

55 Francisco Street Residential Project  
San Francisco, California

Axonometric View Shadow Study

Prepared for

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## Project

The shadow study described in this report is of a residential project at 55 Francisco Street in San Francisco California. The project is the addition of 3 stories of residence above an existing parking garage that would create a six story building. The project is located on the north side of Telegraph Hill in northeastern San Francisco.

## Study Methodology

Shadows were rendered on

|                               |                     |
|-------------------------------|---------------------|
| December 21,                  | winter solstice     |
| March/September 21,           | spring/fall equinox |
| June 21, the winter solstice, | summer solstice.    |

Shadows were cast at one half hour intervals from one hour after sunrise until project shadow no longer reached the Wharf Plaza residences or the Francisco Street-Wharf Plaza Park. The project is in the northeast section of San Francisco where the street grid is rotated 9° counterclockwise from true north.

The axonometric view used in the shadow renderings is centered on the intersection of Francisco Street and Kearny Street. This view encompasses  
 Wharf Plaza One at 150 Francisco St., (Wharf Plaza One)  
 Wharf Plaza Two at 155 Francisco St., (Wharf Plaza Two (N))  
 Wharf Plaza Two at 1855 Kearny St., (Wharf Plaza Two (S))  
 the Francisco Street-Plaza Park, (Francisco-Plaza Park)  
 the existing garage and the residential addition at 55 Francisco St., and  
 other relevant buildings around the Francisco- Kearny intersection.

Wharf Plaza One and Two, and the Francisco-Plaza Park are on the west side of Kearny St. Wharf Plaza One is adjacent and north of the Francisco-Plaza Park. Wharf Plaza Two, consisting of two buildings, is adjacent and south of the Francisco-Plaza Park. The existing 55 Francisco parking garage, the site of the residential addition, is located on the southeast corner of the intersection of Francisco St. and Kearny St.

Four park benches at the east end of the Park are frequently used elements of the Park. They have been given approximate locations until a park survey has been completed. They are used as reference points in descriptions of new and existing shadow.

## Results

### Winter Solstice

During the winter solstice, December 21, when the sun's path is lower in the sky than in the summer, shadows reach further than they would for the same hour during the summer. On December 21 shadows were cast at 8:21 am, 8:30 am, and then at one half hour intervals until 10:30 am.

### December 21 : by time

At 8:21 am new shadow reaches portions of the east and south elevations Wharf Plaza One. Existing shadow from the parking garage on the southeast corner of Francisco and Kearny Streets reaches across Francisco-Plaza Park to the base of these same elevations. These elevations receive progressively less new shadow until

no new shadow reaches Wharf Plaza One. A very small triangle of new shadow reaches the Francisco-Plaza Park. Existing shadows reach almost all of the Park at this time.

At 8:30 am, 9 minutes later, new shadow reaches portions of the east and south elevations of Wharf Plaza One and a slightly larger triangle of the Park. As the morning progresses decreasing amounts of new shadow reach the elevations of Plaza One.

At 9:00 am new shadow reaches less of the east and south elevations of Wharf Plaza One and more of the Park. The eastern pair of park benches are shaded by existing shadows. The western pair of park benches are shaded by new shadow.

At 9:30 am new shadow reaches less of the east and south elevations of Wharf Plaza One and slightly more of the Park than 30 minutes earlier. At this time the eastern pair of park benches are in sunlight and the western pair of park benches are in new shadow. Existing shadow reaches a very small triangle of the Park.

At 10:00 am new shadow reaches a small triangular area at the northeast corner of the Park, a corner of the south elevation of Plaza One, and a portion of the east elevation of Plaza One. The park benches are in sunlight.

Between 10:00 am and 10:30 am new shadow leaves Francisco-Plaza Park and Wharf Plaza One. The four park benches are in sunlight.

### **December 21 : overall**

New shadows from the project reach Wharf Plaza One and Francisco-Plaza Park from 8:21 am until a bit after 10:00 am. The amount of new shadow area is most extensive at 8:21 am and decreases to zero before 10:30 am. The Wharf Plaza Two buildings do not receive new shadow on December 21.

### **Vernal and Autumnal Equinox**

During the equinox, March 21 and September 21, the sun rises due east and sets due west. Its path, during the hours of this study is always south of an east - west line for this site. Shadows were cast at 7:21 am and then at one half hour intervals.

### **March 21 / September 21 : by time**

At 7:12 am new shadow reaches the east elevation of Wharf Plaza Two (S), the east elevation of Wharf Plaza Two (N), a portion of the northwest quadrant of Francisco-Plaza Park, and a portion of the lower half of the south elevation of Wharf Plaza One. All of these surfaces receive existing shadow. Francisco-Plaza Park is completely shaded by existing and new shadow at this time.

At 7:30 am, 18 minutes later, new shadow reaches a small area on Wharf Plaza Two (S), a portion of the east elevation Wharf Plaza Two (N), an area of Francisco-Plaza Park approximately equal to existing shadow, an area along the base of the south elevation of Wharf Plaza One, and very small area on the east elevation of Wharf Plaza One. An area in the northwest corner of Francisco-Plaza Park is sunlit.

