

San Francisco Bay Conservation and Development Commission

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TO: Engineering Criteria Review Board (ECRB) Members

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SUBJECT: India Basin Shoreline Park Project, San Francisco, CA (BCDC Pre-Application)
(For Board consideration on December 6, 2023)

Project Name

India Basin Shoreline Park Project (BCDC Pre- Application)

Project Representatives

Applicant Representatives

David Froehlich, PhD, Project Manager, San Francisco Recreation and Parks Department
Katherine Liss, PLA, Senior Associate, Gustavson Guthrie Nichol Ltd. (GGN)

Project Design Team

GGN – Lead Design Consultant

Moffat & Nichol - Coastal Engineering and Design of Water and Shoreline Structures

AGS Inc. - Geotechnical Consultants

Jon Brody Structural Engineers – Design of Upland Structures

Project Components Under Review

The following components of the India Basin Shoreline Park Project (project) are under review:

1. The South Marine Way Wall, made of reinforced concrete with a mechanically stabilized earth (MSE) core, is intended to serve as a walkway into the water and support the gravel beach. Due to the low lateral support of the deep Young Bay Mud (YBM), the subsurface will be strengthened with deep soil mixing (DMS) treatment;
2. A fixed pier and intermediate landing, supported on prestressed concrete pilings and having a concrete deck; and
3. Resilience of the park grading plan to sea level rise.



Purpose of this Meeting

The purpose of the meeting is to request the review and advice of the Engineering Criteria Review Board (ECRB) about the safety aspects of the design of the walls and piers, and the adequacy of the engineering criteria of these features that could affect the public through their use of the park.

The authority to review and revise engineering criteria and any safety provisions is bestowed on the ECRB through the McAteer-Petris Act government section code 66605(e), which requires that all fill must 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." Additionally, the San Francisco Bay Plan policies (referenced below), especially policies Nos. 1 and 2 on the Safety of Fills, provide additional authority.

Project Description

India Basin Shoreline Park is an existing park fronting San Francisco Bay at the end of Hawes St. in San Francisco. San Francisco Recreation and Parks Department (SF RPD) has submitted pre-application materials for their project prior to submitting a permit application to the San Francisco Bay Conservation and Development Commission (BCDC). In this project, SF RPD is proposing to renovate an existing 5.6-acre public park, adding new features that provide for boating and wading in the Bay. The in-Bay structures under review are the South Marine Way Wall and the Boathouse Pier and Intermediate Landing shown in Figure 1 below. The labels of these elements are highlighted in orange.

The largest structural element in the Bay is the South Marine Way Wall, shown in Figures 2 and 3 below. This element, consisting of a mechanically-stabilized earth (MSE) embankment with a concrete retaining wall, holds up a new gravel beach and a concrete walkway that slopes down into the water. MSE embankments use a manufactured solution along with the soil to add stability. In this case, the soil will likely be placed in layers of one-foot high flexible polymer "geogrid" (an example of one geogrid product is: <https://www.geogrid.com/en-us/products/strataweb>). At its highest point, the concrete wall will extend about nine feet above grade and is approximately 165 feet long. The preliminary design of the concrete wall shows a texture on the side exposed to the Bay.

The Boathouse Pier is adjacent to the Boathouse on the shore of the park (Figure 1). The top of the pier is at an elevation of about 15 feet NAVD88 and has a concrete deck set on six, 20-inch square precast prestressed concrete pilings. The Intermediate Landing has a top elevation of about 10 feet NAVD88 and has a concrete deck also set on six, 20-inch square precast prestressed concrete pilings.

Project elements along or in the water that are not major enough to be under ECRB review include: the shoreline fills, the North Marine Way Wall, the pedestrian bridge, the floating kayak launch dock, the gangways, and the shoreline protection.

