



MEMORANDUM

TO: Megan Nangle, Metropolitan Transportation Commission

FROM: Amy Wang, David J. Powers & Associates, Inc.
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DATE: June 29, 2023

SUBJECT: **Technical Memorandum – Visual Assessment
The Bay Lights 360**

The purpose of this memorandum is to assess the visual impacts associated with the proposed, The Bay Lights 360 Project, on the upper deck level of the Bay Bridge's West Span in the City of San Francisco.

PROJECT DESCRIPTION

The Bay Lights is an existing art installation on the north side of the Bay Bridge's West Span and is the world's largest light-emitting diode (LED) light sculpture. The Bay Lights has been lit since March 5, 2013, was replaced in kind in the fall of 2015, and recommissioned in February 2016 as a permanent installation. The proposed Project consists of three main components: (1) the extension of the light sculpture for another 10 years to 2033; (2) the replacement of the light fixtures with newly updated and more robust fixtures and components while keeping the same technical details and intensity of the lights as the current installation; and (3) the addition of light fixtures to the driver's (inward-facing) side of the same suspension cables for a 360-degree view of the light sculpture.

The Project proposes to remove the existing LED lights on the vertical suspension cables of the north-facing side of the upper deck level of the Bay Bridge's West Span.¹ New LED light strands will be installed on the inward- and outward-facing sides of the same suspension cables during the evening/overnight hours from 9:00 pm to 5:00 am Sunday through Friday nights, and from 11:00 pm to 6:00 am Saturday nights if needed, which will require nightly closure of the outside traffic lanes (lanes 4 and 5) and will take approximately four to six months to complete. The crews will utilize bosun chairs for the high cables and/or bucket trucks for the shorter cables (up to 80 feet) for the removal and reinstallation.

Forty-eight thousand (48,000) energy-efficient LED lights, approximately 1.75" x 2.75" each, will be installed. The LED lights will be secured to the vertical suspension bridge cables at the full height of the suspension cables at one-foot spacing. The lights will be attached to the outward-facing side

¹ There are currently no LED lights, nor does the project propose to install any, on the south-facing side of the upper deck of the Bay Bridge's West Span.

(north-facing side only) of the bridge suspension cables with ultraviolet (UV) resistant, heat-stabilized nylon black zip ties at six-inch intervals, so no paint disturbance will occur to the bridge structure and no repainting is needed. The light temperature will be 4,000 kelvin and the brightness will be 87 lumens (at 100-percent brightness) for all fixtures, consistent with the existing lighting. Light fixtures can be replaced individually, if needed.

The backbone fiber trunk line, power line and electrical boxes from previous installation will stay in place with no modifications, except for the internal back plate of the electrical boxes with all existing power supply and fiber switch components, which will be removed and replaced with new components.

The proposed new The Bay Lights 360 will be visible from all directions (360-degree view) and will be lit from dusk to dawn for 10 years. The light strands on both sides of the cables can be turned off or dimmed independently of each other with their own separate controls. The light fixtures can also be physically adjusted (rotated).

The light display will be controlled by the artist and will appear to be moving in a wave-like and alternating flickering nonrepeatable but abstract pattern, consistent with the existing lighting.

It is anticipated the proposed installation will start in May, 2023, and be fully installed by December, 2023.

VISUAL ENVIRONMENT OF THE PROJECT SITE

Project Setting

The West Span of the Bay Bridge crosses the San Francisco Bay (SF Bay) between Yerba Buena Island (YBI) and the City of San Francisco. The West Span is 10,304 feet (approximately two miles) long and consists of a double deck structure with two complete steel plated suspension spans connected at a center concrete anchorage. The West Span includes diagonal perforated steel crossbeams connecting the upper and lower road decks and four steel towers 519-foot high, located between rows of vertical suspension cables. The upper deck level includes five one-way travel lanes and serves as the Interstate 80 (I-80) western anchorage and touch-down for the San Francisco side of the Bay Bridge from YBI. See Photos 1 through 8 for existing views of the Bay Bridge.

