

**ADDENDUM TO THE
LOCATION HYDRAULIC STUDY REPORT**

**FOR THE
INTERSTATE 80/GILMAN STREET INTERCHANGE
IMPROVEMENT PROJECT**

ALAMEDA COUNTY, CALIFORNIA
District 04 -ALA – 80 – POST MILE 6.38 / 6.95
EA 04-0A7700 / Project ID# 0400020155

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THE STATE OF CALIFORNIA
Department of Transportation
and Alameda County Transportation Commission

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1.1 ADDENDUM SUMMARY OF CHANGES

This addendum updates and augments previous report findings for floodplains and sea-level rise (SLR) projections. Two specific changes addressed in this addendum include a Federal Emergency Management Agency (FEMA) update to delineated floodplain mapping within the project limits and SLR projections. A 2018 pending *Flood Insurance Study* (FIS) and *Flood Insurance Rate Map* (FIRM) are expected to be adopted on December 21, 2018 that will change the FEMA-delineated floodplains and water surface elevations within the project area. Additionally, over the past year, SLR projections have been updated for the region. On March 14, 2018, the California Ocean Project Council presented the revised *State of California Sea-Level Rise Guidance* that includes increased predicted elevations in the project area.

1.2 UPDATES TO MAY 2018 LOCATION HYDRAULIC STUDY REPORT

The following sections would replace sections in the Executive Summary starting from the second paragraph on page iv:

The purpose of this study is to determine the existing Federal Emergency Management Agency (FEMA) floodplains within the Project limits and determine whether the Project improvements will be affected by — or will affect — the base flood.

The Project limits are composed of FEMA Special Flood Hazard Areas (SFHAs) zones, specifically Zone VE, Zone AE, Zone AO, and Zone X (both shaded and unshaded). Zone VE zones are coastal floodplains subject to flooding and velocity hazards (wave action) by the 1%-annual-chance flood. Zone AE zones represent areas subject to inundation by the 1%-annual-chance flood event determined by detailed methods. The area along 5th Street north of Harrison Street is adjacent to Zone AO, which represents areas subject to inundation by 1%-annual-chance shallow flooding (usually sheet flow on sloping terrain) where flood depths are between 1 foot to 3 feet and where average depths have been determined; the average flood depth in a Zone AO is 2 feet. The shaded Zone X area is east of I-80 and represents areas in the 0.2%-annual-chance floodplain. Areas west of I-80 and outside of Zone VE are in an unshaded Zone X, which represents areas outside the SFHA and above the elevation of the 0.2%-annual-chance flood. SLR has the potential to impact some localized areas within the Project limits.

The Project would add under one acre of impervious area. The Project does not propose to change land use within the Project area. The amount of additional fill in the floodplain and change in the 100-year water surface elevation (WSE) will be minimal.

Proposed drainage systems would be designed to capture and convey runoff from the design storm in the Project area. Structures blocking coastal flood flows have been avoided in the design of the Project. Cut and fill volumes in the Zone AE floodplain have been balanced to minimize fill. Work done within Zone AO is limited to striping only, so it would not introduce additional fill inside the floodplain. SLR has the potential to affect the Project area in the year 2040, according to projections from the *State of California Sea-Level Rise Guidance* (CO-CAT 2018). A tidal flap gate would be installed at the existing headwall of the 60-inch-diameter reinforced concrete pipe (RCP) at the west-end terminus of Gilman Street to prevent backflow in the storm drain system. The tidal flap gate will prevent tidal backflow from entering into the Project area; however, the flap gate would not prevent impacts resulting from SLR. Preventing impacts from SLR is beyond the scope of this Project. The Project is anticipated to have minimal impact on floodplains in the Project area; therefore, no minimization measures are proposed as part of the Project.

