San Francisco Bay Conservation and Development Commission
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**TO:** All Engineering Criteria Review Board Members

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**SUBJECT:** **Brooklyn Basin Project**
(For Board consideration on February 26, 2015)

## Project Summary

**Project Name.** Brooklyn Basin Project

**Applicant.** Signature Development

**Project Representatives.** Patrick Van Ness, Eric Harrison

**Presenters:** Dilip Trivedi, P.E. and Jim Brady, P.E. (Moffatt & Nichol), Jeff Fippin, G.E. (ENGEO).

**Project Background.** The Brooklyn Basin Development project involves, the construction of 3,100 housing units, 200,000 square feet of retail/commercial space, and various parks and public access improvements along the Oakland Estuary. Work in the Bay includes the retrofit of the 1,200-foot long by 225-ft wide Ninth Avenue Terminal wharf, the removal of an existing marina at Clinton Basin and replacement with a pile-supported boardwalk and a sheet pile wall to support backfill to create Gateway Park, and the removal of a derelict wharf at the so-called Shoreline Park-West Bulkhead Wall. The shed over the wharf is currently leased to a company for storing cotton, and the inboard side of the wharf is a truck loading area. As part of the Brooklyn Basin Development Plan, the most of the wharf will be converted to public park space by removing the majority of the shed. An approximately 20,000-square-foot portion of the shed will be retained and used as a community center. The proposed park space will include a promenade along the water's edge (Clinton Basin and Shoreline Park-West Bulkhead Wall). All components of the project are located in Oakland, California.

**Project Summary.** The waterfront structures are divided into three parts based on their physical location within the project: Ninth Avenue Terminal Wharf, Shoreline Park–West Bulkhead Wall and Clinton Basin.

### Ninth Avenue Terminal Wharf

The wharf was built in the 1930's and is of concrete and timber construction. It currently has a shed on top of the wharf. The development project will remove a portion of the shed and convert the rest of the wharf deck into a shoreline park. The remaining portion of the shed will be used as a community center or similar flexible use. This structural analysis and design will examine the retrofit options for the wharf that are necessary to convert it into a publicly-used space. A pile-supported dilapidated wooden 20-foot-wide train trestle to the southern end of the site will be reconstructed for public access use by pedestrians.

**Clinton Basin**

Clinton Basin was previously used as a marina, and there are currently floats, guide piles and other small structures at the site. There are also a few abandoned structures on the shore. The shoreline and marina equipment have not been maintained. The marina was last operated around year 2000. As part of the development project, Clinton Basin will have an urban promenade type edge with recreational boating in the marina. In order to develop this area, the following new structures will be constructed: A steel sheetpile bulkhead wall for the northern portion and a pile-supported boardwalk for the eastern and western portions of the site.

**Shoreline Park–West Bulkhead Wall**

The Shoreline Park–West segment, between Clinton Basin and Ninth Avenue Terminal consists of a timber wharf, supported along the shoreline edge by a cast-in-place concrete bulkhead wall that parallels the face of the wharf. Due to the age and condition of the timber wharf, it is unsafe for public use and is proposed to be demolished.

**Project Components.** The design completed to date represents 25% to 30% level design. The overall project has an estimated life expectancy of approximately 50 years for the wharf and over 100 years for non-structural elements.

**Historic Wharf**. The wharf was analyzed for structural-seismic loadings during a preliminary phase of work, and it was found that the wharf structure would need to be retrofitted in order to use the wharf as a public space. Based on the preliminary analyses, planned wharf development modifications include:

- Removal of the timber apron
- Removal of western portion of the wharf
- Retrofit of wharf piles
- Addition of soil mass to the wharf deck in order to plant grass or other landscaping
- Reduction in size of the shed structure to 180 ft. x 145.5 ft.

Based on additional findings during this phase of work, the retrofit for development will also include:

- Soil stabilization along the rock dike (mid wharf)
- Soil design criteria has changed from 1 ft. to 18 inches of soil in smaller areas throughout the wharf deck, however, the analysis assumes evenly distributed mass throughout the structure.
- Mitigations for current condition of structural members

**Geotechnical characteristic:** The rock dike is an important geotechnical characteristic at the site. The rock dike is a soil section made up of roughly head-sized rocks (average 12-inch diameter), running along the length of the wharf at the approximate transverse midpoint. The rock dike was placed over the existing soft bay mud. The bay mud under the rock dike varies in thickness. The rocks were likely placed during the initial construction of the wharf in order to restrain the backfilled soil (dredge material) that was placed to reclaim the land. Based on the ENGEO geotechnical analysis, the rock dike soil layer is much stiffer than the surrounding and underlying soils, and could slide during an earthquake. This slide would impose kinematic loads on the piles that exceed their capacities. Soil stabilization and the impacts of the rock dike were not studied during the initial analysis phase (2010 report). Therefore, an additional parameter of the design is to restrain the rock dike from movement.

