	
24	14	22	e	13	16	-1	e	13	17	-1	e	13	17	-1	e	13	17	-1	e
25	14	19	e	12	15	-2	e	12	13	-2	e	12	12	-2	e	10	8	-4	
26	14	21	e	11	10	-3		12	13	-2	e	12	11	-2	e	10	8	-4	
27	14	22	e	12	15	-2	e	13	20	-1	e	13	16	-1	e	12	13	-2	e
28	12	16	e	19	41	7	e	19	37	7	e	19	37	7	e	13	17	1	e
29	12	15	e	17	33	5	e	16	29	4	e	15	23	3	e	9	6	-3	
30	12	15	e	21	45	9	e	21	44	9	e	20	42	8	e	12	17	0	e
31	15	26	e	17	32	2	e	17	33	2	e	18	36	3	e	14	21	-1	e
32	18	38	e	17	34	-1	e	15	25	-3	e	15	24	-3	e	10	5	-8	
33	11	10		12	14	1	e	14	21	3	e	14	22	3	e	12	16	1	e
34	7	0		14	22	7	e	14	22	7	e	14	22	7	e	10	7	3	
35	11	10		12	14	1	e	12	13	1	e	12	13	1	e	13	17	2	e
36	20	45	e	16	28	-4	e	16	28	-4	e	16	28	-4	e	16	28	-4	e

Table 2.1: Wind Comfort Results – Configurations A through E

References	A Existing			B Existing plus Project *(Buildings Only)*				C Existing plus Project with Improvement Measure 1 *(Increased Setback)*				D Existing plus Project with Improvement Measure 2 *(Increased Setback, Canopies and Windscreens)*				E Existing plus Project with Improvement Measure 3 *(Increased Setback, Canopies and Proposed Landscaping)*			
Location Number	Wind Speed Exceeded 10□ of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Exceeds	Wind Speed Exceeded 10□ of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10□ of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10□ of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10□ of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds
37	16	34	e	14	22	-2	e	14	23	-2	e	14	22	-2	e	14	23	-2	e
38	17	35	e	15	27	-2	e	15	27	-2	e	16	28	-1	e	16	28	-1	e
39	18	40	e	14	24	-4	e	15	25	-3	e	15	25	-3	e	15	25	-3	e
40	6	0		12	15	6	e	12	14	6	e	12	14	6	e	10	7	4	
41	8	1		10	6	2		10	6	2		10	6	2		8	1	0	
42	13	18	e	20	46	7	e	19	45	6	e	19	45	6	e	13	19	0	e
43	14	22	e	12	15	-2	e	12	14	-2	e	12	14	-2	e	9	3	-5	
44	15	26	e	17	37	2	e	16	30	1	e	16	31	1	e	12	14	-3	e
45	19	42	e	18	41	-1	e	18	38	-1	e	17	36	-2	e	15	28	-4	e
46	13	18	e	17	34	4	e	16	31	3	e	16	31	3	e	12	13	-1	e
47	12	18	e	18	36	6	e	17	34	5	e	17	34	5	e	14	17	2	e
48	13	21	e	14	23	1	e	14	21	1	e	13	21	0	e	12	14	-1	e
49	14	22	e	17	21	3	e	17	22	3	e	17	21	3	e	15	17	1	e
50	13	18	e	17	22	4	e	17	22	4	e	12	13	-1	e	9	5	-4	
51	13	20	e	10	6	-3		9	3	-4		9	4	-4		7	0	-6	
52	12	16	e	9	5	-3		9	5	-3		9	5	-3		6	1	-6	
53	12	17	e	12	16	0	e	12	14	0	e	11	10	-1		13	19	1	e
54	15	25	e	15	26	0	e	15	25	0	e	14	21	-1	e	12	14	-3	e

Table 2.1: Wind Comfort Results – Configurations A through E

References	A Existing			B Existing plus Project *(Buildings Only)*				C Existing plus Project with Improvement Measure 1 *(Increased Setback)*				D Existing plus Project with Improvement Measure 2 *(Increased Setback, Canopies and Windscreens)*				E Existing plus Project with Improvement Measure 3 *(Increased Setback, Canopies and Proposed Landscaping)*			
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55	15	26	e	17	36	2	e	17	35	2	e	16	30	1	e	15	25	0	e
56	12	17	e	14	24	2	e	14	22	2	e	14	22	2	e	12	15	0	e
57	13	19	e	7	0	-6		6	0	-7		7	0	-6		5	0	-8	
58	14	22	e	10	5	-4		9	4	-5		9	3	-5		6	0	-8	
59	14	23	e	17	34	3	e	17	35	3	e	17	33	3	e	12	15	-2	e
60	12	15	e	18	39	6	e	18	38	6	e	16	31	4	e	13	17	1	e
61	13	20	e	20	48	7	e	19	44	6	e	18	36	5	e	17	36	4	e
62	12	17	e	19	44	7	e	18	41	6	e	17	37	5	e	15	25	3	e
63	13	18	e	18	37	5	e	17	35	4	e	16	32	3	e	13	19	0	e
64	12	16	e	19	43	7	e	18	42	6	e	18	41	6	e	16	32	4	e
65	13	17	e	20	45	7	e	20	46	7	e	20	46	7	e	18	41	5	e
66	13	16	e	19	40	6	e	18	37	5	e	18	37	5	e	17	33	4	e
67	14	21	e	16	31	2	e	15	25	1	e	14	24	0	e	15	26	1	e
68	16	31	e	20	46	4	e	19	44	3	e	19	42	3	e	19	40	3	e
69	12	14	e	21	48	9	e	20	46	8	e	20	47	8	e	19	43	7	e
70	18	37	e	23	53	5	e	24	55	6	e	28	63	10	e	22	51	4	e
71	14	22	e	11	10	-3		11	10	-3		12	14	-2	e	9	2	-5	
72	16	32	e	26	60	10	e	25	58	9	e	24	56	8	e	23	54	7	e