The following figure would replace Figure 2. Project Location in Section 1.1 Project Description:



Figure 2. Project Location

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The following figure would replace Figure 3. Roundabout Alternative in Section 1.2 Build Alternative:



Figure 3. Roundabout Alternative

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The following sections would replace Section 2.6. FEMA Floodplains:

Typically, each county (or community) has a *Flood Insurance Study* (FIS), which is used to locally develop *Flood Insurance Rate Maps* (FIRMs) and Base Flood Elevations (BFEs). Alameda County's effective FIS identifies Special Flood Hazard Areas (SFHA) and other flood areas within unincorporated and incorporated areas of the County. The majority of the Project is located within FIRM No. FM06001C0018H (FEMA 2018a) as shown in Figure 4. The remainder of the Project is located within FIRM No. FM06001C0014H (FEMA 2018b) and No. FM06001C0056H (FEMA 2018c).

The FEMA FIRMs were researched for floodplain information. Figure 5 shows the Project layout with the associated FEMA flood zones. The FEMA-delineated SFHA at the Project location include Zone VE, Zone AE, Zone AO, shaded Zone X, and unshaded Zone X.

Zone VE areas are coastal floodplains subject to flooding and velocity hazards (wave action) by the 1%-annual-chance flood. The outfall of the existing 60-inch-diameter storm drain system is identified as being in Zone VE within the Project Area.

Zone AE represents areas subject to inundation by the 1%-annual-chance flood event determined by detailed methods. Within the Project area, Zone AE represents areas inundated by stillwater flooding with minimal wave hazard effects. The parking lot for the Tom Bates Regional Sports Complex is identified as being within a Zone AE within the Project Area, and the floodplain boundary is located at the point where the ground elevation equals the stillwater elevation, which is 10.2 feet NAVD 88 in the City of Berkeley. The limits of the Zone AE within the Project Area do not extend to the proposed Gilman Street and Gilman Street Extension.

The area along 5th Street north of Harrison Street is adjacent to Zone AO, which represents areas subject to inundation by 1%-annual-chance shallow flooding (usually sheet flow on sloping terrain) where flood depths are between 1 foot to 3 feet and where average depths have been determined. This Zone AO is associated with Codornices Creek. The Alameda County FIS states:

“Because the City of Berkeley is fully urbanized and lies not in a valley but on a coastal plain bound by steep hills, stream flood flows may leave the channel and spread out through city streets towards the San Francisco Bay as shallow flooding. Floodways for Codornices, Schoolhouse...Creeks are not applicable.”
(FEMA 2018d).

A majority of the Project area east of I-80 is identified as being within shaded Zone X, defined by FEMA's digital FIRM (No. NFHL_06001C) as areas in the 0.2%-annual-chance floodplain. The shaded Zone X area is likely attributed to Codornices Creek.

Project areas outside of Zones VE, AO, and shaded Zone X are within unshaded Zone X, which represents areas outside the SFHAs and above the elevation of the 0.2%-annual-chance flood.

The following figures in this section was revised:



Figure 4. Project Area with FEMA FIRM Panel Numbers



Figure 5. Project Layout with FEMA Flood Zones

The following sections would replace Section 3.1.3. Fill Inside the Floodplain:

There would be minimal fill in the Project area. The Project proposes to balance cut and fill in FEMA SFHA Zone AE. Cut and fill quantities will be further determined for Zone VE in the design phase. No cut or fill is proposed for Zone AO.

The following sections would replace Section 3.3. Sea Level Rise:

The elevation of the Project site (9.0-20.0 feet NAVD 88) is relatively low in comparison to the existing 100-year stillwater elevation of 10.2 feet NAVD 88 at the Project location (FEMA 2018d). The Project site would be susceptible to inundation from future SLR. The SLR for the project was estimated using the following decision framework steps available in the 2018 *State of California Sea-Level Rise Guidance* published by the California Ocean Protection Council (CO-CAT 2018).