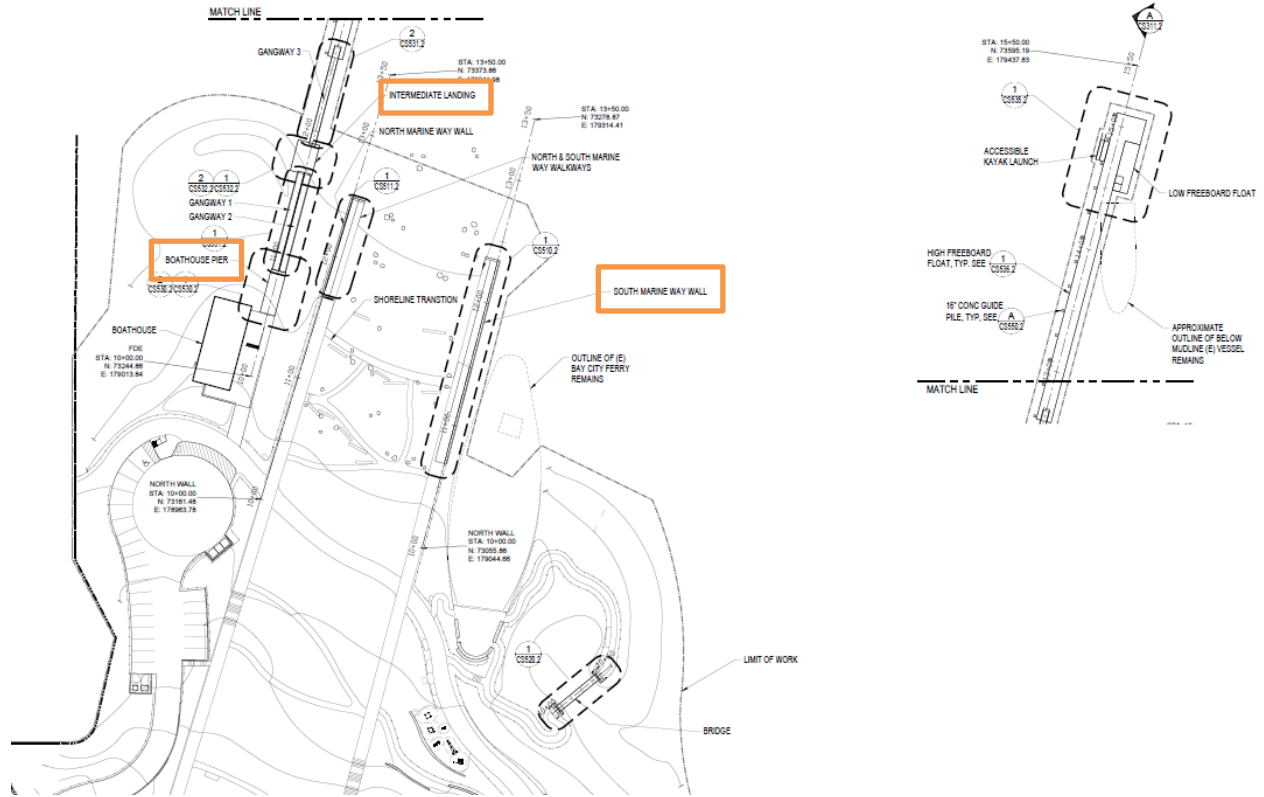


Figure 1. Map of the proposed India Basin Shoreline Park structural elements along the shoreline (Permit Set Coastal Eng Plan CS110.2 by Moffat & Nichol dated 7/17/2023)