Table 2.1: Wind Comfort Results – Configurations A through E

References	A Existing			B Existing plus Project *(Buildings Only)*				C Existing plus Project with Improvement Measure 1 *(Increased Setback)*				D Existing plus Project with Improvement Measure 2 *(Increased Setback, Canopies and Windscreens)*				E Existing plus Project with Improvement Measure 3 *(Increased Setback, Canopies and Proposed Landscaping)*			
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73	17	36	e	18	39	1	e	19	41	2	e	17	35	0	e	17	35	0	e
74	15	24	e	23	53	8	e	23	52	8	e	23	52	8	e	23	53	8	e
75	15	28	e	15	25	0	e	15	25	0	e	14	23	-1	e	14	24	-1	e
76	18	37	e	18	39	0	e	18	38	0	e	18	37	0	e	18	38	0	e
77	16	32	e	13	19	-3	e	13	17	-3	e	12	17	-4	e	13	19	-3	e
78	15	27	e	10	7	-5		10	7	-5		10	5	-5		12	17	-3	e
79	15	25	e	12	12	-3	e	13	17	-2	e	12	16	-3	e	12	15	-3	e
80	16	30	e	10	5	-6		10	4	-6		9	4	-7		8	2	-8	
81	14	24	e	9	3	-5		9	4	-5		9	3	-5		10	7	-4	
82	14	22	e	10	5	-4		10	5	-4		9	4	-5		9	4	-5	
83	16	30	e	13	16	-3	e	13	15	-3	e	12	14	-4	e	13	18	-3	e
84	16	31	e	12	16	-4	e	13	19	-3	e	13	18	-3	e	12	16	-4	e
85	17	34	e	14	21	-3	e	14	23	-3	e	14	21	-3	e	14	21	-3	e
86	15	28	e	14	21	-1	e	14	22	-1	e	13	20	-2	e	14	21	-1	e
87	13	19	e	9	4	-4		9	4	-4		9	3	-4		9	4	-4	
88	13	21	e	10	7	-3		11	10	-2		10	6	-3		10	7	-3	
89	14	23	e	8	2	-6		8	1	-6		7	1	-7		6	0	-8	
90	12	16	e	6	0	-6		7	0	-5		7	0	-5		7	0	-5	

Table 2.1: Wind Comfort Results – Configurations A through E

References	A Existing			B Existing plus Project *(Buildings Only)*				C Existing plus Project with Improvement Measure 1 *(Increased Setback)*				D Existing plus Project with Improvement Measure 2 *(Increased Setback, Canopies and Windscreens)*				E Existing plus Project with Improvement Measure 3 *(Increased Setback, Canopies and Proposed Landscaping)*			
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91	14	25	e	7	0	-7		7	0	-7		6	0	-8		7	0	-7	
92	15	27	e	11	10	-4		11	10	-4		11	10	-4		7	0	-8	
93	15	26	e	12	12	-3	e	12	13	-3	e	12	12	-3	e	5	0	-10	
94	15	27	e	10	6	-5		10	6	-5		10	6	-5		6	0	-9	
95	14	23	e	12	12	-2	e	11	10	-3		11	10	-3		5	0	-9	
96	15	28	e	11	10	-4		12	15	-3	e	12	14	-3	e	10	4	-5	
97	15	26	e	10	6	-5		9	4	-6		9	4	-6		6	0	-9	
98	15	29	e	9	2	-6		8	1	-7		8	1	-7		5	0	-10	
99	15	28	e	12	13	-3	e	11	10	-4		11	10	-4		7	0	-8	
100	14	25	e	12	15	-2	e	12	16	-2	e	12	16	-2	e	7	1	-7	
101	13	18	e	12	12	-1	e	12	12	-1	e	11	10	-2		7	0	-6	
102	13	20	e	16	28	3	e	16	28	3	e	15	27	2	e	13	20	0	e
103	14	23	e	12	16	-2	e	12	15	-2	e	12	14	-2	e	9	2	-5	
104	14	22	e	14	23	0	e	14	24	0	e	14	23	0	e	9	3	-5	
105	13	20	e	12	13	-1	e	11	10	-2		11	10	-2		6	0	-7	
106	15	26	e	6	0	-9		6	0	-9		6	0	-9		5	0	-10	
107	15	25	e	8	1	-7		9	3	-6		9	3	-6		6	0	-9	
108	15	25	e	9	4	-6		10	5	-5		9	5	-6		7	1	-8	

Table 2.1: Wind Comfort Results – Configurations A through E

References	A Existing			B Existing plus Project *(Buildings Only)*				C Existing plus Project with Improvement Measure 1 *(Increased Setback)*				D Existing plus Project with Improvement Measure 2 *(Increased Setback, Canopies and Windscreens)*				E Existing plus Project with Improvement Measure 3 *(Increased Setback, Canopies and Proposed Landscaping)*			
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109	15	24	e	9	3	-6		9	4	-6		9	3	-6		6	0	-9	
110	14	20	e	14	21	0	e	13	17	-1	e	13	20	-1	e	9	3	-5	
111	14	22	e	16	32	2	e	17	33	3	e	17	33	3	e	10	5	-4	
112	14	22	e	13	19	-1	e	13	20	-1	e	13	19	-1	e	8	2	-6	
113	14	24	e	10	8	-4		11	10	-3		11	10	-3		9	6	-5	
114	15	27	e	12	13	-3	e	12	14	-3	e	12	13	-3	e	12	13	-3	e
115	14	24	e	13	18	-1	e	13	20	-1	e	13	17	-1	e	13	18	-1	e
116	12	14	e	12	13	0	e	12	13	0	e	12	12	0	e	10	7	-2	
117	13	19	e	14	25	1	e	13	22	0	e	13	21	0	e	14	22	1	e
118	12	15	e	12	13	0	e	12	13	0	e	12	13	0	e	8	3	-4	
119	13	17	e	10	8	-3		10	9	-3		10	9	-3		7	1	-6	
120	13	14	e	9	4	-4		9	5	-4		9	6	-4		9	2	-4	
121	14	19	e	12	16	-2	e	13	19	-1	e	13	18	-1	e	10	8	-4	
122	13	17	e	15	19	2	e	15	20	2	e	15	19	2	e	8	3	-5	
123	13	18	e	12	12	-1	e	13	17	0	e	13	16	0	e	8	2	-5	
124	14	18	e	16	22	2	e	16	23	2	e	17	22	3	e	12	12	-2	e
125	14	18	e	12	11	-2	e	13	15	-1	e	13	15	-1	e	11	10	-3	
126	14	23	e	11	10	-3		12	12	-2	e	12	13	-2	e	9	4	-5	