**Alternatives:** Two alternatives were developed during the first phase of analyses (2010 report) to improve the seismic stability of the wharf: installing fiberglass jackets on existing piles, and installing new steel pipe pile groups at various locations throughout the wharf. Based on the revised geotechnical data, neither of these two solutions will suffice. This is particularly due to the presence of the rock dike and higher code required seismic accelerations. The 2014 ENGEO geotechnical analysis indicates that the rock dike should be stabilized. If not stabilized, it could potentially slide during an earthquake and apply loads to the piles that are greater than their capacities. This design aspect is incorporated into the design alternatives. Several additional alternatives were analyzed in 2014, and the selected alternative is **ALTERNATIVE 14A.**

**Clinton Basin**. It is proposed to remove existing marina docks and guide piles and provide a 30-ft wide boardwalk on the basin's east and west side and a steel sheet pile bulkhead on the north side.

The boardwalk will consist of three pile bents with 24" octagonal piles supporting three-foot-wide concrete cap and composite or CIP deck. The pile cap will be connected to three longitudinal beams. The longitudinal beam at one end will be connected to a cutoff wall.

The sheet pile bulkhead will be anchored at top using either grouted tie-backs or deadman anchors. The free height of the steel-pile bulkhead is around 20 feet.

**Shoreline Park–West Bulkhead Wall.** The timber wharf is unsafe and it is proposed to be demolished. The bulkhead is believed to be in good condition. The toe of the bulkhead wall is protected by rip-rap, which is proposed to be replaced.

**Law and Policy Considerations.** The *McAteer-Petris Act*, the Commission's law, allows the Commission to approve fill[1] only when public benefits from fill clearly exceed public detriment from the loss of the water areas and should be limited to water-oriented uses (Section 66605). Further, fill shall meet certain specific criteria, including that the fill be constructed "in accordance with sound safety standards which will afford reasonable

[1] Fill is defined in the McAteer-Petris Act as "earth or any other substance or material, including pilings or structures placed on pilings, and structures floating at some or all times and moored for extended periods, such as houseboats and floating docks" (Section 66632(a)) .

protection to persons and property against the hazards of unstable geologic or soil conditions or of flood or storm waters" (Section 66605(e)) and that that the fill should be the “minimum necessary to achieve the purpose of the fill” (Section 66605(c)).

Within the Commission’s 100-foot shoreline band, the Commission can only deny a project if it fails to provide the “maximum feasible public access consistent with the project” (Section 66632.4).

*The project consists of three waterfront structures and a landfill in the Bay in the Oakland Estuary. There is a riprap component (East and West sides of Clinton Basin and along the Shoreline Park-West bulkhead wall) and landfill (North side of Clinton Basin) to be retrofitted and built anew, respectively.*

Additionally, in order to carry out its responsibility, the Commission adopted policies in the San Francisco Bay Plan regarding the safety of fills, shoreline protection and climate change, which include the following:

***San Francisco Bay Plan on the Safety of Fills***

1. Policy No. 1 states, in part, that “the Commission has appointed and empowered the ECRB to:

   (a) … review safety criteria for Bay fills and structures thereon;

   (b) review all except minor projects for the adequacy of their specific safety provisions, and make recommendations concerning these provisions;…”

2. Policy No. 2 states, in part, that “even if the Bay Plan indicates that a fill may be permissible, no fill or building should be constructed if hazards cannot be overcome adequately for the intended use in accordance with the criteria prescribed by the ECRB.”

3. Policy No. 3 states, in part, that “to provide vitally-needed information on the effects of earthquakes on all kinds of soils, installation of strong-motion seismographs should be required on all future major land fills. In addition, the Commission encourages installation of strong-motion seismographs in other developments on problem soils, and in other areas recommended by the U. S. Geological Survey, for purposes of data comparison and evaluation. “

4. Policy No. 4 states, in part, that “[a]dequate measures should be provided to prevent damage from sea level rise and storm activity that may occur on fill or near the shoreline over the expected life of a project. The Commission may approve fill that is needed to provide flood protection for existing projects and uses. New projects on fill or near the shoreline should either be,

   > set back from the edge of the shore so that the project will not be subject to dynamic wave energy,
   >
   > be built so the bottom floor level of structures will be above a 100-year flood elevation that takes future sea level rise into account for the expected life of the project,

be specifically designed to tolerate periodic flooding, or

employ other effective means of addressing the impacts of future SLR and storm activity."

***San Francisco Bay Plan on Shoreline Protection***

1. Policy No. 1 states, in part, that "[n]ew shoreline protection projects and the maintenance or reconstruction of existing projects and uses should be authorized if:

   (a) the project is necessary to provide flood or erosion protection for

   (i) existing development, use or infrastructure, or

   (ii) proposed development, use or infrastructure that is consistent with other Bay Plan policies;

   (b) the type of the protective structure is appropriate for the project site, the uses to be protected, and the erosion and flooding conditions at the site;

   (c) the project is properly engineered to provide erosion control and flood protection for the expected life of the project based on a 100-year flood event that takes future sea level rise into account;

   (d) the project is properly designed and constructed to prevent significant impediments to physical and visual public access; and

   (e) the protection is integrated with current or planned adjacent shoreline protection measures. Professionals knowledgeable of the Commission's concerns, such as civil engineers experienced in coastal processes, should participate in the design."