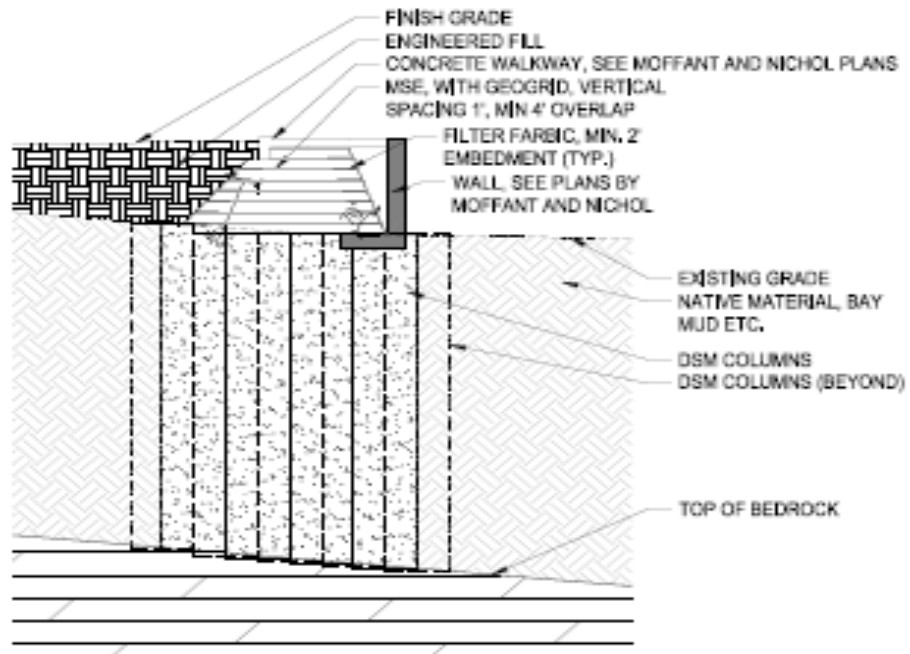


Figure 2. Enlargement of Detail 4, Section B-B' from the preliminary design of the proposed South Marine Way Wall, India Basin Shoreline Park (Permit Set Geotech Plans by AGS dated 10/20/2023)