Table 2.1: Wind Comfort Results – Configurations A through E

References	A Existing			B Existing plus Project *(Buildings Only)*				C Existing plus Project with Improvement Measure 1 *(Increased Setback)*				D Existing plus Project with Improvement Measure 2 *(Increased Setback, Canopies and Windscreens)*				E Existing plus Project with Improvement Measure 3 *(Increased Setback, Canopies and Proposed Landscaping)*			
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127	14	21	e	11	10	-3		11	10	-3		11	10	-3		9	3	-5	
128	15	22	e	15	25	0	e	15	24	0	e	14	24	-1	e	9	3	-6	
129	14	22	e	13	20	-1	e	11	10	-3		11	10	-3		6	0	-8	
130	15	27	e	14	23	-1	e	14	23	-1	e	14	23	-1	e	11	10	-4	
131	15	28	e	12	14	-3	e	12	14	-3	e	12	14	-3	e	10	9	-5	
132	15	28	e	10	7	-5		10	8	-5		10	7	-5		8	5	-7	
133	14	23	e	13	16	-1	e	11	10	-3		11	10	-3		7	2	-7	
134	15	27	e	12	11	-3	e	11	10	-4		11	10	-4		5	0	-10	
135	13	22	e	9	2	-4		9	3	-4		9	3	-4		5	0	-8	
136	14	23	e	10	6	-4		10	7	-4		11	10	-3		6	0	-8	
137	15	26	e	5	0	-10		6	0	-9		6	0	-9		6	0	-9	
138	15	27	e	6	0	-9		6	0	-9		6	0	-9		6	0	-9	
139	16	31	e	12	12	-4	e	12	13	-4	e	12	12	-4	e	11	10	-5	
140	15	27	e	11	10	-4		12	12	-3	e	11	10	-4		10	8	-5	
141	15	25	e	9	5	-6		10	8	-5		10	8	-5		9	6	-6	
142	16	31	e	9	6	-7		10	8	-6		10	8	-6		10	8	-6	
143	13	17	e	9	3	-4		9	2	-4		9	3	-4		8	2	-5	
144	13	19	e	9	2	-4		8	2	-5		8	2	-5		8	1	-5	

Table 2.1: Wind Comfort Results – Configurations A through E

References	A Existing			B Existing plus Project *(Buildings Only)*				C Existing plus Project with Improvement Measure 1 *(Increased Setback)*				D Existing plus Project with Improvement Measure 2 *(Increased Setback, Canopies and Windscreens)*				E Existing plus Project with Improvement Measure 3 *(Increased Setback, Canopies and Proposed Landscaping)*			
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145	16	30	e	8	2	-8		8	2	-8		8	2	-8		8	2	-8	
146	16	32	e	10	8	-6		11	10	-5		10	9	-6		10	8	-6	
147	16	32	e	8	3	-8		9	4	-7		9	5	-7		8	4	-8	
148	11	10		8	2	-3		8	2	-3		7	1	-4		7	1	-4	
149	16	28	e	9	5	-7		9	4	-7		9	4	-7		7	1	-9	
150	14	23	e	15	27	1	e	16	28	2	e	16	27	2	e	11	10	-3	
151	15	26	e	7	1	-8		7	0	-8		7	0	-8		6	0	-9	
152	14	21	e	8	3	-6		8	2	-6		7	2	-7		5	0	-9	
153	14	23	e	10	7	-4		9	5	-5		9	4	-5		7	1	-7	
154	15	24	e	11	10	-4		8	3	-7		8	2	-7		6	0	-9	
155	14	21	e	15	27	1	e	14	23	0	e	14	23	0	e	6	0	-8	
156	14	23	e	15	21	1	e	14	17	0	e	13	15	-1	e	7	1	-7	
157	15	27	e	19	37	4	e	18	35	3	e	18	33	3	e	9	3	-6	
158	17	33	e	14	23	-3	e	14	23	-3	e	14	20	-3	e	10	5	-7	
159	16	31	e	16	30	0	e	15	26	-1	e	15	26	-1	e	7	1	-9	
160	15	25	e	18	34	3	e	16	28	1	e	16	27	1	e	9	4	-6	
161	14	22	e	10	6	-4		10	7	-4		10	7	-4		9	5	-5	
162	14	23	e	10	8	-4		10	8	-4		10	7	-4		9	5	-5	

Table 2.1: Wind Comfort Results – Configurations A through E

References	A Existing			B Existing plus Project *(Buildings Only)*				C Existing plus Project with Improvement Measure 1 *(Increased Setback)*				D Existing plus Project with Improvement Measure 2 *(Increased Setback, Canopies and Windscreens)*				E Existing plus Project with Improvement Measure 3 *(Increased Setback, Canopies and Proposed Landscaping)*			
Location Number	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds
163	15	27	e	9	4	-6		10	7	-5		11	10	-4		6	0	-9	
164	17	33	e	18	34	1	e	18	34	1	e	17	31	0	e	12	12	-5	e
165	16	31	e	18	38	2	e	18	37	2	e	17	33	1	e	10	7	-6	
166	17	35	e	19	41	2	e	19	40	2	e	19	40	2	e	14	24	-3	e
167	17	35	e	18	40	1	e	18	39	1	e	18	38	1	e	17	33	0	e
168	17	35	e	20	42	3	e	20	43	3	e	14	22	-3	e	16	29	-1	e
169	13	20	e	17	35	4	e	17	35	4	e	17	33	4	e	11	10	-2	
Average speed, Average % of time and Total exceedances	**15 mph**	**25 %**	**163 of 169**	**14 mph**	**20 %**	**-1 mph**	**111 of 169**	**13 mph**	**20 %**	**-2 Hours**	**109 of 169**	**13 mph**	**18 %**	**-2 Hours**	**107 of 169**	**11 mph**	**12 %**	**-4 Hours**	**65 of 169**

