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Berkeley Water Transportation Pier Ferry (BWTPF) BCDC ECRB Submittal
Berkeley, CA

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The following are the responses to the five questions received via email on January 21, 2026. We plan to have slides in our presentation for each of these items at the ECRB meeting and will be able to answer any follow-up questions.

1. ***Elevation of the lowest element of the pier***. *The top of the pier has been noted as ranging from 16.5' MLLW at the landward most section of the pier, rising to 17.6' for the rest of the pier. Please provide information about the lowest elements of the pier and the consequences of their regular exposure to water and waves.*

   Response: The pier consists of a 20" concrete deck with no beams. The bottom of deck elevation is +14.8' and rises to +15.9' within the first 100ft. This is higher than the design water levels of 14.2' for inside the breakwater and 15.2' outside breakwater. See Coastal Study section 5.3 Deck elevation for additional information. If SLR is higher than estimated, the concrete deck may have additional splashing which would marginally accelerate corrosion, but the pier is designed with high-quality marine grade concrete with corrosion inhibitors that have good resistance to salt water. Coastal Study, Appendix B has a detailed explanation of all the element and operation impacts for the 2075 and 2100 SLR predictions along with Intermediate, intermediate-high, and high scenarios.

2. ***Uplift Analysis.*** *The coastal analysis of the pier and breakwater addresses flooding frequency but has not addressed wave uplift forces. While these forces are often less than the uplift forces for seismic design, the consideration of wave uplift should be addressed for all overwater horizontal elements.*

   Response: Uplift on the breakwater deck due to runup will be considered. The pier deck is above the waves and uplift is not expected. The uplift force is not expected to overcome the self-weight of the structure or to exceed earthquake loads.

3. ***Flooding and Currents at the Ferry Terminals****. In situations where the breakwater is overtopped, the overtopping flows could affect conditions at the ferry terminals. How has or will this situation been considered in the design of the terminal areas?*

   Response: The breakwater is designed for an overtopping limit of 0.1l/s/m which is in line with Eurotop guidance. This limited flow is not expected to cause any issues. Additional information on the overtopping limits and analysis can be found in Coastal Study, Section 5.1 wave runup and overtopping.

4. ***Tsunami impacts***. *The water levels from tsunami might be similar to other waves or surge during a storm; however, these events can generate rapid currents. The coastal analysis should note the approach(s) to addressing these currents, for the pier and the ferry terminals.*

   Response: Tsunami impacts will be evaluated. The tsunami loading is anticipated to be much less than the seismic loading on the pier. For the floating dock the tsunami loading will be less than the 100 years storm event wave loading and the ferry vessel berthing/mooring loads.

5. *Retaining walls. The analysis should provide more details about the design of these walls, the deep soil mixing, attention to liquefaction and stability under overflow and soil saturation conditions.*

   Response: Our analysis and design of the pier abutment (ie retaining wall) considered the geotechnical setting of location. The location of the abutment is the location of a former rock breakwater that was converted to a rock dike to retain fill. The rock dike forms the current shoreline. Our review of aerial photographs, as-built plans, and borings drilled through the former rock dike indicate that the material was placed without significant dredging and a layer of Young Bay Mud (YBM) exists below the rock. Below the YBM, all of our explorations encountered stiff clay. Based on this information, we do not anticipate liquefaction below the rock dike, though we are concerned about lateral movement of the rock dike and fill retained by the rock dike in a large earthquake due to shearing in the YBM below.

   Mechanically Stabilized Earth (MSE) Seawall and Pier Abutment
   The MSE seawall and pier abutment will be constructed along the pier plaza shoreline on top of the dense to very dense rock dike. Based on this, we anticipate liquefaction to be negligible beneath the wall and pier abutment. Because we are adding weight with the wall and retained fill, we are concerned about consolidation settlement of the Young Bay Mud below the rock dike and landward due to added loading. For the majority of the pier plaza, the consolidation settlement will be mitigated through surcharging (Appendix J). Close to the shoreline, we will not be able to efficiently get a full surcharge, so we will mitigate settlement through the use of light weight fill (cellular concrete, Section 5.9.1).

   The design team selected a segmental wall (MSE) so that there is some flex to the wall to reduce the risk of cracking if any minor unmitigated consolidation settlement occurs. In addition, the wall and pier abutment are designed to statically resist groundwater up to Elevation 14.5, which accounts for sea-level rise and wave run up. This is a conservative assumption because the backfill is free-draining cellular concrete.

   A detailed design of the seawall is provided in Appendix L of the geotechnical report and the specifications are provided in Specification Section 32 32 23.

   Deep Soil Mixing (DSM) (Global Plaza Shoreline Stability)
   The DSM is a separate element from the MSE Seawall and pier abutment. The purpose of the DSM is to reduce lateral movement of the ground at the pier abutment due to seismically induced shear of the YBM. The DSM will reduce the driving load on the sliding mass by adding shear reinforcement through the fill and YBM. As designed, the seismic lateral displacement of the rock dike on the water side of the DSM is significantly reduced through this shear reinforcement. The DSM will be constructed along Seawall Drive to buttress the pier plaza shoreline and maintain ingress and egress to the Ferry Terminal during and following a seismic event. The DSM will be constructed to the

bottom of the Young Bay Mud. We discuss the DSM in Sections 3.6 and 4.1, provide the supporting analysis in Appendix G, and specifications in Specification Section 31 23 40.

During preliminary design, we also considered a tieback solider pile and lagging, concrete sheetpile, and cast-in place concrete wall as an alternative to DSM. However, we ultimately opted to use DSM due to cost, environmental impacts, and construction practicality.

Sincerely,
COWI North America

James Connolly, P.E., S.E.