Existing Visual Character and Visual Quality

Given that the Bay Bridge is located at the interface between the natural setting of the SF Bay, YBI, and the existing development of the City of San Francisco and YBI, the project area is considered suburban in nature. The visual character of the Bay Bridge is dominated by the SF Bay. The Bay Bridge itself is also a visual feature because its massive scale visually dominates the area. Under existing nighttime conditions, views of the Bay Bridge from the San Francisco shoreline towards YBI include lights along the top of the suspension cables between the towers, the LED lights that make up the existing The Bay Lights light sculpture on the suspension cables, and roadway lights (Photo 2). The Bay Bridge also includes marine navigation lights pursuant to the requirements of 33 CFR 118. The center of the navigable channel under each span is marked by two green lights, and

each margin of each navigable channel is marked by a red light. Because the Bay Bridge has two or more spans over a navigable channel, the main channel span is also marked with three white lights arranged in a vertical line directly above each green light. The steel and concrete of the bridge contrast with the SF Bay and YBI, adding to the visual diversity of the landscape. The scale and structure of the bridge complement the existing buildings on the San Francisco side of the Bay Bridge.

According to the publication *Visual Impact Assessment for Highway Projects* (Federal Highway Administration, March 1981), visual quality is evaluated by identifying the vividness, intactness, and unity present in the viewshed.² The visual quality of the Bay Bridge is high, given the presence of the SF Bay. The **vividness** of the project setting is high, given the Bay Bridge is massive in scale and dominates views in the area. The Bay Bridge does not disrupt the **intactness** of the landscape because the scale and elevation of the bridge is consistent with development on the San Francisco shoreline. The Bay Bridge provides **unity** to the project area, as development transitions from the sparsely populated YBI in the east, across the SF Bay, to the highly developed urban skyline of San Francisco in the west.

EXISTING VIEWS OF AND FROM THE PROJECT SITE

Project Viewshed

The outward facing side of the northern vertical suspension cables of the upper deck level of the Bay Bridge's West Span is visible looking west from a small stretch of the existing bridge viaduct structure on the west side of YBI (Photos 3 and 4) and looking east from various public access points along the San Francisco shoreline north of the Bay Bridge. Groups with a predominate view of this area of the Bay Bridge include the people who work at, or visit, the San Francisco shoreline, mainly along The Embarcadero north of the Bay Bridge. This area of the Bay Bridge is also visible to mariners within the Bay channel traveling south.

The inward facing side of the northern vertical suspension cables of the upper deck level of the Bay Bridge's West Span is visible along the travel lanes of the upper deck level (Photos 5 and 6) and looking north/northeast from various public access points along the shoreline south of the Bay Bridge (Photos 7 and 8). Groups with a predominate view of this area of the Bay Bridge include the people who work at, or visit, the San Francisco shoreline, mainly along The Embarcadero south of the Bay Bridge. This area of the Bay Bridge is also visible to mariners within the Bay channel traveling north.

Viewer Exposure

Viewer exposure is typically assessed by measuring the number of viewers exposed to the resource change, type of viewer activity, duration of their view, speed at which the view moves, and position

² **Vividness** is the visual power or memorability of landscape components as they combine in distinctive visual patterns. **Intactness** is the visual integrity of the natural and man-built landscape and its freedom from encroaching elements. **Unity** is the visual coherence and compositional harmony of the landscape considered as a whole; it frequently attests to the careful design of individual man-made components in the landscape.

of the viewer.³ For example, viewer groups with frequent, stationary exposure to a particular landscape are expected to have greater sensitivity and have a stronger desire for visual detail; whereas users of a roadway will have a temporary, moving view and will, therefore, have different values regarding scenic quality, such as a greater need for visual simplicity.

The employees and travelers along the San Francisco shoreline north of the bridge, as well as the mariners in the Bay, have the greatest degree of exposure with frequent and stationary views of the outward facing side of the Bay Bridge's northern vertical suspension cables. The drivers along the upper deck and existing bridge viaduct structures on the west side of YBI, the employees and travelers along the San Francisco shoreline south of the bridge, as well as the mariners in the Bay have the greatest degree of exposure with frequent and or close views of the inward facing side of the Bay Bridge's northern vertical suspension cables. The speed limit along the Bay Bridge is 50 miles per hour. While fleeting, the drivers and passengers are exposed to the inward-facing side of the vertical suspension cables.

Viewer Sensitivity

Viewer sensitivity is defined both as the viewers' concern for scenic quality and the viewers' response to change in visual resources that make up the view.⁴ Viewer response is influenced by local values and goals with particular sensitivity to landscapes with cultural significance.