Table 2.2: Wind Comfort Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
Location Number	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds
1	21	46	e	22	46	1	e	21	44	0	e	22	47	1	e	21	44	0	e
2	21	47	e	21	46	0	e	18	36	-3	e	21	48	0	e	18	37	-3	e
3	21	46	e	18	37	-3	e	18	38	-3	e	21	46	0	e	18	38	-3	e
4	19	42	e	18	38	-1	e	16	33	-3	e	19	41	0	e	16	33	-3	e
5	18	38	e	17	32	-1	e	15	25	-3	e	20	41	2	e	15	25	-3	e
6	19	41	e	13	20	-6	e	12	14	-7	e	20	43	1	e	12	14	-7	e
7	19	42	e	11	10	-8		10	8	-9		19	40	0	e	10	8	-9	
8	21	47	e	15	28	-6	e	16	30	-5	e	19	39	-2	e	16	31	-5	e
9	24	56	e	19	41	-5	e	17	33	-7	e	23	52	-1	e	17	33	-7	e
10	20	46	e	7	0	-13		7	0	-13		12	13	-8	e	7	0	-13	
11	20	43	e	5	0	-15		8	1	-12		11	10	-9		8	1	-12	
12	19	42	e	11	10	-8		10	9	-9		15	25	-4	e	10	9	-9	
13	17	35	e	6	0	-11		6	0	-11		14	21	-3	e	6	0	-11	
14	18	37	e	7	0	-11		7	0	-11		15	26	-3	e	7	0	-11	
15	16	31	e	12	14	-4	e	12	14	-4	e	9	5	-7		12	14	-4	e
16	15	27	e	5	0	-10		5	0	-10		10	6	-5		5	0	-10	
17	14	20	e	8	1	-6		8	1	-6		11	10	-3		8	1	-6	

Table 2.2: Wind Comfort Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
Location Number	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds
18	12	12	e	8	1	-4		8	1	-4		10	5	-2		8	1	-4	
19	14	18	e	8	3	-6		8	3	-6		9	4	-5		8	3	-6	
20	14	20	e	13	16	-1	e	14	19	0	e	16	27	2	e	14	20	0	e
21	15	25	e	12	14	-3	e	12	14	-3	e	14	21	-1	e	12	14	-3	e
22	17	34	e	9	4	-8		8	2	-9		13	16	-4	e	8	2	-9	
23	13	20	e	11	10	-2		10	8	-3		12	14	-1	e	10	8	-3	
24	14	22	e	13	16	-1	e	14	17	0	e	13	17	-1	e	14	18	0	e
25	14	19	e	10	8	-4		11	10	-3		13	16	-1	e	11	10	-3	
26	14	21	e	10	8	-4		10	8	-4		12	12	-2	e	10	8	-4	
27	14	22	e	13	15	-1	e	13	14	-1	e	13	17	-1	e	13	14	-1	e
28	12	16	e	14	20	2	e	14	21	2	e	20	42	8	e	14	23	2	e
29	12	15	e	12	12	0	e	11	10	-1		17	32	5	e	11	10	-1	
30	12	15	e	15	25	3	e	12	15	0	e	21	45	9	e	13	17	1	e
31	15	26	e	13	19	-2	e	13	17	-2	e	17	32	2	e	13	17	-2	e
32	18	38	e	9	4	-9		9	4	-9		18	35	0	e	9	4	-9	
33	11	10		13	17	2	e	13	17	2	e	12	14	1	e	13	17	2	e
34	7	0		9	6	2		9	6	2		14	23	7	e	9	6	2	

Table 2.2: Wind Comfort Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
Location Number	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds
35	11	10		13	17	2	e	12	13	1	e	13	14	2	e	12	13	1	e
36	20	45	e	15	28	-5	e	12	14	-8	e	16	28	-4	e	12	14	-8	e
37	16	34	e	14	22	-2	e	11	10	-5		14	23	-2	e	11	10	-5	
38	17	35	e	15	27	-2	e	11	10	-6		16	29	-1	e	11	10	-6	
39	18	40	e	14	24	-4	e	10	5	-8		15	25	-3	e	10	5	-8	
40	6	0		10	7	4		12	15	6	e	12	15	6	e	12	15	6	e
41	8	1		8	1	0		9	2	1		10	6	2		9	2	1	
42	13	18	e	13	19	0	e	15	24	2	e	19	46	6	e	14	24	1	e
43	14	22	e	9	3	-5		8	2	-6		13	14	-1	e	8	2	-6	
44	15	26	e	12	15	-3	e	14	20	-1	e	18	38	3	e	14	20	-1	e
45	19	42	e	15	28	-4	e	15	26	-4	e	19	43	0	e	15	26	-4	e
46	13	18	e	11	10	-2		11	10	-2		18	36	5	e	11	10	-2	
47	12	18	e	14	18	2	e	11	10	-1		18	37	6	e	11	10	-1	
48	13	21	e	12	14	-1	e	12	12	-1	e	15	25	2	e	12	12	-1	e
49	14	22	e	15	17	1	e	15	17	1	e	18	22	4	e	15	18	1	e
50	13	18	e	9	5	-4		8	5	-5		17	22	4	e	8	4	-5	
51	13	20	e	7	0	-6		7	1	-6		10	6	-3		7	1	-6	

