

Introduction

This chapter addresses the potential shadow and wind impacts that would result from the proposed project. Existing and project-generated shade patterns are described and evaluated. An analysis of wind and shadow effects is provided, and mitigation is recommended to reduce any significant impacts to less-than-significant levels. The analysis of shadow effects is based on shadow diagrams provided by Environmental Vision (Environmental Vision 2001). The analysis of wind effects is based upon a wind study written by Don Ballanti Associates (Ballanti 2001), contained in Appendix F.

Setting

Environmental Setting

Shadow

Shadows resulting from the proposed project need to be considered because the proposed building is significantly taller than most of the existing buildings in the immediate project area. The relationships between the heights of the existing buildings and that of the proposed building could affect lighting in parts of the project area and could possibly affect the suitability, aesthetics, and functionality of some structures for their current uses.

Under existing conditions, most buildings are one to three stories tall in the general vicinity of the project area, which is bounded by Clay Street, Embarcadero, Franklin Street, and I-880. The project site is bordered by commercial development and the produce district. The produce district sheds, which are approximately two stories tall, occupy the rest of the block adjacent to the project site and the area across 2nd and 3rd Streets. Also in the project area are a two-story motel across Broadway, a three-story restaurant/commercial building across 3rd Street, a two-story restaurant across 2nd Street, and other commercial structures—the tallest of which is approximately five stories tall. Two County office buildings located two blocks away from the project site are

approximately five stories tall. Open space areas in the project vicinity include public sidewalks; outside dining at Everett & Jones Barbecue, located at the corner of 2nd Street and Broadway; limited outdoor seating at Soizic, located at 3rd and Broadway; outdoor dining at the Urban Café, located at 4th Street and Broadway; and a large area of open space along the waterfront, west of Embarcadero. Figures 3H-1 through 3H-6 illustrate existing shadow patterns in the project area.

Wind

Wind is an important factor because the project site is located near the eastern shore of San Francisco Bay, and, as such, is almost constantly subject to sea-to-land breezes. The closest source of long-term wind data to the project site is the former Alameda Naval Air Station; located 4 miles west-southwest of the site. Figure 3H-7 provides a graphic summary of wind direction frequency and average wind speed by direction based on 23 years of data collected at the air station. Wind direction refers to the direction from which the wind is moving.

As indicated in Figure 3H-7, a westerly or west wind (i.e., coming off the Pacific Ocean) is the most frequent and strongest wind during all seasons. Winds from the west average 22.1 miles per hour (mph); these are not necessarily the strongest winds experienced in Oakland throughout the year, but they are those most frequently experienced. Calm conditions (no wind) occur about 10% of the time.

Regulatory Setting

Shadow

The General Plan LUTE contains the following policy relevant to the proposed project.

City of Oakland Land Use and Transportation Policy N3.9

Residential buildings should be oriented such that they avoid unreasonably blocking sunlight and views for neighboring buildings.

Wind

The City uses a pedestrian wind hazard criterion of one occurrence per year, at sidewalk locations, of winds greater than 36 mph as the maximum allowable wind speed and occurrence. The City of San Francisco uses the same criteria and experiences windy conditions throughout most of the year. After some of the tallest buildings in San Francisco (e.g., the 48-story TransAmerican Pyramid, 1972) were built, the public began to experience uncomfortable winds at the bases of these buildings. The bases of these buildings were never wind-tunnel tested. Considering wind factors during building design and city planning can help bring winds to a comfortable and safe level.

Impacts and Mitigation

Methodology

Shadow

In order to identify the proposed project's potential shadow-related impacts, existing and project-generated morning, noon, and afternoon shade patterns were compared for each of the four seasons. Specifically, four dates were used for analysis purposes: the winter and summer solstices (December 21 and June 21), when the sun is at its lowest and highest point, respectively, and the spring and fall equinoxes (March 21 and September 21), when day and night are of approximately equal length.

Photogrammetry is the science of taking measurements from photographs, models, or other types of images to make physical maps.

The shadow analysis was based on architectural design data provided by Kwan Henmi, Architects, in December 2000, and shadow modeling and photogrammetry data provided by Environmental Visions. A three-dimensional digital model of the proposed project was used to calculate the shadows for each time of day and date evaluated. This analysis considers shadow effects associated with proposed building massing only; the shadow patterns associated with proposed landscaping are not addressed.