The SF Bay and shoreline are considered scenic resources in the City of San Francisco. According to the City of San Francisco General Plan, the Pacific Ocean, San Francisco Bay and their respective shorelines are the most important natural resources in San Francisco. They offer opportunities for water-oriented recreation, passive recreation, and views, and the Embarcadero corridor is becoming one of the world's great public urban waterfronts. The City currently has a NorthEastern Waterfront Area Plan, which includes The Embarcadero, and recommends objectives and policies designed to contribute to the waterfront's environmental quality and provide for the maximum feasible visual and physical access to and along the Bay. Under the NorthEastern Waterfront Area Plan goals, the increased visibility of the natural attributes of the Bay will reinforce the special identity of the area. As indicated by the City's plans, maintaining the visual accessibility and views along the San Francisco shoreline is a priority in terms of visual resources for the City.

VISUAL ASSESSMENT

The visual impacts of the proposed, The Bay Lights 360 Project, are determined by assessing the visual resource change due to the Project and predicting viewer response to that change.⁵ The following describe the levels of visual impact:

Low: Minor adverse change to the existing visual resource, with low viewer response to change in the visual environment. May or may not require mitigation.

³ Federal Highway Administration. 1981. *Visual Impact Assessment for Highway Projects*. March 1981.

⁴ Ibid.

⁵ Ibid.

Moderate: Moderate adverse change to the visual resource with moderate viewer response. Impact can be mitigated within five years using conventional practices.

Moderately High: Moderate adverse visual resource change with high viewer response or high adverse visual resource change with moderate viewer response. Extraordinary mitigation practices may be required. Landscape treatment required will generally take longer than five years to mitigate.

High: A high level of adverse change to the resource or a high level of viewer response to visual change such that architectural design and landscape treatment cannot mitigate the impacts. Viewer response level is high. An alternative project design may be required to avoid highly adverse impacts.

Changes to Visual Character of the Site

The Project would maintain the same lighting on the Bay's (outward-facing) side of the northern vertical suspension cables while adding identical lighting to the driver's (inward-facing) side of the northern vertical suspension cables. The Project will not change the visual character of the outward-facing side of the Bay Bridge, as the lights currently exist on that side. The Project will change the visual character of the inward-facing side of the northern vertical suspension cables by adding lights to the entire Bay Bridge's West Span. The Project as a whole has been designed to complement the existing aesthetic value of the Bay Bridge and its surrounding setting by adding an additional visual element to the character of the bridge. The current LED light display is compatible with the surrounding SF Bay and shoreline, as it complements the existing nighttime views of the lighted urban skyline on the San Francisco side of the bridge. The LED light display on the inward-facing side of the bridge will mirror the lights on the outward-facing side, creating a 360-view of the lights, and achieve the same visual effect as the outward-facing side. The LED white lights do not affect daytime views, because the small LED lights (unlit from dawn until dusk) are imperceptible from the San Francisco shoreline. Currently, the light pattern does not block existing views in any way. This will not change when the lights are reinstalled on the outward-facing side and added to the inward-facing side. The LED white lights will continue to not interfere with the marine navigation lights, as they will be reinstalled on the vertical suspension bridge cables, well above the marine navigation lights.

The visual character of the site will be temporarily and slightly affected during the removal and re-installation of the lights due to the presence of removal/installation crews and traffic controls. The existing LED lights will be removed, and new LED lights will be installed concurrently during the evening/overnight hours and will require nightly closure of the two outside traffic lanes. The removal and installation will take approximately four to six months. Because the removal and reinstallation is temporary and the visibility of the traffic controls and installation crews will be primarily limited to the immediate surroundings, the visual impact will be low.

Changes to Visual Resources

Adding lighting to the inward-facing side of the vertical suspension cables will change the view of the Bay Bridge looking north from the south of the bridge as it would create a new focal point, however, it will not adversely affect the visual quality of the area. The light display is designed to and currently complements the existing views of the Bay Bridge and its surroundings. The new

lighting on the inward-facing side would create the same view as what is currently experienced on the northern side of the bridge. The existing lights are currently partially visible from the south side of the bridge along The Embarcadero (Photo 8). The lights will continue to create a fine arts experience for San Francisco residents and visitors and bring focus to the structure that represents connectivity and mobility.

Views of the Bay Bridge Lights

As previously described, views from which the Project will be visible include the vehicle users on the Bay Bridge (passengers and drivers), San Francisco shoreline, mariners on the Bay, and a small stretch of the existing bridge viaduct structure on the west side of YBI. The Bay Bridge's massive scale visually dominates the area; therefore, the proposed Project will affect a scenic vista.