At 8:00 am new shadow no longer reaches Wharf Plaza Two (S). New shadow reaches a portion of Wharf Plaza Two (N), a portion of Francisco-Plaza Park, and a small area of the south and east elevation of Wharf Plaza One.

At 8:30 am new shadow reaches a portion of the east elevation of Wharf Plaza Two (N), and an area on the eastern end of Francisco-Plaza Park. New shadow no longer reaches Wharf Plaza One.

At 9:00 am new shadow reaches a portion of the east elevation of Wharf Plaza Two (N) and an area on the eastern end of Francisco-Plaza Park.

At 9:30 am new shadow no longer reaches the east elevation of Wharf Plaza Two (N). New shadow reaches Francisco-Plaza Park and two of the four benches are in sunlight.

At 10:00 am new shadow reaches only a small piece of Francisco-Plaza Park. All four benches are in sunlight.

Shortly after 10:00 am no new shadow reaches Wharf Plaza One or Two, and Francisco-Plaza Park.

### **March 21 / September 21 : overall**

On March and September 21 new shadow reaches Wharf Plaza Two (S) from 7:12 am until just before 8:00 am, Wharf Plaza Two (N) from 7:12 am until 9:30 am, Wharf Plaza One from 7:12 am until 8:30 am, and Francisco-Plaza Park from 7:12 am until shortly after 10:00 am.

At 7:12 am existing and new shadow reach all of Francisco-Plaza Park and portions of Wharf Plaza One and Two. At this time the east elevation of Wharf Plaza Two (N) is completely shaded by a combination of existing and new shadow. Existing shadow leaves this elevation by a little before 8:30 am. New shadow leaves this elevation by 9:30 am. Over the course of the morning shadow areas decrease as they move to the east. The four park benches currently receive sunlight beginning at 8:00 am. With the new building the four park benches would be sunlit beginning just before 10:00am.

### **Summer Solstice**

During the summer solstice the sun's path is most northerly. It rises north of east and sets north of west. The sun reaches its highest point of the year on June 21 at noon.

#### **June 21 : by time**

At 5:48 am new shadow reaches a portion of the upper east elevation of Wharf Plaza Two (N) and a portion of the upper east elevation of Wharf Plaza Two (S). Existing shadow reaches the lower portion of the east elevation of Wharf Plaza Two (N) and the lower half of the east elevation of Wharf Plaza Two (S). New shadow does not reach Francisco-Plaza Park at this time.

At 6:00 am, 12 minutes later, new shadows on the east elevations of Wharf Plaza Two (N & S) have decreased slightly.

At 6:30 am new shadow reaches Plaza Two (N) and an area at the north end of Plaza Two (S). Existing shadow reaches the lower portion of the east elevation of Plaza Two (N) and of Plaza Two (S).

From 7:00 am until 8:00 am new shadow reaches decreasing areas of both Wharf Plaza Two (N) and (S). Shortly after 8:00 am no new shadow falls on Wharf Plaza Two (S). At 8:00 am new shadow reaches the lower half of the east elevation of Wharf Plaza Two (N). New shadow reaches a small area of Francisco-Plaza Park.

At 7:30 am new shadow reaches a strip at the southeast corner of Francisco-Plaza Park.

At 8:30 am new shadow no longer reaches the residential areas of Wharf Plaza Two (N). New shadow reaches a small area of Francisco-Plaza Park.

At 9:00 am new shadow does not reach Wharf Plaza Two (N).  
Just after 9:30 am new shadow does not reach Francisco-Plaza Park.

### **June 21 : overall**

On June 21 new shadow reaches

Wharf Plaza Two (S) from 5:48 am until just after 8:00 am,  
the residential areas Wharf Plaza Two (N) from 5:48 am until 8:30 am, and  
Francisco-Plaza Park from 7:30 am until just after 9:30 am.

New Shadow reaching the Wharf Plaza Two buildings is most extensive at 5:48 am and decreases to zero by mid morning. Francisco-Plaza Park shadowing is zero at 5:48 am, begins near 7:30 am on an area at the southeast corner of the Park and leaves the Park by a little after 9:30 am.

Wharf Plaza One receives no new shadow on June 21.

### **Reading the Shadows**

The residential project is created as a semi transparent object within the CAD model to provide a method of distinguishing between existing and new shadow within the same graphic. New shadow from the 55 Francisco Street residential project will render in gray tones while existing shadow will render in dark gray to black tones.

Recognizing new and existing shadows is facilitated by determining the areas that are sunlit. Once this is established, solid shadows and semi transparent shadows can be distinguished. Tracing shadow lines from prominent objects also facilitates understanding where shadows are falling and which building element is creating them.

It is necessary when viewing shadow from the addition to know that each planar element casts a shadow. The opacity of these shadows is additive. Sunlight passing through 4 walls of the residential addition will be twice as dark as sunlight passing through only two walls.