MEMORANDUM

June 7, 2024

TO: MEMBERS, PORT COMMISSION
Hon. Kimberly Brandon, President
Hon. Gail Gilman, Vice President
Hon. Willie Adams
Hon. Ed Harrington
Hon. Steven Lee

FROM: Elaine Forbes
Executive Director

SUBJECT: Request approval to award a sole source grant in the amount of $285,300 to Smithsonian Environmental Research Center for the Living Seawall Pilot Project to conduct monitoring and analysis, and to prepare a final report.

DIRECTOR'S RECOMMENDATION: Approve the Attached Resolution No. 24-27

EXECUTIVE SUMMARY

In 2018, the San Francisco Board of Supervisors proposed Proposition A Seawall Earthquake Safety Bond ("Proposition A") and San Francisco voters approved this bond with a margin of 83-17% at the November 6, 2018 election. At the time, the Port and the City acknowledged that Proposition A was a vital down payment to address costly seismic and flood risks along the waterfront.

Since the passage of Proposition A, the Port has engaged in in-depth study and analysis of the waterfront earthquake risks to life safety and emergency response. The Port has also developed a greater understanding of the engineering challenges and risks of rising sea levels through its work with the U.S. Army Corps of Engineers ("USACE") on the San Francisco Waterfront Coastal Flood Study ("Flood Study").

As described at the February 6, 2024 Port Commission meeting[1], USACE and the City have published a Draft Integrated Feasibility Report and Environmental Impact Statement ("Draft Report") to defend the 7½ miles of waterfront from flood risks from Heron's Head Park to Aquatic Park. The Draft Report describes the Draft Plan, which proposes actions to defend the shoreline against rising sea levels and presents an environmental analysis of those actions. The Draft Report includes descriptions for coastal flood defenses, cost and benefit analysis, the rationale for choosing the Draft Plan, an analysis of environmental impacts under the National Environmental Policy Act, and supporting information.

The Port and the USACE are looking to maximize the application of natural and nature-based features and incorporate engineering with nature in the Flood Study and all Port projects. The application of nature-based features as a means of climate adaptation has steadily grown over the past 20 years and technical advances are being implemented and monitored. This staff report describes a key investigation the Waterfront Resilience Program is conducting to examine how we can incorporate nature-based features along segments of the shoreline that require a highly engineered shoreline solution to reduce future flood risks – the San Francisco Living Seawall Pilot ("Living Seawall Pilot Project" or "Pilot Project"). Living seawalls are a key feature of the Draft Plan for coastal flood defenses in the Flood Study.

Through the CH2M HILL Engineers, Inc. contract for planning, engineering, and environmental services for the Waterfront Resilience Program ("PEC Contract"), the Port and the Smithsonian Environmental Research Center, a non-profit scientific institution associated with the public institution the Smithsonian Institute, ("SERC") worked together to develop a Pilot Project to test engineering with nature features that could be incorporated into a new seawall. The Port worked with the SERC to develop, design, fabricate, install, and monitor the Living Seawall Pilot Project. The Pilot Project is funded by Proposition A. In coordination with Port Maintenance and Divers, scientists from the SERC monitor the test tiles in the field and collect data for the project and final report. As further described in this report, the PEC Contract will be exhausted this year. Port staff recommend a grant agreement with the SERC to complete the work.

The proposed resolution would approve a grant to support the SERC scientists for a total of $285,300 funded by Proposition A.

STRATEGIC OBJECTIVES

The Port's Waterfront Resilience Program supports the goals of the Port's Strategic Plan as follows:

[1] Staff Report:
https://sfport.com/files/2024-02/020624_10a_usace_flood_study_draft_staff_report.pdf

Engagement:
By leading an inclusive stakeholder process to develop a shared vision, principles, and goals for the Waterfront Resilience Program and Flood Study. Data from this study will be publicly available to benefit all future projects proposed within SF Bay.