The LED white lights will be reinstalled on the outward-facing side of the vertical suspended cables and face both outward (towards the Bay) and inward (towards the bridge vehicular traffic). The Bay Lights 360 will be lit from dusk to dawn. It is anticipated that viewer response north of the bridge would not change compared to existing conditions (Photos 1 and 2), and viewer response south of the bridge would be low but positive, because the view would be similar to existing views from the north of the bridge, where the lights have been designed to complement the existing aesthetic value of the Bay Bridge and its surrounding setting.

Compared to existing conditions, the vehicle drivers will now perceive the LED lights as they drive along the approximately two-mile bridge. The change in viewer response would be considered low due to the fleeting nature of the view, backdrop of the lighted San Francisco skyline, and partial visibility of the existing lights on the bridge. The lights on the outward- and inward-facing sides will be independently controlled and one side can be turned off independently from the other side, therefore, the inward-facing lights can be dimmed, physically adjusted (rotated), or turned off at the request of the California Highway Patrol for driver safety concerns, if needed.

The view of the bridge structure from existing bridge viaduct structure on the west side of YBI will be similar as the view looks at the outward-facing side of the bridge, where the existing lights are placed. In addition, the duration of views from existing bridge viaduct structure on the west side of YBI is not long enough for drivers and passengers to perceive the landscape and notice visual features in the area; therefore, the viewer response at YBI will be low.

Per the federal requirements of Title 33: Navigation and Navigable Waters, (33 CFR 118.10), no person shall obstruct or interfere with any lights or signals maintained in accordance with the regulations prescribed in this part. Therefore, the proposed lights may not obstruct or interfere with the existing Bay Bridge navigational lights. The LED white lights will be reinstalled on the vertical suspension cables well above the existing marine navigation lights and will not block or obscure the navigational lights. Additionally, the LED white lights cannot interfere with the visibility of the required navigation lights for mariners, especially during varying weather conditions (i.e., fog). For this reason, Caltrans has an established procedure in place during the period the lights are illuminated to quickly extinguish the LED white lights display, as needed, to ensure marine navigation safety.

During the past 9 years that the lights have been lit there has never been a need to implement the “Coast Guard Power-down” procedure to ensure marine navigation safety.⁶

Similarly, the proposed Bay Lights 360 Project will not obstruct or interfere with the Federal Aviation Administration (FAA) aviation obstruction lights currently in place on the bridge for aviation safety.

Since the installation of The Bay Lights on March 5, 2013, there has been substantial positive response from members of the media and locals, including the Hemispheres Magazine listing the artwork as the number one thing to see in the world during 2013, members of the public posting half a billion media impressions within the first six month of installation, and increasing visitors along the waterfront.⁷ Same as existing condition, the Project will not adversely affect the visual quality of the area or block views. The viewer response to The Bay Lights 360 by motorists traveling along the bridge and viewers (mariners, bicyclists, and pedestrians) south of the bridge would be low given the nighttime visual character of the area. For all viewer types, the change in view would not be adverse and would likely continue to be positive.

References:

United States Department of Transportation, Federal Highways Administration, Office of Environmental Policy. *Visual Impact Assessment for Highway Projects*. March 1981.

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Illuminate. *Projects*. 2022. Available at: <https://illuminate.org/projects/the-bay-lights/>.

⁶ Shahmirzai, Saeed. Senior Construction Manager – Zoon Engineering. Personal Communication. November 7, 2022.

⁷ Illuminate. *Projects*. 2022. Available at: <https://illuminate.org/projects/the-bay-lights/>.



Photo 1: View of Bay Bridge looking east from the San Francisco shoreline, towards Yerba Buena Island and hills.



Photo 2: Nighttime view of Bay Bridge with The Bay Lights art display looking east from the San Francisco shoreline, towards Yerba Buena Island and hills.



Photo 3: View of the Bay Bridge looking west from Yerba Buena Island, towards the San Francisco shoreline.



Photo 4: Nighttime view of the Bay Bridge with The Bay Lights art display looking west from Yerba Buena Island, towards the San Francisco shoreline.



Photo 5: View of suspension cables of the Bay Bridge looking west, toward the San Francisco shoreline, from upper deck of the Bay Bridge.