Table 2.2: Wind Comfort Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
Location Number	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds
52	12	16	e	6	0	-6		6	1	-6		10	5	-2		7	1	-5	
53	12	17	e	13	18	1	e	13	19	1	e	12	16	0	e	13	20	1	e
54	15	25	e	12	14	-3	e	12	14	-3	e	15	26	0	e	12	14	-3	e
55	15	26	e	15	25	0	e	17	33	2	e	18	38	3	e	17	33	2	e
56	12	17	e	12	15	0	e	14	21	2	e	15	25	3	e	14	22	2	e
57	13	19	e	5	0	-8		6	0	-7		7	0	-6		6	0	-7	
58	14	22	e	6	0	-8		6	0	-8		10	5	-4		6	0	-8	
59	14	23	e	12	15	-2	e	13	18	-1	e	16	33	2	e	11	10	-3	
60	12	15	e	13	16	1	e	14	20	2	e	18	38	6	e	12	14	0	e
61	13	20	e	17	36	4	e	17	36	4	e	21	49	8	e	17	35	4	e
62	12	17	e	15	26	3	e	15	26	3	e	19	44	7	e	17	32	5	e
63	13	18	e	13	19	0	e	13	19	0	e	17	33	4	e	12	13	-1	e
64	12	16	e	16	32	4	e	17	35	5	e	19	43	7	e	8	1	-4	
65	13	17	e	18	41	5	e	19	42	6	e	20	46	7	e	11	10	-2	
66	13	16	e	17	33	4	e	14	24	1	e	19	40	6	e	9	4	-4	
67	14	21	e	15	26	1	e	12	14	-2	e	16	30	2	e	5	0	-9	
68	16	31	e	19	41	3	e	15	28	-1	e	20	46	4	e	13	18	-3	e

Table 2.2: Wind Comfort Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
Location Number	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds
69	12	14	e	19	42	7	e	17	35	5	e	21	48	9	e	15	27	3	e
70	18	37	e	22	52	4	e	19	43	1	e	23	54	5	e	18	39	0	e
71	14	22	e	13	20	-1	e	9	3	-5		11	10	-3		8	1	-6	
72	16	32	e	23	53	7	e	23	52	7	e	26	60	10	e	20	48	4	e
73	17	36	e	16	31	-1	e	15	27	-2	e	18	39	1	e	15	26	-2	e
74	15	24	e	23	52	8	e	23	53	8	e	23	53	8	e	21	49	6	e
75	15	28	e	14	21	-1	e	11	10	-4		15	25	0	e	10	6	-5	
76	18	37	e	18	36	0	e	18	40	0	e	18	38	0	e	15	25	-3	e
77	16	32	e	12	16	-4	e	8	3	-8		13	19	-3	e	9	3	-7	
78	15	27	e	12	14	-3	e	6	0	-9		11	10	-4		6	0	-9	
79	15	25	e	12	14	-3	e	9	2	-6		11	10	-4		10	4	-5	
80	16	30	e	8	2	-8		7	0	-9		10	4	-6		7	0	-9	
81	14	24	e	10	6	-4		6	0	-8		10	4	-4		6	0	-8	
82	14	22	e	9	4	-5		9	2	-5		12	13	-2	e	6	0	-8	
83	16	30	e	13	17	-3	e	9	2	-7		13	17	-3	e	6	0	-10	
84	16	31	e	12	16	-4	e	12	14	-4	e	12	16	-4	e	8	1	-8	
85	17	34	e	14	21	-3	e	13	18	-4	e	14	21	-3	e	8	2	-9	

Table 2.2: Wind Comfort Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
Location Number	Wind Speed Exceeded 10□ of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Exceeds	Wind Speed Exceeded 10□ of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10□ of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10□ of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10□ of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds
86	15	28	e	14	21	-1	e	14	21	-1	e	14	21	-1	e	10	7	-5	
87	13	19	e	9	4	-4		10	4	-3		10	4	-3		9	2	-4	
88	13	21	e	11	10	-2		11	10	-2		12	12	-1	e	8	1	-5	
89	14	23	e	6	0	-8		7	0	-7		8	1	-6		7	0	-7	
90	12	16	e	8	1	-4		7	0	-5		5	0	-7		5	0	-7	
91	14	25	e	7	0	-7		7	0	-7		5	0	-9		5	0	-9	
92	15	27	e	7	0	-8		6	0	-9		12	12	-3	e	6	0	-9	
93	15	26	e	5	0	-10		5	0	-10		12	16	-3	e	5	0	-10	
94	15	27	e	7	0	-8		5	0	-10		10	6	-5		5	0	-10	
95	14	23	e	5	0	-9		4	0	-10		13	18	-1	e	4	0	-10	
96	15	28	e	9	4	-6		5	0	-10		12	15	-3	e	4	0	-11	
97	15	26	e	6	0	-9		4	0	-11		7	0	-8		4	0	-11	
98	15	29	e	5	0	-10		3	0	-12		6	0	-9		4	0	-11	
99	15	28	e	7	0	-8		6	0	-9		13	19	-2	e	6	0	-9	
100	14	25	e	7	2	-7		7	2	-7		13	17	-1	e	7	2	-7	
101	13	18	e	6	0	-7		6	0	-7		12	12	-1	e	6	0	-7	
102	13	20	e	13	20	0	e	13	17	0	e	16	29	3	e	12	13	-1	e

Table 2.2: Wind Comfort Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
Location Number	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds
103	14	23	e	9	2	-5		9	2	-5		12	16	-2	e	8	2	-6	
104	14	22	e	9	3	-5		9	3	-5		14	23	0	e	8	2	-6	
105	13	20	e	6	0	-7		6	0	-7		12	13	-1	e	6	0	-7	
106	15	26	e	5	0	-10		4	0	-11		5	0	-10		4	0	-11	
107	15	25	e	6	0	-9		6	0	-9		7	1	-8		6	0	-9	
108	15	25	e	7	1	-8		6	0	-9		9	4	-6		6	0	-9	
109	15	24	e	6	0	-9		6	0	-9		9	3	-6		6	0	-9	
110	14	20	e	9	3	-5		8	2	-6		13	21	-1	e	9	3	-5	
111	14	22	e	10	5	-4		9	3	-5		17	33	3	e	8	2	-6	
112	14	22	e	8	2	-6		8	2	-6		13	20	-1	e	8	1	-6	
113	14	24	e	9	5	-5		8	3	-6		11	10	-3		8	2	-6	
114	15	27	e	12	12	-3	e	12	12	-3	e	12	13	-3	e	12	13	-3	e
115	14	24	e	13	19	-1	e	12	15	-2	e	13	20	-1	e	12	16	-2	e
116	12	14	e	10	7	-2		9	3	-3		12	14	0	e	9	3	-3	
117	13	19	e	14	22	1	e	14	21	1	e	14	26	1	e	14	22	1	e
118	12	15	e	8	3	-4		8	3	-4		12	14	0	e	8	3	-4	
119	13	17	e	7	1	-6		7	0	-6		10	8	-3		7	0	-6	