- Identify the nearest tidal gauge from the project location
- Evaluate the project lifespan
- For the nearest tide gauge and project lifespan, identify range of sea-level rise projections

For this Project, the San Francisco gauge is the closest tidal gauge identified in the 2018 Guidance (CO-CAT 2018). The project is expected to have a pavement design life of 20 years. Therefore, year 2040 was selected as the year for SLR projection. Per Table 13 of the 2018 Guidance, the Project SLR depth is estimated at 1.0 foot assuming high emissions and using the 5% (1-in-20) chance of occurrence.

After determining the SLR depth, following general implementation steps were performed for this Project using the Caltrans' *Guidance on Incorporating Sea Level Rise* (Caltrans 2011).

- Obtain topo maps to determine the correlation between current sea level and planned facility elevations for the proposed project
- Determine if relative SLR will have negative impacts on facility function or operation
- For the listed impacts, determine if adaptive measures will be necessary
- Provide incremental or staged improvements to address SLR

With this projection, the tidal 100-year stillwater elevation at the Project location would increase to approximately 11.2 feet NAVD 88. There are local low points at a drain inlet on the southwestern edge of the westbound traffic circle with an approximate elevation of 10.4 feet NAVD 88 and along Gilman Street Extension with an approximate elevation of 9.0 feet NAVD 88. The area around these low points would be especially susceptible to impacts from SLR during the 100-year flood event due to backflow through the drainage system or from overland tidal inundation. A tidal flap gate is proposed at the Gilman Street outfall to prevent tidal backflow from entering into the Project area. More information about the tidal flap gate is discussed in Section 4.2. In addition, the road surface elevations and the storm drain inlet elevations around the 2nd Street and Gilman Street intersection, the Gilman Street Extension, and the Golden Gate northwest and northeast parking lots range from 9.0 to 15.0 feet NAVD 88. These areas are susceptible to backflow through the storm drain system or overland tidal inundation when accounting for SLR.

The following figure in this section was revised:

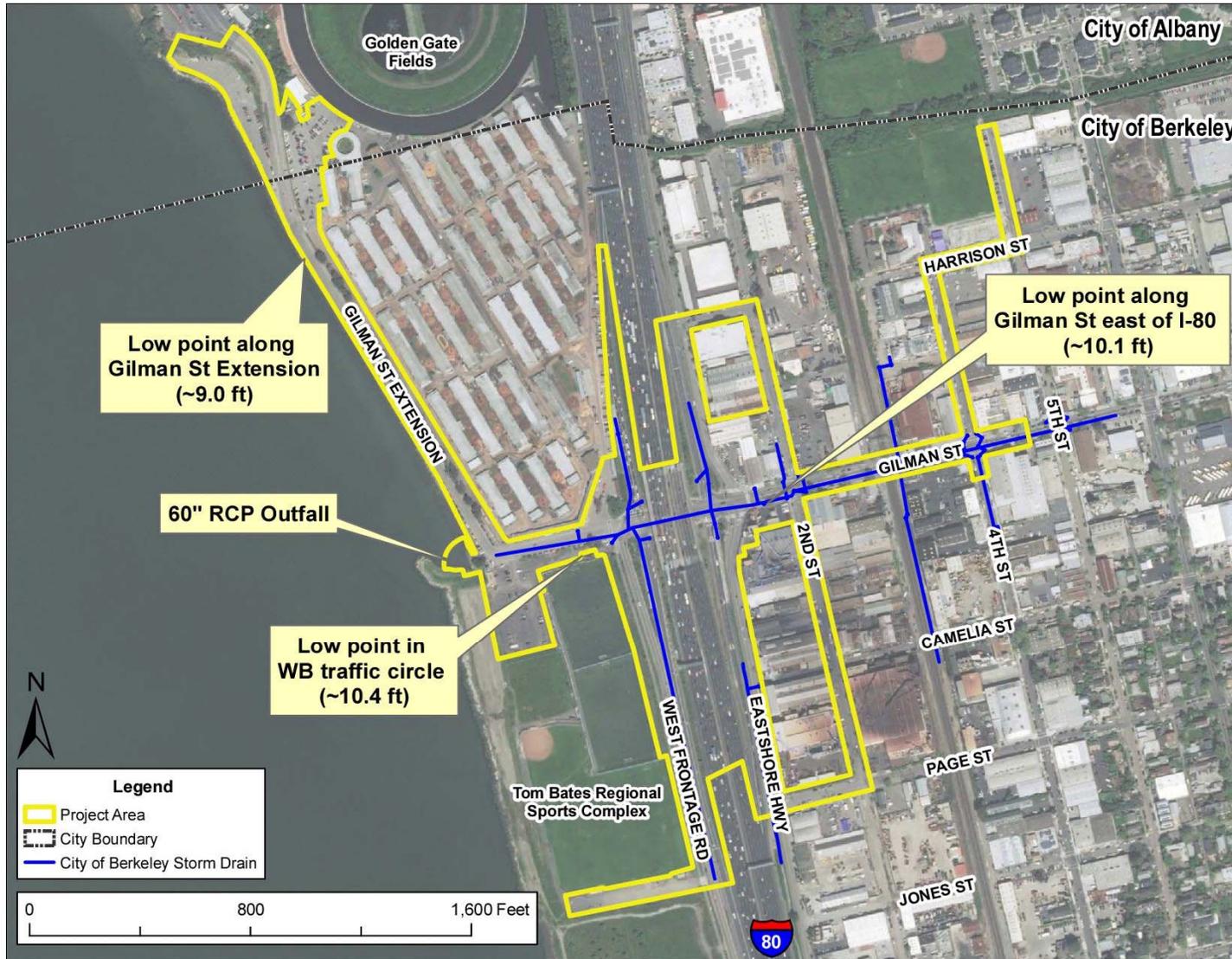


Figure 6. Project layout showing the low points susceptible to sea level rise

The following sections would replace Section 4. AVOIDANCE, MINIMIATION, AND/OR MITIGATION MEASURES:

The Project does not propose any adverse impacts to the floodplain, and therefore, mitigation measures are not necessary for this Project. The Project proposes to avoid blocking coastal flood flows and to minimize fill in the floodplain by balancing the cut and fill work in Zone AE. No additional fill is proposed in Zone AO. The elevation of the original ground will be maintained within Zone AE and Zone AO. Cut and fill quantities will be further determined for Zone VE in the design phase. The Project does not propose any structures with the potential to block flows within Zone VE, Zone AE, or Zone AO. The Project is required to prevent flooding from runoff from the design storm event, as defined by the *Highway Design Manual* (Caltrans 2015). In order to accomplish this, proposed drainage systems will be designed to capture and convey runoff from the design storm in the Project area.

The following sections would replace Section 4.2. Sea-Level Rise:

SLR at the Project site was estimated using projections from the 2018 *State of California Sea-Level Rise Guidance* published by the California Ocean Protection Council (CO-CAT 2018). Based on the guidelines provided in this document, the SLR for this Project would be 1.0 foot by the year 2040.

The water level of the San Francisco Bay has the potential to increase in elevation as a result of future SLR; however, the Project would not affect additional SLR. SLR by the year 2040 has the potential to impact local low points at the Project site. High-tide stages and storm surges in conjunction with SLR would cause backflow into the 60-inch RCP storm drain outlet near the bay jetty (Figure 6) and into the storm drain system draining Gilman Street and the surrounding area. Therefore, to prevent the effects of backflow due to SLR, a tidal flap gate is proposed to be installed at the existing headwall of the 60-inch RCP at the west end terminus of Gilman Street. The flap gate will reduce backwater caused by high tides by preventing backflow from the bay into the storm drain system. Tides that are high enough to cause flooding will increase in frequency with SLR. The flap gate will not reduce flooding that is caused by stormwater runoff unable to drain to the bay due to a high tide. Therefore, the flap gate will reduce backwater due to tidal action but will not reduce flooding due to precipitation. A flap gate is recommended for this Project because it can be maintained from the outside, and trash is not likely to cause frequent malfunctions. The gate will still need to be routinely inspected and maintained to prevent mussel accumulation or blockage from sediment. Resource agency permitting will be required due to the need for construction in the San Francisco Bay.