Resiliency:
By leading the City's efforts to address threats from earthquakes and flood risk through research and infrastructure improvements to the Embarcadero Seawall and adjoining buildings and other infrastructure, and to the 7½ miles of Port shoreline property. Data from this study will allow engineering with nature principles to be incorporated into future projects within the Bay.

Sustainability:
The incorporation of engineering with nature principles provides opportunities to enhance the ecosystem with habitat improvements and sustainable design and construction best management practices. This project will explore the living shoreline aspect of natural infrastructure alternatives (e.g. wetlands, horizontal levees, and "living shorelines") for future shoreline stabilization and improvement projects. This project will provide data to help implement City Biodiversity Goals and best sustainable practices in all Bay improvement projects.

Evolution:
Incorporating engineering with nature and providing benefits to bay ecosystems is in line with providing publicly desired amenities requested for a new seawall and the Waterfront Resilience Program.

San Francisco Living Seawall Pilot

The Living Seawall Pilot Project is the first of its kind on San Francisco Bay, and the findings from the Pilot Project could potentially support combining habitat creation and native species benefits with projects designed to increase the seismic safety of the Embarcadero seawall and the San Francisco Waterfront as well as potential flood defense projects and other Port projects. The Pilot Project is a unique collaboration between Port staff and SERC scientists and ecologists, and the findings from this effort could help define best practices for embedding natural elements within and along engineered structures for all San Francisco Bay area coastal communities.

The Living Seawall Pilot Project is designed to better understand how the Port can create viable habitats along the seawall that can provide benefits to the larger San Francisco Bay ecosystem. At the April 12, 2022 Port Commission Meeting[2], Port staff described the Pilot Project, including Port-led design and installation of a series of concrete panels to the seawall made to promote the establishment and success of native species.

[2] Staff Report: https://sfport.com/files/2022-04/04122022%20Item%209B%20SF%20Living%20Seawall%20Pilot%20Project%20Staff%20Report_final.pdf

The panels include different surface textural designs to assess which textured surfaces attract the most native species. The Pilot Project is assessing the number of native of species established and the quality of the habitat provided across the full tidal range, from the high intertidal zone to the subtidal zone, along with differences in wave exposure and salinity gradients, and the ability to scale the project up to larger expanses of the seawall that could provide greater benefits for native species.

The experimental design included the fabrication of steel frames that are mounted along the seawall or breakwaters. The custom frames were designed by the Port's Project Engineer to hold the concrete panels in place and provide hand holds and access points for the scientists to monitor the recruitment of species. The frames were fabricated and installed by Port Maintenance in 2022 and the two years of monitoring began in 2023. Experimental success could result in increases in native species richness (number of species), differences in community composition (in which species are present), and increases in total abundance and distribution of native species.

Three project sites were chosen along the northern waterfront, as shown in the figure below: Site 1) Pier 45 Breakwater, Site 2) Agriculture Building Seawall, and Site 3) South Beach Harbor East Breakwater. The locations were chosen based on the ability of the scientists to safely monitor the panels over time, tidal exposure from the high intertidal zone to the deep subtidal zone, and to represent differences in wave exposure and salinity.

Matt Bell, the Port's Project Engineer, designed the steel frames in close collaboration with Tim Felton and Luis Vallejos from the Port's Maintenance Division and SERC's scientists. The Port Maintenance Division purchased the materials and fabricated the frames at their Pier 50 facilities. The Port Maintenance Division also installed the experimental frames at the three selected sites and provided boat services to the SERC scientists for periodic monitoring of the panels during the first-year monitoring period. Port Maintenance will remove the steel frames and panels from three sites upon completion of the Pilot Project.

The SERC scientists participated in comprehensive safety training and preparation to safely transfer to and from boats and frames and conduct the monitoring. Monitoring activities are tide-dependent and can only be conducted during specific, limited tide windows.

