San Francisco Bay Conservation and Development Commission
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TO: Engineering Criteria Review Board (ECRB) Members

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SUBJECT: **Encinal Terminals Project, City of Alameda, Alameda County (20% Design)**
(For Board consideration on November 1, 2017)

Project Summary

Project Name. Encinal Terminals Project, City of Alameda.

Project Proponent. North Waterfront Cove LLC c/o Tim Lewis Communities.

Project Representatives. Mike O'Hara (North Waterfront Cove, LLC).

Project Geotechnical Engineer. Uri Eliahu, Jeff Fippin and Pedro Espinosa, (ENGEO).

Project Marine Structural and Coastal Engineer. Sam Tooley, Marc Percher, Brad Porter and Dilip Trivedi (Moffatt & Nichol).

Project Civil Engineer. Angelo Obertello (Carlson, Barbee & Gibson).

Project Description. The Encinal Terminals Project ("Project") contemplates the redevelopment of the Encinal Terminals property in Alameda, California. The site is about 23 acres of mostly flat land, bordered to the north by the Oakland-Alameda Estuary, to the west by an inlet known as the Alaska Basin, to the east by the Fortman Marina, and to the south by a warehouse known as the Del Monte Building.

The project sponsor proposes to develop the site with a combination of townhouse and wood-podium multi-family residential structures with associated streets, underground utilities, and landscaping.

Further, the project sponsor proposes to repurpose two wharf structures to public access. Three wharves were previously constructed along the western and northern boundaries of the site through three generations in the 1920s and 1960s. One is a timber structure built in the 1920s in the northwest and two are concrete structures along the west constructed in 1924 and 1960. The timber structure is deemed unsalvageable and, therefore, will be removed as part of the Project. Therefore, only the two concrete wharves are subject to this review.

The 1924 concrete wharf (C1) is a 1,500-foot-long by 65-foot-wide, 8-inch concrete slab over 18-inch diameter timber piles with concrete pile jackets. The 1960 wharf (C2) is an 800-foot-long by 35-foot-wide, 24-inch concrete deck over 18-inch octagonal precast piles with cast-in-place pile caps.

Geotechnical Design Criteria. In reference to the Geotechnical Report prepared by ENGEO, the Project's geotechnical engineer, (see references to ENGEO's October 2, 2017 report enclosed with this Staff Report), based on the site geology and type of structure, the seismic performance of the shoreline and the effects on the existing wharf, and planned structures, due to slope movement, should be designed for the Design Earthquake (DE), defined as 2/3 of the Maximum Credible Earthquake (MCEr). To develop the site DE, a site-specific site ground response analysis was performed.

A Deep Soil Mix (DSM) buttress is recommended along two of the three waterfronts to mitigate slope movement and impacts on the wharf and landside improvements behind. The DSM would consist of below-ground shear walls with overlapping columns of in-situ soil mixed with water and cement and oriented perpendicular to the shoreline.

Structural Design Criteria. Moffatt & Nichol has evaluated two seismic design approaches for existing structures: Performance Based Design using a Rational Performance Objective and Code Based Design per the California Building Code.

1. Performance based design is typically based on displacement methods, which examine how far a structure can move for associated damage levels. For existing structures with no retrofit, it involves determining its displacement capacity versus the displacement demand at the specified earthquake event. If the displacement demand exceeds the capacity, then retrofit of the structure is necessary such that the capacity exceeds the demand.

   To develop the performance based design, two parameters are to be determined: the Performance (damage) level and the Design event.

   a. The Performance level-Life Safety per American Society of Civil Engineers (ASCE) 61-14 must satisfy the following:

      (1) The post-earthquake damage state is such that the structure continues to support gravity loads.

      (2) Damage that occurs does not prevent egress.

      (3) There is no loss of containment of materials in a manner that would pose a public hazard.

   b. The Design Event -Design event per ASCE 7-16

      (1) Defined as ASCE 7, Design Earthquake

      (2) Inertial Response: 475-year return event site specific spectra determined by geotechnical engineer.

      (3) Kinematic Response: 475-year return event site specific analysis determined by the geotechnical engineer.