2. Policy No. 4 states, in part, that "Whenever feasible and appropriate, shoreline protection projects should include provisions for nonstructural methods such as marsh vegetation and integrate shoreline protection and Bay ecosystem enhancement, using adaptive management. Along shorelines that support marsh vegetation, or where marsh establishment has a reasonable chance of success, the Commission should require that the design of authorized protection projects include provisions for establishing marsh and transitional upland vegetation as part of the protective structure, wherever feasible."

***San Francisco Bay Plan on Climate Change***

1. Policy No. 2 states, in part, that "When planning shoreline areas or designing larger shoreline projects, a risk assessment should be prepared by a qualified engineer and should be based on the estimated 100-year flood elevation that takes into account the best estimates of future sea level rise and current flood protection and planned flood protection that will be funded and constructed when needed to provide protection for the proposed project or shoreline area. A range of sea level rise projections for mid-century and end of century based on the best scientific data available should be used in the risk assessment. Inundation maps used for the risk assessment should be prepared

under the direction of a qualified engineer. The risk assessment should identify all types of potential flooding, degrees of uncertainty, consequences of defense failure, and risks to existing habitat from proposed flood protection devices."

2. Policy No. 3 states, in part, that "To protect public safety and ecosystem services, within areas that a risk assessment determines are vulnerable to future shoreline flooding that threatens public safety, all projects should be designed to be resilient to a mid-century sea level rise projection. If it is likely the project will remain in place longer than mid-century, an adaptive management plan should be developed to address the long-term impacts that will arise based on a risk assessment using the best available science-based projection for sea level rise at the end of the century."
3. Policy No. 5 states that "Wherever feasible and appropriate, effective, innovative sea level rise adaptation approaches should be encouraged."

**ECRB Advisory Role.** BCDC seeks the Board's advice with respect to the proposed project in light of BCDC's law and policies:

1. **Seismic, Structural and Geotechnical Concerns**.
   a. *Ninth Avenue Wharf. The applicant will focus on one retrofit alternative of several repair options in relation to the rock dike along the shoreline: Is the proposed geotechnical alternatives analysis comprehensive, feasible and suitable for the site. Does it provide sound safety standards that will afford reasonable protection to the public and property against the hazards of unstable geologic or soil conditions or of flood or storm water?*
   b. *Clinton Basin. Does the proposed structural design of the improvements along the perimeter of the Clinton Basin address geotechnical aspects related to the stability of the shoreline and parameters for structural design of its elements (boardwalk and piles, 20-foot bulkhead, etc.?*
   c. *Shoreline Park-West Bulkhead Wall. Would the bulkhead wall be adequate to provide backfill support in light of a future public access and amenities at the shoreline? Could there be other non-structural methods to provide shoreline protection from erosion in conformity with Policy 5 of the Shoreline Protection policies?*
2. **Sea Level Rise and Flooding Questions**.
   a. *The Moffatt & Nichol January 19, 2010 Memo indicated that wave and runup studies were done to establish the required grades along the shoreline. The document also points out that the only location where wave effects should be accounted for was the Channel Park Shoreline near the Lake Merritt Channel, an area outside of the scope of this meeting.*

      *Although no risk assessment has been conducted at this time, the January 2015 memo indicates that the <u>minimum</u> finish floor elevation of structures will be +12.5 feet MLLW, and that the soffit elevation of the Ninth Avenue Wharf and the boardwalk at Clinton Basin will be +13.2 and +9.5 feet MLLW, respectively. The flood*

*analysis that included 100-year return period water levels in addition to SLR projections shows water levels at +10.83 feet by year 2050 and +14.08 feet by year 2100 (at a 55-inch projection for sea level rise) whereby the boardwalk soffit at Clinton Basin would be periodically underwater by 2050 and the all project's finish floor elevation for all structures would be periodically overtopped between the years of 2050 and 2100. Are adequate measures being provided to prevent damage from SLR and storm activity over the expected life of the project in conformance with Policy No. 4 of the Safety of Fills policy? Is the project specifically designed to tolerate periodic flooding in conformance with Policy No. 4 of the Safety of Fills?*

**Enclosed Material**

1. Brooklyn Basin Development/ECRB Submittal prepared by Moffatt & Nichol and dated February 11, 2015.
2. Oak to Ninth Avenue Development-Proposed Shoreline Improvements, prepared by Moffatt & Nichol, September 2010.
3. Digital copies (CD) of items 1 and 2 above.