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Executive Summary

On November 6, 2018, the citizens of San Francisco passed Proposition A with 82.7% voter approval, authorizing a $425 million General Obligation Bond known as the Embarcadero Seawall Earthquake Safety Bond (Seawall Bond) to support the Seawall Earthquake Safety and Disaster Prevention Program (Seawall Program).

Prior to the approval of the Seawall Bond, in June 2018 the United Stated Army Corps of Engineers (USACE) awarded San Francisco a “new start” study appropriation to commence a General Investigation feasibility study, which would consider and recommend potential project alternatives that would reduce coastal flood risk along the San Francisco waterfront (the Flood Resiliency Study).

In February 2019, Executive Director Elaine Forbes formed the Port’s Waterfront Resilience Program. The Waterfront Resilience Program includes the Seawall Program, the Flood Resiliency Study and related resilience planning and implementation efforts for the Port’s entire 7 ½ miles of waterfront property.

On March 12, 2019, the Port Commission approved Resolution 19-08, authorizing the first issuance of the Seawall Bond for up to $50.0 million, including issuance costs, to support the planning and preliminary design phases of the Seawall Program. After a delay due to a legal challenge that ultimately was appealed to the California Supreme Court – which denied review of an appellate decision in favor of the City – Bonds were issued pursuant to Resolution No. 323-19 and Resolution No. 324-19, both adopted by the Board of Supervisors on July 16, 2019, and approved by the Mayor on July 26, 2019. On

June 2, 2020 the City issued $49.7 million in taxable general obligation bonds at an interest rate of 0.7% and a final maturity date of June 15, 2021.

This first bond sale supports management, planning and overall program development, and partially funds preliminary design of Phase I projects of the Embarcadero Seawall Program. Specifics of this work include site surveys, comprehensive geotechnical investigation and laboratory testing of soils, earthquake risk assessment of the seawall and associated infrastructure, flood risk assessment including sea level rise, alternatives development and evaluation (conceptual level design, engineering, cost estimating, constructability), advancing environmental analysis (NEPA/CEQA) and permitting, advancing preliminary design of Seawall Bond projects, and extensive stakeholder and community engagement.

This work also includes bond-funded matching funds for the Flood Resiliency Study with the United States Army Corps of Engineers (USACE). The Flood Resiliency Study is cost shared 50/50 with USACE and will analyze flood risks to the Port's entire jurisdiction from Fisherman's Wharf to Heron's Head Park.

Please refer to the following report for further details. Visit the Waterfront Resilience Program website at https://www.sfportresilience.com/ for a link to this Quarterly Report and future reports.

Program Summary

The Port established the Waterfront Resilience Program (Resilience Program) to ensure that the entire 7½ mile waterfront, and its important regional and citywide assets, are resilient in the face of hazards such as earthquakes, flooding, and sea level rise due to climate change. The Resilience Program includes several initiatives to increase the resilience of the waterfront:

- **Embarcadero Seawall Program:** A City sponsored effort, that the Port is entrusted to implement, to reduce seismic and flood risk along the waterfront from Fisherman's Wharf to Mission Creek. In November 2018, voters of the City and County of San Francisco voted overwhelmingly to support Proposition A, the San Francisco bond initiative to provide $425 million to upgrade and repair a portion of the 100 year-old Embarcadero Seawall. The overall repair is estimated to cost up to $5 billion; this figure will be revised when the Program team produces cost estimates. Program staff will use results from a Multi-Hazard Risk Assessment and public feedback to develop a range of potential seismic and flood risk reduction project alternatives. The Port will present Proposition A project recommendations with the target to seek Port Commission endorsement by the end of June 2021.

- **USACE / Port of San Francisco Waterfront Flood Resiliency Study:** USACE awarded the Port of San Francisco a "New Start" in 2018 which authorized a General Investigation of flood risk along the San Francisco Bay waterfront. As a result, the Port and USACE are studying flood risk along San Francisco's bayside shoreline, from Aquatic Park to Heron's Head Park. The approximately six-year USACE Flood Resiliency Study will identify vulnerabilities and recommend strategies to reduce current and future flood risks for consideration for federal investment and implementation.