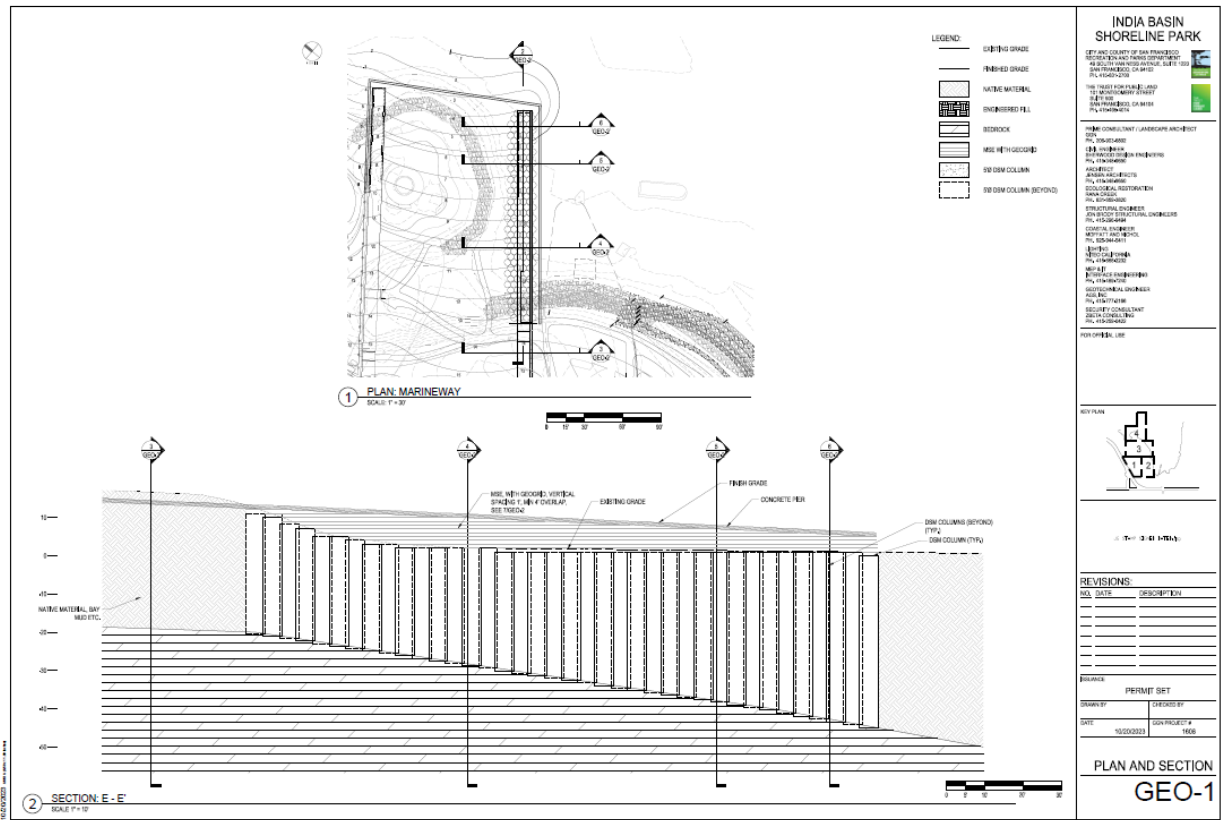


Figure 3. Preliminary plan and section of the proposed South Marine Way Wall, India Basin Shoreline Park (Permit Set Geotech Plans by AGS dated 10/20/2023)

Project Design Considerations

A large portion of the project site is reclaimed land, some of which was filled with construction debris. Geologic units below the artificial fill are Young Bay Mud (YBM), Interbedded Sands and Clays (ISC), Old Bay Clay (OBC) and Colluvium/Residual Soil followed by Bedrock. The project is in a seismically active region which has been subjected to several strong earthquakes in the last 200 years. Potentially liquifiable soil layers were encountered in almost all borings and CPTs performed.

Addendum 5 to the Geotechnical Study describes the presence of the deep YBM with very low lateral support leading to the recommended design approach for the South Marine Way walkway as being a MSE retention system below the walkway and a structurally-separate poured-in-place concrete retaining wall that partially supports the concrete walkway. All these components will be founded on a DSM structure created by drilling a cementitious material such as quicklime into columns of the subsurface.

Stability analyses on the structures have been performed and the results are being organized into the final slide deck by the applicant. The approach, assumptions and criteria for the stability analyses are laid out in the Basis of Design Report (M&N 2023). Major geotechnical

design considerations include:

1. Static settlement due to presence of undocumented fill and highly compressible clays below the fill,
2. Seismically-induced deformation due to presence of potentially liquefiable soils and loose unsaturated soils,
3. Strong ground shaking, and
4. Ground movement due to earthquake-induced slope failure.

Coastal engineering considerations include:

1. Wind, wave and current loads
2. Sea level rise

The design grades for the key features of the park have been selected to have a minimum elevation of 15 feet NAVD88. This level allows the project to be resilient to sea level rise to 2050 for the 1% Annual Chance Flood Event (100-year probability event) projected to be 11.8 feet NAVD88 and the king tide at 2100 projected to be 14.7 feet NAVD88.

List of References

The Board will review the following reports submitted by SF RPD:

1. AGS, Geotechnical Study Report, India Basin Shoreline Park, San Francisco, CA November 2021. (Note this report also presents data for the 900 Innes Ave. site which is a different project).
2. AGS, Additional Geotechnical Recommendations – Addendum 3 (Boat House Pier and Intermediate Landing Pile Capacities), India Basin Redevelopment, December 16, 2020.
3. AGS, Additional Geotechnical Recommendations – Addendum 5 (MSE and DSM Recommendations for the South Marine Way), India Basin Shoreline Park Project, November 2, 2023.
4. Moffat & Nichol, Basis of Design, India Basin Shoreline Park – Draft. October 2023.
5. Moffat & Nichol, Coastal Flooding, SLR Analysis & Recommended Grades (v3), 900 Innes and India Basin Shoreline Park Project, July 30, 2021 (Note this report also presents data for the 900 Innes Ave site which is a different project).
6. Appendix A to the report above: Moffat & Nichol, 900 Innes Park and India Basin Shoreline Park, Coastal Engineering Analyses and Shoreline Improvements, October 2020 (Note this report also presents data for the 900 Innes Ave site which is a different project).