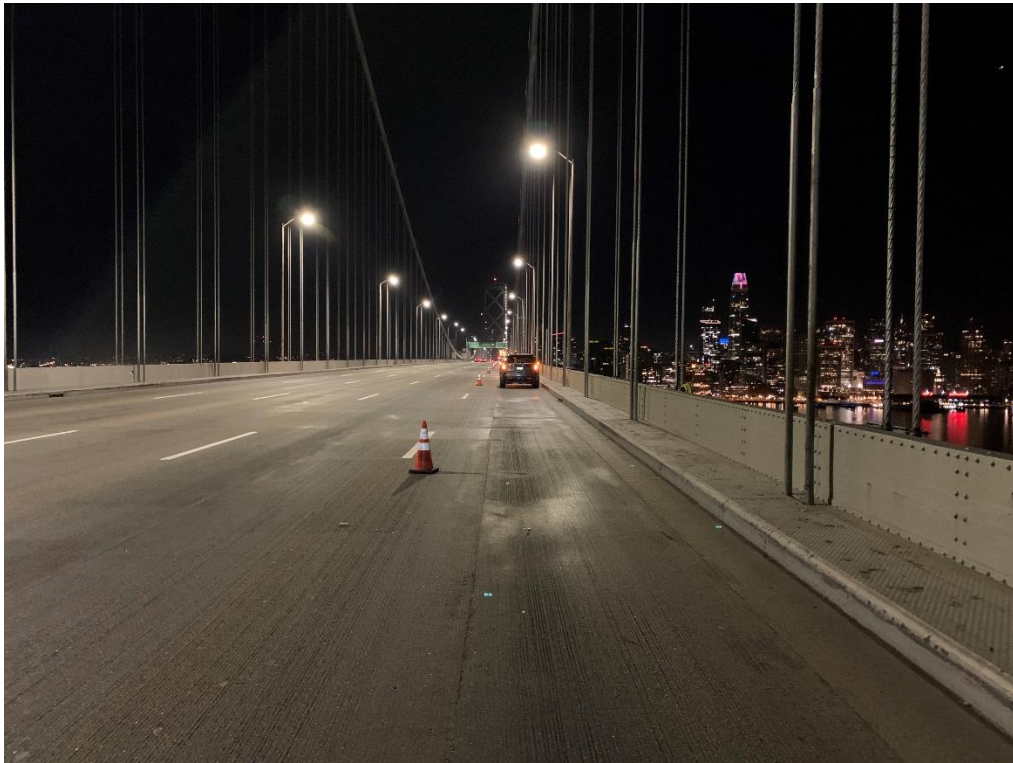


Photo 6: Nighttime view of suspension cables of the Bay Bridge with The Bay Lights art display looking west, toward the San Francisco shoreline, from upper deck of the Bay Bridge.



Photo 7: View of Bay Bridge looking north/northeast from the San Francisco shoreline, towards Yerba Buena Island and hills.

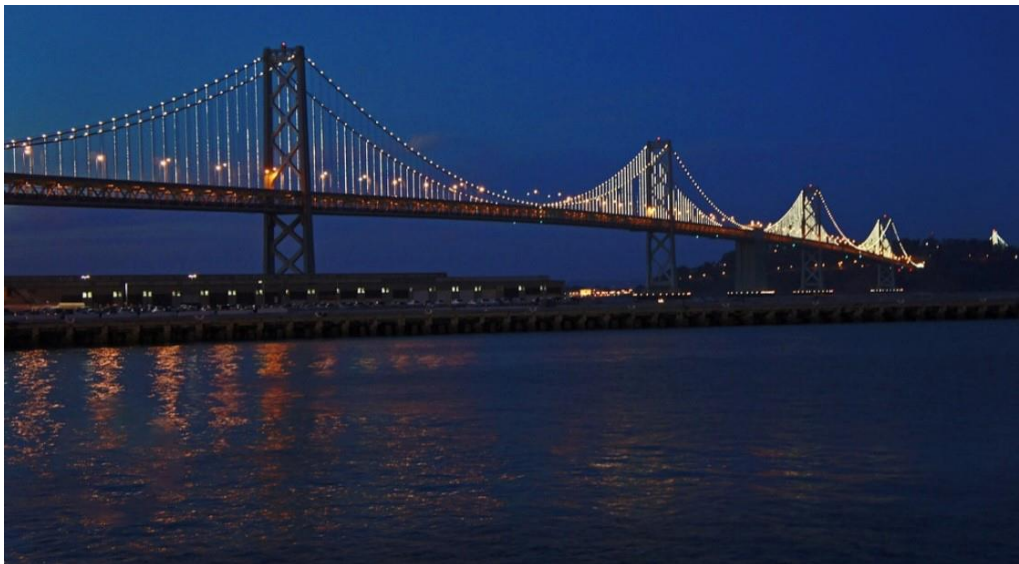


Photo 8: Nighttime view of Bay Bridge with The Bay Lights art display partially visible looking north/northeast from the San Francisco shoreline, towards Yerba Buena Island and hills.