Table 2.2: Wind Comfort Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
Location Number	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Exisitng (mph)	Exceeds
120	13	14	e	9	2	-4		9	0	-4		9	4	-4		9	0	-4	
121	14	19	e	10	7	-4		9	5	-5		12	15	-2	e	9	5	-5	
122	13	17	e	8	3	-5		8	2	-5		15	20	2	e	8	2	-5	
123	13	18	e	8	2	-5		8	2	-5		12	13	-1	e	8	2	-5	
124	14	18	e	12	12	-2	e	12	12	-2	e	16	22	2	e	12	12	-2	e
125	14	18	e	10	8	-4		10	8	-4		12	12	-2	e	10	8	-4	
126	14	23	e	9	4	-5		9	4	-5		11	10	-3		9	4	-5	
127	14	21	e	9	3	-5		9	3	-5		11	10	-3		9	3	-5	
128	15	22	e	9	2	-6		6	0	-9		14	25	-1	e	6	0	-9	
129	14	22	e	6	1	-8		7	2	-7		14	21	0	e	7	2	-7	
130	15	27	e	11	10	-4		10	7	-5		14	25	-1	e	10	7	-5	
131	15	28	e	10	8	-5		10	8	-5		12	13	-3	e	10	8	-5	
132	15	28	e	8	4	-7		8	4	-7		10	8	-5		8	4	-7	
133	14	23	e	7	2	-7		6	0	-8		12	14	-2	e	5	0	-9	
134	15	27	e	5	0	-10		5	0	-10		11	10	-4		5	0	-10	
135	13	22	e	4	0	-9		5	0	-8		9	2	-4		4	0	-9	
136	14	23	e	6	0	-8		6	0	-8		10	7	-4		6	0	-8	

Table 2.2: Wind Comfort Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
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137	15	26	e	5	0	-10		6	0	-9		5	0	-10		5	0	-10	
138	15	27	e	6	0	-9		6	0	-9		6	0	-9		6	0	-9	
139	16	31	e	11	10	-5		11	10	-5		11	10	-5		11	10	-5	
140	15	27	e	10	8	-5		10	7	-5		11	10	-4		10	6	-5	
141	15	25	e	9	6	-6		10	7	-5		9	6	-6		10	7	-5	
142	16	31	e	10	8	-6		10	8	-6		9	7	-7		10	8	-6	
143	13	17	e	9	3	-4		9	4	-4		10	4	-3		9	4	-4	
144	13	19	e	8	1	-5		8	1	-5		8	2	-5		8	2	-5	
145	16	30	e	8	1	-8		8	2	-8		8	1	-8		8	2	-8	
146	16	32	e	10	8	-6		10	8	-6		10	7	-6		10	8	-6	
147	16	32	e	8	3	-8		8	3	-8		8	3	-8		8	3	-8	
148	11	10		7	1	-4		7	1	-4		8	2	-3		7	1	-4	
149	16	28	e	7	1	-9		7	1	-9		9	4	-7		7	1	-9	
150	14	23	e	11	10	-3		11	10	-3		15	26	1	e	11	10	-3	
151	15	26	e	6	0	-9		6	0	-9		7	2	-8		6	0	-9	
152	14	21	e	5	0	-9		6	0	-8		9	4	-5		6	0	-8	
153	14	23	e	7	1	-7		7	1	-7		10	7	-4		7	1	-7	

Table 2.2: Wind Comfort Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
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154	15	24	e	6	0	-9		6	0	-9		11	10	-4		6	0	-9	
155	14	21	e	6	0	-8		6	0	-8		16	30	2	e	6	0	-8	
156	14	23	e	6	1	-8		7	1	-7		15	23	1	e	7	1	-7	
157	15	27	e	9	3	-6		9	3	-6		19	38	4	e	9	3	-6	
158	17	33	e	10	5	-7		10	5	-7		14	23	-3	e	10	5	-7	
159	16	31	e	7	1	-9		7	1	-9		17	30	1	e	7	1	-9	
160	15	25	e	9	4	-6		9	4	-6		18	35	3	e	9	4	-6	
161	14	22	e	9	5	-5		9	5	-5		10	7	-4		9	5	-5	
162	14	23	e	9	5	-5		9	5	-5		11	10	-3		9	4	-5	
163	15	27	e	6	0	-9		6	0	-9		9	4	-6		6	0	-9	
164	17	33	e	12	11	-5	e	12	11	-5	e	18	34	1	e	12	11	-5	e
165	16	31	e	10	6	-6		11	10	-5		18	38	2	e	11	10	-5	
166	17	35	e	15	25	-2	e	15	28	-2	e	19	41	2	e	15	28	-2	e
167	17	35	e	17	34	0	e	17	33	0	e	19	40	2	e	17	33	0	e
168	17	35	e	16	28	-1	e	16	28	-1	e	20	42	3	e	16	28	-1	e
169	13	20	e	11	10	-2		11	10	-2		18	36	5	e	11	10	-2	e

Table 2.2: Wind Comfort Results – Configurations F through I

References	A Existing			F Existing plus Project with Improvement Measure 4 *(Increased Setback and Proposed Landscaping)*				G Existing plus Project with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*				H Project plus Cumulative *(Buildings Only)*				I Project plus Cumulative with Improvement Measure 5 *(Increased Setback, Proposed Landscaping and Additional Landscaping)*			
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Average speed, Average % of time and Total exceedances	**15 mph**	**25 %**	**163 of 169**	**11 mph**	**12 %**	**-4 Hours**	**67 of 169**	**10 mph**	**10 %**	**-5 Hours**	**57 of 169**	**14 mph**	**20 %**	**-1 Hours**	**113 of 169**	**10 mph**	**9 %**	**-5 Hours**	**50 of 169**