Wind

Wind-tunnel testing of a scale model of the proposed project and surrounding area was undertaken at the U.C. Berkeley Architecture Department Boundary Layer Tunnel. A scale model of the project and structures within one to two blocks of the site was constructed (scale of 1 inch = 30 feet). Data used in construction of the model were provided by the project architects and from the City of Oakland Building Department's geographic information system (GIS).

Thirty-one sidewalk wind-measurement points were measured using the wind-tunnel testing scale model. Three additional measurements were also predicted for the 14-story rooftop, using the model of the proposed project. Figure 3H-8 shows the location of these measurement sites. Measurements were taken along both sides of Broadway between 4th Street and Embarcadero. Testing was also conducted for the area along 3rd and 2nd Street between Franklin and Broadway.

A computer program was developed to predict frequencies of wind speeds exceeding the San Francisco hazard criterion. The model combines data from different wind directions at each of the measurement points from the sidewalk and rooftop measurements. Testing was conducted for north-northwest, west, and southeast wind directions. These wind directions are modeled by a second computer program that processes wind tunnel data for sites in Oakland, using a 5-year database of wind measurements recorded at Alameda Naval Air Station.

Thresholds of Significance

Shadow

A project would have a significant impact if it would unreasonably block sunlight for neighboring buildings. Specifically, a project would have a significant impact if it would

- introduce landscape that would now or in the future cast shadow on existing solar heat collectors (in conflict with California Public Resource Code Section 25980-25986);
- cast a shadow that substantially impairs the functions of a building using passive solar collection, solar collectors for hot water heating, or photovoltaic collectors;
- cast a shadow that substantially impairs the beneficial use of any public or quasi-public park, lawn, garden, or open space;
- cast a shadow on a historic resource, as defined by CEQA Section 15064.5(a), such that it would substantially diminish /impair its eligibility for listing in the NRHP, CRHR, or a local register of historic resources or historical resource survey as defined by Public Resource Code; or
- require an exception (variance) to the policies and regulations in the General Plan, Planning Code, or Uniform Building Code, and the exception causes a fundamental conflict with policies and regulations in the General Plan, Planning Code, and Uniform Building Code addressing the provision of adequate light related to appropriate uses.

Wind

For the purposes of CEQA, the City uses a pedestrian wind hazard criterion that a 1-hour occurrence per year, at sidewalk locations, of winds greater than 36 mph represents a significant impact.

Because the ambient wind (unaffected by buildings) in Oakland seldom exceeds 36 mph, a project must substantially increase wind speeds for this threshold to be exceeded, except in very exposed locations where wind speeds would be greater (i.e., the Embarcadero area, Lake Merritt, and other areas where there is little shelter from wind). Therefore, for this analysis, the proposed project would be considered to have a potentially significant wind impact if it would result in winds greater than 36 mph persisting for more than 1 hour per year at any of the sidewalk locations modeled for the project.

Project Impacts and Mitigation

Shadow

Impact 3H-1: Shadows that would impair the function of a building using solar collectors, impair the beneficial use of public open space areas, substantially impair a historic resource, or require a variance from the City related to providing/obstructing adequate lighting (Less than Significant)

The proposed project would result in construction of a building up to 14 stories in height; approximately 186 feet. The proposed building would cast new shadows on nearby buildings, public streets, and sidewalks. Figures 3H-1 through 3H-6 illustrate project-generated shadow patterns in the area bounded by Clay Street, Embarcadero, Franklin Street, and I-880. As described below, project-generated shadow would be cast on portions of Broadway and 3rd Streets throughout the year; project-generated shadow would also be cast on 2nd Street for specific portions of the year and day. In addition, the proposed building would cast shadows on several neighboring buildings, as described below.

In summer (Figures 3H-1, 3H-3, and 3H-5), the project would create shadows on 2nd Street, 3rd Street, and Broadway. The project would shade the corner of 2nd and Broadway in the morning but would not cast a shadow on the restaurant, Everett & Jones Barbeque, located at the southeast corner of 2nd Street and Broadway. At noon, as depicted in Figure 3H-3, the shadows would cover a majority of the adjacent sidewalk on Broadway. At 3:00 p.m., the building would shade the adjacent sidewalk, a portion of the far sidewalk, and 3rd Street.