2. Code based design is performed per the 2016 CBC Code. The structure is considered to be in Risk Category II[1] before and after the planned work; therefore, the design is considered as a structural alteration. CBC references ASCE 7 for evaluation of seismic loads. In turn, ASCE 7 provides the guidance to refer to ASCE 61, which addresses the seismic design of piers and wharves, as the most appropriate design document per CBC.

Sea Level Rise (SLR). All elevations indicated in the structural design report are referenced to the North American Vertical Datum 1988 (NAVD88). The wharf deck is proposed as public access. The wharf deck varies from a minimum elevation of 13.0 feet up to 13.4 feet. Today's FEMA's 100-year return flood elevation or Base Flood Elevation is 10 feet, so the project contains SLR projection of 3 feet (36 inches).

According to the referenced Project's Master Plan (Page 29), no changes are required to the site to provide a flood protection system for the projected sea level rise. Public access may still be permitted after the 36 inches of SLR has occurred, with infrequent inundation preventing access to the structure during episodic extreme high tide events. The document on Page 30 refers to the development of an adaptive management design strategy of the site in the event that SLR exceeds the anticipated 36 inches. As described on Page 31, the strategy will involve the construction of seawalls along the edges of the public promenades.

Law and Policy Considerations. Section 66605 of the McAteer-Petris Act allows the Commission to approve fill[2] 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 or minor fill for improving shoreline appearance or public access to the Bay. Authorized fill shall meet certain additional criteria, including among others, that the fill be constructed "in accordance with sound safety standards which will afford reasonable protection to persons and property against the hazards of unstable geologic or soil conditions or of flood or storm waters."

Bay Plan Policies. The applicable BCDC Bay Plan policies in relation to the proposed project include policies on Safety of Fills, Shoreline Protection, Public Access and Climate Change.

Policies on the Safety of Fills

1. **Policy No. 1** states, in part, that the Commission has appointed and empowered the ECRB to "establish and revise safety criteria for Bay fills and structures thereon."
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."

[1] The basic underlying principle in assigning Risk Category is to recognize the impact of a structural failure. There are four Risk Categories (RC) under the building code, ranging from lowest hazard to human life (RC I) to highest hazard to human life (RC IV).

[2] 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)) .

3. **Policy No. 3** states, "[t]o 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."

Policies on Climate Change

1. **Policy No. 2** states, in part, that "[w]hen 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, "[w]herever feasible and appropriate, effective, innovative sea level rise adaptation approaches should be encouraged."

Request for the ECRB's Technical Advice. The project proposes to repurpose two historic structures from their original use as cargo receiving facilities to a public promenade and plaza. Prior to the development proposal, non-engineered fill has occupied most of the landside of the Project area. Therefore, the existing fill is subject to potential settlement from new fill and structures. The Project proposes to mitigate soil settlement through ground improvement methods and thus reduce liquefaction potential of isolated liquefiable soil in the fill. Per the Project's criteria, a deep soil mix or DSM buttress under the ground of the development areas would protect the wharves and improvements inland of the shoreline by reducing slope movement of the shoreline. Upon consideration of the possible risks to the projected public access over the wharves, the staff requests the Board's assessment of the viability of the Project's engineering criteria.

The following are questions and issues raised by the staff regarding the Project's safety:

1. **Seismic, Structural and Geotechnical Concerns.** Would the soil improvement methods and the physical conditions of the wharves be sufficient to protect people and property against physical hazards of earthquakes and flooding?
2. According to the structural assessment, the wharves would be considered Risk Category II, in that they do not present substantial hazard to human life in the event of failure and are not intended to achieve a more stringent performance beyond life-safety. Therefore, would the criteria envision safe egress from the public access on the wharves in the event of a major earthquake?
3. **Sea Level Rise and Flooding.** Has the Project identified potential sources of flooding, degrees of uncertainty and consequences of defense failure as required in Climate Change Policy No. 2?

Material Enclosed with this Staff Report for November 1, 2017 ECRB Meeting

1. Slope Stability Analysis with Ground Improvement, ENGEO, October 2, 2017
2. Updated Geotechnical Report/Encinal Terminals/Alameda, California, ENGEO, October 2, 2017.
3. Encinal Wharf Schematic Structural Design Engineering Criteria, Moffatt & Nichol, October 16, 2017
4. Encinal Terminals Master Plan, North Waterfront Cove LLC, July 7, 2017.
5. Encinal Terminals Project Description