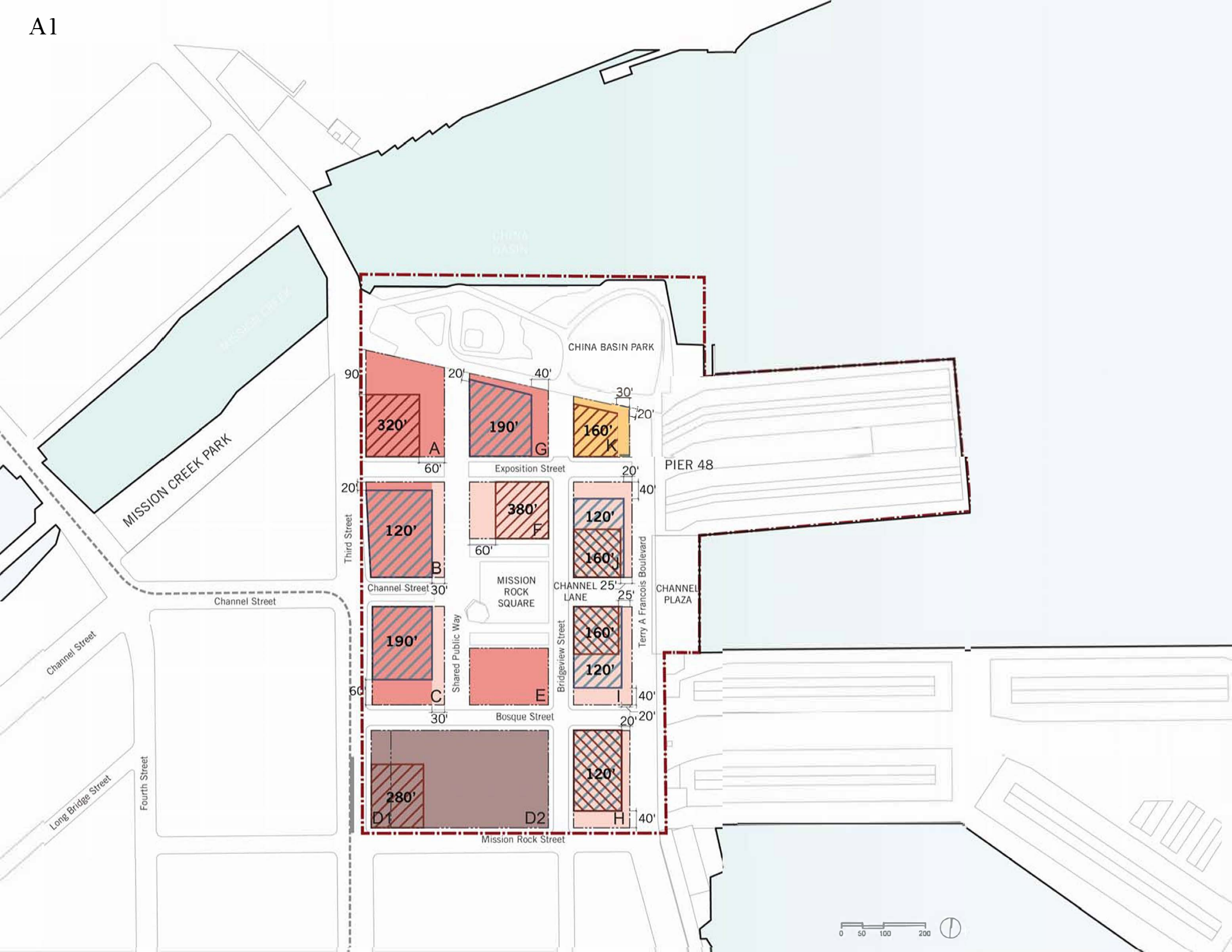
APPENDIX A

APPENDIX A: DRAWING LIST FOR MODEL CONSTRUCTION

The drawings and information listed below were received from ICF International and were used to construct the scale model of the proposed Mission Rock Development. Should there be any design changes that deviate from this list of drawings, the results may change. Therefore, if changes in the design area made, it is recommended that RWDI be contacted and requested to review their potential effects on the pedestrian wind conditions presented in this report.

Description	File Name	File Type	Date Received (dd/mm/yyyy)
3d Model	150416_SiteModel.3dm	.3dm	8/4/2015
Tree Diagram (Appendix A1)	151123 Tree Placement_Example Diagram.pdf	PDF	11/23/2015
Tree Diagram (Appendix A2)	151123 Urban Forest-Habitat-Species Guidelines	PDF	11/23/2015
Tree Diagram (Appendix A3)	160217 SITE PLAN-EIR Trees Diagram - Flat.pdf	PDF	2/23/2016

A1


CHINA BASIN PARK
MISSION CREEK PARK
PIER 48
MISSION ROCK SQUARE
Exposition Street
Channel Street
Bosque Street
Mission Rock Street
Third Street
Shared Public Way
Bridgeview Street
Terry A Francois Boulevard
CHANNEL LANE
CHANNEL PLAZA
Fourth Street
Long Bridge Street
320'
190'
160'
120'
380'
280'
A
B
C
D1
D2
E
F
G
H
I
J
K
90'
60'
40'
30'
20'
25'
0 50 100 200

Trees | **Example Tree Placement**

Legend: Tree Species

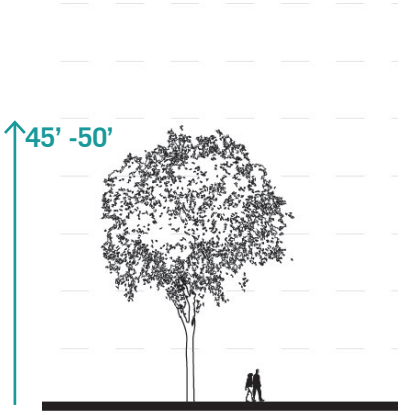
- China Basin Park (species by program area; see Images PDF)
- Shared Public Way (single species)
- Mission Rock Square (single species)
- Exposition, Bosque Streets (mixed species)
- Neighborhood Street: Bridgeview Street (single species)
- Park Promenade Tree (single species)
- *Third Street & Mission Rock Street (see existing Mission Bay design guidelines)*