In winter, when shadows are the longest, morning shadows would be present north of the project site and throughout all of 3rd Street between Broadway and Washington Street (Figure 3H-1), and about a quarter of a block beyond Washington Street. Retail businesses, including the Buttercup Restaurant, would be affected by the morning shadow in winter. At noon, the proposed project building would shade the intersection and corners of 3rd and Broadway as well as most of Broadway between 3rd and 4th streets (Figure 3H-3). At 3:00 p.m., the shadows would shade an area east of the project site (Figure 3H-5). A portion of 3rd Street between Broadway and Franklin, immediately east of the project site, would be shaded. In addition, various buildings located within the block between 3rd and 4th and Broadway and Franklin Street (as well as a portion of 4th Street between Franklin and Broadway) would be shaded in the afternoon during the winter months.

In spring and fall, as illustrated by Figures 3H-2, 3H-4, and 3H-6, the proposed project would cast morning shadows on and across Broadway between 2nd and 3rd Streets, including on the Buttercup Restaurant. At noon, the proposed project building would shade the sidewalks facing Broadway adjacent to the building. At 3:00 p.m., the proposed project building would shade the sidewalks along 2nd

and 3rd Streets, as well as the front of some commercial property along 3rd Street, between Broadway and Franklin. Local two- to three-story businesses would be partially shaded during the morning and afternoon hours during the spring and fall.

The proposed project would shade nearby businesses during winter mornings, and would shade nearby businesses during spring and fall mornings and afternoons. The project area is already shaded by existing development. The existing shadows are shown in the shadow simulations by lighter gray shading. The proposed project would incrementally increase the area already covered by shadow on winter, spring, and fall mornings and afternoons. The proposed project would not cast any shadow that would substantially impair the function of a building using passive solar heat collection, solar collectors for hot water heating, or photovoltaic solar collectors; nor would the project cast shadows that substantially impair the beneficial use of any public or quasi-public park, lawn, garden, or open space. This was determined from a visual inspection conducted from the rooftop of 401 Broadway on December 12, 2001. Using binoculars, the inspector determined that there are no rooftop solar collectors on the blocks surrounding the project site, and no public or quasi-public open space exists in the project area. Lastly, the project would not cast shadows on a historic resource, as defined by CEQA Section 15064.5 (a), such that it would substantially diminish/impair its eligibility for listing in the NRHP, the CRHR, or in a local register of historic resources; because only incrementally increased shading would occur on limited portions of the produce district. The project would not result in significant shade and shadow impact. No mitigation is required.

Wind

Impact 3H-2: Substantial increase in wind (Less than Significant)

The proposed project would generally increase wind at sidewalk areas near the project site. Although 6 of 31 sidewalk measurement points would have decreased winds (21.4–26.5 mph) under the proposed project, 25 sidewalk locations would have increased winds (18.4–34.3mph). The largest increases would occur along 3rd Street and near the 3rd Street/Broadway intersection.

Table 3H-1 shows maximum wind (speeds exceeded once per year) with and without the proposed project, compared to the wind hazard criterion. The wind hazard criterion would not be exceeded at any of the 31 sidewalk measurement points with the proposed project. Therefore, the proposed project would have a less-than-significant effect on wind conditions for pedestrians at ground level. No mitigation is required.

At the three modeled rooftop measurement locations, the strongest winds were estimated at up to 45 mph. These winds at rooftop level would need to be

reduced because rooftop terraces are planned for use by building tenants. The following recommendation would reduce wind speeds.

In order to reduce rooftop wind speeds, the project applicant could screen open rooftop areas with vegetation, screens, or fencing. The project applicant could design the rooftop portion of the project so that vegetation (sturdy shrubs or trees), permanently attached screens, or fencing provides wind shelter and improves the safety and usability of these spaces. To maximize effectiveness, wind-sheltering elements should be porous (approximately 50% open) and engineered and anchored to withstand wind forces up to 45.1 mph. These design features should be incorporated into the final design for the project prior to the issuance of a building permit.

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 geographic information system (GIS)3

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Environmental Vision 20011
 Ballanti 20011

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