The Board will review the following preliminary plansets submitted by SF RPD:

1. Civil Engineering Plans by Sherwood Engineering dated 7/17/2023
2. Coastal Engineering Plans by Moffat & Nichol dated 7/17/23
3. Geotechnical Plans by AGS dated 10/20/23
4. Landscape Plans by GGN dated 7/17/23
5. Structural Engineering Plans by Jon Brody Structural Engineers dated 7/17/23

Staff Questions to the Board

BCDC staff requests that the Board review the content provided and advise on the following:

1. Are the scenarios and design criteria in the stability analyses for the piers and the South Marine Way appropriate for the site hazards, site conditions and site criticality?
2. Are potential hydrodynamic impacts from the South Marine Way wall a concern?
3. Are future coastal flooding concerns from sea level rise addressed adequately in the park design?
4. Is there any data monitoring you recommend BCDC require of the applicant to enhance the future safety of the project in light of its projected 40-year estimated design life?
5. Are there any other design and physical concerns that have not been addressed?

Bay Plan Policies

The project raises issues related to Bay Plan policies on topics including Safety of Fills, Shoreline Protection, Climate Change and Subtidal Areas. The following policies are relevant for the Board's review:

Safety of Fills

The policies on the Safety of Fills seek to reduce risk of life and damage to property for projects that require construction on fill in San Francisco Bay. The following policies apply:

1. **Policy No. 1.** The Commission has appointed and empowered the ECRB to:
 - a. Establish and revise safety criteria for Bay fills and structures thereon,
 - b. Review projects for the adequacy of their specific safety provisions and make recommendations concerning these provisions, and
 - c. Prescribe an inspection system to assure placement and maintenance of fill according to approved designs.
2. **Policy No. 2.** Even if 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** requires the installation of strong-motion seismographs on all future major landfills with the guidance of and recommendations by the California Geological Survey, for purposes of data comparison and evaluation.
4. **Policy No. 4** Adequate 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:
 - a. Be set back from the edge of the shore so that the project will not be subject to dynamic wave energy,
 - b. 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,
 - c. Be specifically designed to tolerate periodic flooding, *or*
 - d. Employ other effective means of addressing the impacts of future sea level rise and storm activity.

Rights-of-way for levees or other structures protecting inland areas from tidal flooding should be sufficiently wide on the upland side to allow for future levee widening to support additional levee height so that no fill for levee widening is placed in the Bay.

Shoreline Protection Policies

The following policies of Shoreline Protection apply:

1. **Policy No. 1** New 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 causes and conditions of erosion and flooding 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;
 - (e) the protection is integrated with current or planned adjacent shoreline protection measures; and
 - (f) adverse impacts to adjacent or nearby areas, such as increased flooding or accelerated erosion, are avoided or minimized.

2. **Policy No. 4** Authorized protective projects should be regularly maintained according to a long-term maintenance program to assure that the shoreline will be protected from tidal erosion and flooding and that the effects of the shoreline protection project on natural resources during the life of the project will be the minimum necessary.

Climate Change Policies

The Bay Plan Climate Change policies apply to the proposed project:

2. **Policy No. 2:** 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.
3. **Policy No. 3:** 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—other than repairs of existing facilities, small projects that do not increase risks to public safety, interim projects and infill projects within existing urbanized areas—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.

Subtidal Areas Policies

The Bay Plan includes the following Subtidal Area policies relevant to the proposed project:

1. **Policy No. 1:** Any proposed filling or dredging project in the subtidal area should be thoroughly evaluated to determine the local and Bay-wide effects of the project on: (b) tidal hydrology and sediment movement; ... and (e) the Bay's bathymetry. Projects in the subtidal areas should be designed to minimize and, if feasible, avoid harmful effects.