GUIDELINES

China Basin Park

- Large-canopy evergreen tree (to 60'+) with picturesque, sculptural form
- Iconic character
- Windbreak and specimen tree
- Wind-tolerant; Coastal-tolerant; healthy in paving and/or lawn (select as appropriate for design concept), in high pedestrian traffic areas
- Low water use
- Minimal root disruption when planted in paving
- **Recommended species**: Monterey Cypress [*Cupressus macrocarpa*]; New Zealand Christmas Tree [*Metrosiderous excelsa*]; Red-Flowering Gum [*Corymbia ficifolia*]

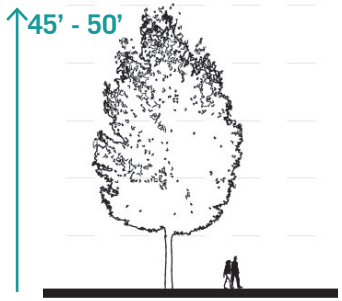
Shared Public Way



- Large, Semi-Deciduous or Evergreen tree; Deciduous acceptable if other requirements are satisfied
- Fine-textured canopy with textured, special bark
- Arching form, but more vertical than spreading
- 13'-6" clear trunk must be maintained where tree branches extend into the Shared Zone; minimum box size: 48" box
- Close spacing
- Partial-shade tolerant; Paving-tolerant; Medium wind tolerance
- Minimal root disruption
- Low water use
- **Recommended species**: Chinese Elm [*Ulmus parvifolia*]; Strawberry Tree [*Arbutus 'Marina'*]; Southern Live Oak [*Quercus virginiana]*

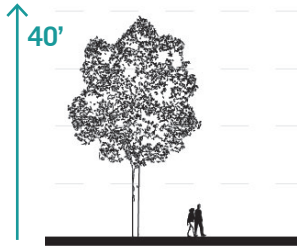
Figure 2.3.2 Urban Forest Guidelines

Mission Rock Square



- Large Deciduous or Evergreen with iconic seasonal ornamental character in leaf or flower
- Upright/somewhat columnar form with winter and summer interest
- 10' clear trunk at installation; minimum box size: 48" box
- Delicate leaf; medium-fine textured canopy
- As uniform as possible; close spacing
- Shade-tolerant; Paving-tolerant; Medium wind tolerance
- Minimal root disruption at plaza
- Low water use
- **Recommended species**: Ginkgo [*Ginkgo biloba* cultivar], Freeman Maple [*Acer x. freemanii*]; Chinese Elm [*Ulmus parvifolia*]

Neighborhood Street: Upright

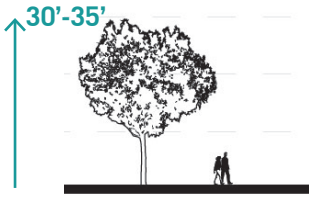


- Medium to large Evergreen or Deciduous tree
- Upright/Narrow Form
- 13'-6" clear trunk must be maintained where tree branches extend into the travel lanes.
- Shade-tolerant; Paving-tolerant; Wind-tolerant
- Minimal root disruption at sidewalk
- Low water use
- **Recommended species**: Brisbane Box [*Lophostemon confertus*], Red Oak cultivar [*Quercus rubra 'Crimson Spire'*]

Neighborhood Street: Arching

- Medium to large Evergreen tree
- Arching, graceful form
- 13'-6" clear trunk must be maintained where tree branches extend into the travel lanes.
- Special flowering if possible
- Partial-shade tolerant; Paving-tolerant; Medium wind tolerance
- Minimal root disruption
- Low water use
- **Recommended species**: Victorian Box [*Pittosporum undulatum*], California Pepper [*Schinus molle*], Cork Oak [*Quercus suber*]

China Basin Park: Park Promenade



- Small to Medium Evergreen or Deciduous tree
- Scaled to intimate walking/ seating experience
- Notable ornamental leaf or flower; showy bark
- Native/naturalized if possible
- Deep-shade tolerant; Paving-tolerant; Wind-tolerant, Coastal-tolerant
- Low water use
- **Recommended species**: Red Oak cultivar [*Quercus rubra 'Crimson Spire'*]; Melaleuca [*Melaleuca quinquenervia*]

A4

Mission Rock EIR Wind Analysis | Context Trees Diagram
1" = 50'-0"
2.17.2016

APPENDIX B

CONSULTING ENGINEERS & SCIENTISTS

APPENDIX B: SAN FRANCISCO PLANNING CODE SECTION 148

Reduction of Ground-level Wind Currents in C-3 Districts

a) **Requirement and Exception.** In C-3 Districts, buildings and additions to existing buildings shall be shaped, or other wind-baffling measures shall be adopted, so that the developments will not cause ground-level wind currents to exceed, more than 10 percent of the time year round, between 7:00 a.m. and 6:00 p.m., the comfort level of 11 m.p.h. equivalent wind speed in areas of substantial pedestrian use and seven m.p.h. equivalent wind speed in public seating areas.

When preexisting ambient wind speeds exceed the comfort level, or when a proposed building or addition may cause ambient wind speeds to exceed the comfort level, the building shall be designed to reduce the ambient wind speeds to meet the requirements. An exception may be granted, in accordance with the provisions of Section 309, allowing the building or addition to add to the amount of time that the comfort level is exceed by the least practical amount if (1) it can be shown that a building or addition cannot be shaped and other wind-baffling measures cannot be adopted to meet the foregoing requirements without creating an unattractive and ungainly building form and without unduly restricting the development potential of the building site in question, and (2) it is concluded that, because of the limited amount by which the comfort level is exceeded, the limited location in which the comfort level is exceeded, or the limited time during which the comfort level is exceeded, the addition is insubstantial.

No exception shall be granted and no building or addition shall be permitted that causes equivalent wind speeds to reach or exceed the hazard level of 26 miles per hour for a single hour of the year.

b) **Definition.** The term "equivalent wind speed" shall mean an hourly mean wind speed adjusted to incorporate the effects of gustiness or turbulence on pedestrians.

c) **Guidelines.** Procedures and Methodologies for implementing this section shall be specified by the Office of Environmental Review of the Department of City Planning. (added by Ord. 414-85, App. 9/17/85)