- **Other resilience work:** In addition to these efforts, the Resilience Program is supporting other areas of work to improve resilience along the 7 ½ mile waterfront:

    - Floodproofing the piers assesses the options available to adapt the piers to be resilient to elevated sea levels.
    - The Southern Waterfront Seismic Vulnerability Study use existing geotechnical information in the Port's Southern Waterfront to assess earthquake risk to Port facilities in the area.
    - The Islais Creek Adaptation Study, a joint effort by the Port, the San Francisco Municipal Transportation Agency and City Planning, is examining sea level rise and flood risk in the Islais Creek/Bayview neighborhood, with a focus on transportation assets.
    - The Resilience Program also represents the Port with participation in citywide and regional adaptation and resilience efforts led by others.

The Port has appropriated non-bond funding to support work in areas beyond the scope of the Embarcadero Seawall and the Army Corps of Engineers Flood Resiliency Study.

Embarcadero Seawall Program Status

The Embarcadero Seawall Program is currently in the Planning, Engineering, Preliminary Design phase of the program. The recently completed Multi-Hazard Risk Assessment (MHRA) provides a foundation for the Seawall Program development. The MHRA includes new modeling of physical earthquake and coastal flood damages, recovery times, and economic loss predictions – all at four earthquake levels and water levels assuming a variety of sea level rise scenarios. This very detailed analysis of damages and consequences, including damage and recovery time for City infrastructure and damage and recovery for Port tenants, including lost rent and economic activity allows the Port to quantify the financial benefits of investment compared to a no action scenario.

To produce the MHRA, the Port developed a number of important tools (sitewide subsurface soil mapping, earthquake ground shaking hazard models, advanced engineering models of the Seawall, Hazus earthquake model of Port buildings and marine structures on the Embarcadero) to carry out the MHRA that are currently being used in the design of seismic and flood risk reduction measures and alternatives.

The MHRA significantly advanced the Port's understanding of the risks and consequences associated with earthquake and flood risk. The Port now knows:

- **Soil conditions have a big effect, creating higher and lower risk zones.** Deep Young Bay Mud is a problem in some areas, sand layers are a problem in other locations, ground shaking and settlement are Embarcadero-wide problems.

- **Earthquake risk to San Francisco's waterfront is severe and the consequences will be expensive.** We now have predicted physical damages and understand economic losses across four earthquake levels. Included in the economic loss predictions are cost of

repair/replacement, loss of building related contents, business interruption and relocation, lost wages, lost rent to the Port, and indirect and induced effects.

- **San Francisco's waterfront is very sensitive to flood thresholds, with significant consequences.** We now have predicted coastal flood damages for all buildings and major infrastructure exposed by Seawall "overtopping," along with the first flood mapping of the City that includes wave action, an important contributor to flooding. There is a critical tipping point between 2-3 feet of sea level rise where flood damages will begin to rise significantly along the San Francisco waterfront.

This advanced analysis gives a more accurate understanding of how flooding will affect different areas of the Port and City. The Port now knows that the majority of long-term flood damages and disruptions are predicted to occur inland of Port jurisdiction, and that the shoreline will be a critical area of intervention to avoid long term flood damage in coordination with upland water management interventions. We also have predicted economic losses due to flooding.

With the completion of the MHRA, the Port is taking action and moving quickly to share develop potential strategies – called alternatives – for responding to these risks and to subsequently identify Proposition A Seawall Bond projects.

Community and Stakeholder Engagement

Since 2017, the Port has connected with tens of thousands of people through robust community and stakeholder engagement efforts to advance work on the Embarcadero Seawall Program and Waterfront Resilience Program. This engagement included community members, businesses and merchants, advisory committees, non-profit groups and others. The engagement was designed to ensure that the findings from the MHRA including the hazards, risks and consequences would be accompanied by an understanding of the priorities, concerns and issues that mattered to community members and other stakeholders.