Because there are future scenarios where the rise of the sea level would be above the 100-year WSEs in Gilman Street, Gilman Street Extension, and the Golden Gate Fields northwest and northeast parking lots, the roadways, storm drain system, and various improvements in the Project area have the potential to be inundated. The low points on the westbound traffic circle and on Gilman Street Extension are locations in the Project area that would be impacted by the year 2040 projected sea level during a 100-year storm event.

Adaptive measures to reduce risk or exposure of the Gilman Street Extension or Gilman Street would involve considerably greater changes to the roads than what is currently proposed. Raising the surface would require reconstruction of other conforms to other city streets and highway ramps and the mainline highway (potentially), as well as potentially require the relocation of utilities, signage, lighting, and other infrastructure. The cost of these improvements would render the project infeasible due to previously allocated budget. The proposed design has specifically avoided reconstruction of the highway mainline in order to maintain a financially viable project. The project does include the addition of a flap gate to the outfall of the City of Berkeley's large drainage trunk line from Gilman Street to aid in the prevention of drainage backwater conditions. This is a first step to add resiliency to the Project and to aid in

incorporating other adaptive management strategies to be considered in the future as part of other regional projects.

Strategies have also been identified by Association of Bay Area Governments and Metropolitan Transportation Commission in *Plan Bay Area* (2017). Other measures that would be considered during final design for this project include:

- Placement, relocation, and protection of equipment that may be vulnerable to inundation such as communications and power equipment.
- Use of corrosion-resistant construction materials for utility, power-service connections, foundations, and drainage facilities.
- Consideration for planning responses for inundation or emergency events. For emergency response procedures develop alternative transportation communication protocols, response and enforcement, and recovery procedures.

These recommendations recognize that multiple agencies and jurisdictions would have to be involved in long-term solutions. Long term solutions could include the development of additional regional strategies in coordination with Caltrans, the City of Berkeley, the City of Albany, the City of Emeryville, and other local Bay Area jurisdictions. Regional approaches could involve improvements to drainage facilities, pump stations, and/or floodwalls. The proposed I-80 Gilman Interchange Improvement Project would not interfere with or preclude the implementation of these types of future measures. Caltrans would also work with the Alameda County and other jurisdictions to develop long-term solutions to reduce or mitigate sea level risks on future projects.

The following reference is added to 5. References.

California Department of Transportation. (2011). *Guidance on Incorporating Sea Level Rise*, For use in the planning and development of Project Initiation Documents.

The following references added to 5. References supersede CO-CAT 2013 and FEMA 2009a, b, c, and d.

Coastal and Ocean Working Group of the California Climate Action Team (CO-CAT). (2018). *State of California Sea-Level Rise Guidance Document 2018 Update*.

http://www.opc.ca.gov/webmaster/ftp/pdf/agenda_items/20180314/Item3_SLR-Guidance_FINAL.pdf

Federal Emergency Management Agency. (2018a). *Flood Insurance Rate Map* for Alameda County, California and Incorporated Areas. Map Number 06001C0018H. Panel 18 of 725.

Federal Emergency Management Agency. (2018b). *Flood Insurance Rate Map* for Alameda County, California and Incorporated Areas. Map Number 06001C0014H. Panel 14 of 725.

Federal Emergency Management Agency. (2018c). *Flood Insurance Rate Map* for Alameda County, California and Incorporated Areas. Map Number 06001C0056H. Panel 56 of 725.

Federal Emergency Management Agency. (2018d). *Flood Insurance Study* for Alameda County, California and Incorporated Areas. Flood Insurance Study Number 06001CV001B, 06001CV002B, and 06001CV003B.