All community engagement offered the public an opportunity to provide the Port key feedback on Seawall Program priorities as the Port and its consultants worked with City partners and others to advance the MHRA. The engagement included the assets and services within the Seawall Program area and the nature and consequences of the risks. The stakeholder engagement approach included:

- Embarcadero Seawall community meeting series;
- Participation in and hosting of community events like mixers, walking tours, and boat tours throughout the waterfront;
- Online engagement through the Waterfront Resilience Program website (www.sfportresilience.com);
- Presentations to and discussions with advisory committees, boards, and targeted organizations including youth organizations, and multi-lingual groups;
- Participation in neighborhood outreach events; and
- Engagement partnerships with various non-profits and family science based institutions such as Exploratorium and Cal Academy of Sciences.

Other Embarcadero Seawall Program Efforts

Concurrent with work to finalize the MHRA, the Port has pivoted to using the results of the risk assessment to lay the groundwork for developing Proposition A Seawall Bond projects by the 2nd quarter of 2021 to address earthquake and flood risks. The workstreams to develop the range of alternatives for potential projects include:

- **Adapt Plan:** To demonstrate leadership in resilience work, the Port of San Francisco is developing a robust adaptation plan to inform and guide the city's seismic and sea level rise response along the Port's 7.5 mile jurisdiction over the next century.

- **Envision:** What are potential scenarios for a Port of San Francisco shoreline that would be resilient to 3 to 7 feet (or more) of sea level rise expected by 2100, and how should these scenarios influence the design of adaptation measures developed today?

- **Bulkhead Wharf Elevation Scenarios:** The wharves in the Embarcadero Historic District which are connected to the Seawall provide flood protection to the Embarcadero today, but they are aging and are exposed to significant seismic risk. If they are rebuilt, can they be constructed at a higher elevation to increase sea level rise flood protection for the City, and can this be accommodated consistent with historic preservation and Americans with Disabilities Act standards?

- **Seismic Measures Development:** Given the unique soil conditions and structures at various points along the Embarcadero, what are the engineering solutions that can reduce lateral spreading and protect structures and infrastructure near the Seawall? What do these approaches cost, what are the associated construction impacts, how effective are these solutions at mitigating risks, and how can they be part of sea level rise adaptation?

- **Flood Measures Development:** Through the USACE Flood Resiliency Study, the Port and USACE are developing flood measures for the Port's entire waterfront. For the Embarcadero Seawall area, what are the most effective measures that can also improve seismic performance and what are the costs of these measures?

Current work underway is described in more detail below.

Adapt Plan

The Adapt Plan is the Port of San Francisco's "roadmap to resilience" in the face of urgent earthquake risk, increasing sea level rise, and other climate change impacts. The Plan allows the Port to combine approaches of different planning documents: overarching goals and metrics like a strategic plan, recommended projects like a capital plan and policy and design guidance to ensure that the waterfront is thoughtfully and intentionally adapted over time– making it all accessible and accountable to the public to ensure robust feedback.

In the near-term, the Adapt Plan includes proposed construction projects and other actions for implementation along the Embarcadero waterfront, including those funded by Proposition A in the Embarcadero segment of the waterfront.

In the mid and longer-term, the Adapt Plan identifies the next actions that should be implemented, including the next phased of construction projects, the development of working groups, partnerships with tenants, private and public partners and other City departments to implement shared actions, the identification of additional funding and financing sources and the advancement of further studies and for the entire 7.5 mile Port jurisdiction.

Envision

While the Port has heard important public feedback on values for a waterfront of 2100, the Port is still engaged in the process of developing options for a waterfront that is resilient to 2100 conditions by understanding the critical assets, systems and services that must remain along the waterfront and the range of sea level rise scenarios are projected for the end of the century. The Port is working to develop draft concepts that are resilient to this range of potential 2100 water levels, which according to current State of California and City guidance is from 3.4 feet to approximately 7 or more feet of sea level rise.

The Port will develop Envision concepts that demonstrate that the actions planned as part of Proposition A Seawall Bond funded projects are adaptable to future conditions including California Ocean Protection Council (OPC) high (1:200) projection and share how we might adapt into future concepts of the waterfront. These concepts are intended to help guide near term actions and long-range planning and will be updated over time to reflect changing science, priorities, and strategies.

Bulkhead Wharf Elevation Scenarios

The historic wharves in the Embarcadero Historic District currently provide flood protection to the City today. Early results from the MHRA indicate substantial seismic risk in the bulkhead wharf zone. The condition of the soils, the wharves and the structures all combine to make the bulkhead wharf zone a critical seismic safety hazard along the waterfront. In addition to the seismic risk associated with the bulkhead wharves, these wharves also present an entry point for future flood risk and a challenge when considering how to raise the entire San Francisco waterfront to reduce increasing current and future flood risks.

This study will provide concepts for how seismically-strengthened, raised bulkhead wharves could provide increased coastal flood management method for the City to address sea level rise and improved seismic performance, including analysis of whether this approach is consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties and the Americans with Disabilities Act.

Seismic Measures Development

Concurrent with the completion of the final subtasks in the MHRA, the Port started a technical task – Seismic Measures Development – to support identifying Proposition A Seawall Bond projects through development of alternatives. This task includes developing a range of measures applicable to the unique areas of the Embarcadero Seawall based on subsurface conditions, marine structure type, and landside infrastructure type and configurations. The work includes conceptual engineering design, performance, constructability, service life considerations, and cost estimating. This work supports development of complete alternatives, alternatives evaluation, and selection of Proposition A Seawall Bond projects.

Flood Measures Development

The Port, through its work with USACE, is also developing a comprehensive set of flood measures for potential Embarcadero Seawall and Port wide application through the Flood Resiliency Study.

Budget, Funding, Expenditures

The Seawall Bond 2018 budget is $425,000,000 and the total appropriation is $49,675,000. The following is a summary of the budget and appropriation per component:

Components	Original Budget*	General Obligation Bond**				Encumbrance + Expenditures / Budget	Encumbrance + Expenditures / Appropriation
		Appropriations	Expenditures	Encumbrances	Balance		
Seawall Program Labor	18,800,00	3,155,482	786,344	-	2,369,138	4.2%	24.9%
United States Army Corps of Engineers (Flood Study)	8,900,00	3,000,000	1,195,143	-	1,804,857	13.4%	39.8%
Planning/Engineering/Preliminary Design (35%)	37,500,000	24,154,000	14,818,141	9,335,859	-	64.2%	100.0%
Final Design (65%)	46,600,000	-	-	-	-	0.0%	0.0%
Other City Depts/Gov Agencies	1,900,000	-	-	-	-	0.0%	0.0%
Design Support during Construction	8,400,000	-	-	-	-	0.0%	0.0%
Pilot Projects	40,000,000	-	-	-	-	0.0%	0.0%
Seawall Program Projects	262,900,000	-	-	-	-	0.0%	0.0%
Oversight, Accountability & Cost of Issuance	-	875,000	-	-	875,000	0.0%	0.0%
Unallocated Bond Safe Funds	-	18,490,518	-	-	18,490,518	0.0%	0.0%
TOTAL	425,000,000	49,675,000	16,799,627	9,335,860	23,539,513	6.1%	52.6%

* Subject to change based on program schedule and needs

** Appropriations, Expenditures, Encumbrances and Balance are based on FSP as of January 6, 2021

The Accountability reports for the bond sales will be available on the Waterfront Resilience Program website at https://www.sfportresilience.com/

Expenditures and Encumbrances

The Seawall Bond 2018 expenditures and encumbrances are $16,799,627 and $9,335,860, respectively. The expenditures represent 33.9% of the total current appropriations.

There are expenditures from the Capital Planning Revolving Fund ($3,000,000) that will be reimbursed by the Seawall Bond next fiscal year.

Attachment 1 – Contact Information

Contact	Title	Contact No.	E-mail
Brad Benson	Program Director	415-819-1759	brad.benson@sfport.com
Steven Reel	Program Manager	415-793-5352	steven.reel@sfport.com
Lindy Lowe	Planning Manager	415-274-0621	lindy.lowe@sfport.com
Kelley Capone	Program Manager	415-307-9881	kelley.capone@sfport.com
Matthew Wickens	Program Manager	415-539-5359	matthew.wickens@sfport.com
Kirsten Southey	Communications Manager	415-828-2887	kirsten.southey@sfport.com
Carlos Colón	Program Administrator	415-274-0616	carlos.colon@sfport.com

Attachment 2 – Schedule