The SERC scientists provide interim timepoint progress updates during the monitoring period and provide a final report describing their findings and results, including recommendations for elements that could be incorporated within Waterfront Resilience Program projects. Two interim timepoint reports for August 2023 and December 2023 were submitted. The final report will summarize the potential benefits to resident communities, including native species, of incorporating textural elements within the seawall design that support the establishment of native species, and recommendations for additional studies or design variations that could further improve habitat for these resident communities and native species. In addition to using data and information learned from this Pilot Project, the information will be circulated to other agencies pursuing engineering with nature approaches along engineered shorelines in San Francisco Bay.

Pilot Project Problem Statement, Goals, and Anticipated Outcomes

A detailed description of the development of the Living Seawall Pilot Project, the problem statement and goals of the project, and the anticipated outcomes were provided in the staff report for the April 12, 2022 Port Commission meeting.

San Francisco Bay is one of the most heavily invaded bays in the world, with many common non-native species. In the San Francisco Bay Area, there is a strong desire to protect and enhance marine habitats, especially for native species. The overarching goal of this project to is enhance the habitat value of the seawall that the Port of San Francisco will be rebuilding over the coming years for the resident biota, particularly native species.

The Pilot Project is providing key scientific information in support of that goal. The Pilot Project has two main project objectives: 1) to experimentally determine whether the addition of a three-dimensional structure and/or an admixture created to increase marine growth increases overall and native species richness and/or abundance, and 2) determine whether the effects of these modifications vary with tidal elevation, a gradient of wave exposure and salinity, or with a scale of treatment (large vs. small panels). The Pilot Project is designed to generate San Francisco Bay-specific information, which is currently lacking, and to fill critical data gaps in the larger body of research on ecological enhancements to seawalls. As such, it is expected that the Pilot Project will be able to provide specific design guidance for the seawall renovation.

Three target native species are identified that may particularly benefit from ecological enhancements of the seawall, all of which are of interest to local resource management agencies:

- the Olympia oyster, Ostrea lurida,
- the common rockweed, Fucus distichus,

- the Pacific herring, Clupea pacifica.

Olympia oysters, the only oyster native to the West Coast, are the focus of restoration efforts in San Francisco Bay, and along the West Coast of North America more broadly (https://olympiaoysternet.ucdavis.edu/). The brown alga Fucus distichus is a foundation species (providing food and habitat for many other organisms) and has been the focus of mitigation efforts, such as those following the Cosco Busan oil spill, which damaged Fucus and other intertidal species in 2007. The Pacific herring supports Bay food webs is an important commercial fishery and is a state-managed fish species. While these three species are highlighted, it is anticipated that an enhanced seawall could support many other species, including several other native seaweeds, which provide food and habitat for many species at the base of the food web. These include a host of marine invertebrates and small fish, which are in turn, important food for larger fish and birds.

This Pilot Project will provide important data at three tidal elevations, at three sites with different environmental conditions, and at two spatial scales (large and small panels/tiles). It is also intended to compare native vs non-native species' use of the ecological enhancements. The SERC has strong taxonomic expertise gained from decades of studying species in San Francisco Bay. This Pilot Project is unique in attempting to answer all of these questions simultaneously.

Design guidance for ecological enhancements to seawalls is particularly needed at this time, as more coastal defense structures are built in response to sea-level rise. Options for shoreline protection range along a continuum from green (all nature-based, soft elements, such as marsh restoration) to gray (all artificial, hard substrates, such as seawalls and revetments), and the approach is dependent on both shoreline conditions and human uses. Within San Francisco Bay, numerous agencies are working on shoreline solutions along this continuum, from revegetating marsh edges to mixed hard and soft living shoreline projects (such as the San Francisco Living Shorelines Project[3]), but seawall modifications for habitat benefits have not yet been tried.

The first timepoint reporting of data was made in August 2023 with 44 taxa identified with eight likely non-native species. A second timepoint report was completed in December 2023 with 106 taxa identified with 11 likely non-native species.

During public engagement for the Flood Study, public input strongly supported natural and nature-based solutions. The public is enthusiastically supportive of the Living Seawall Pilot Project. Organizations that work on climate adaptation and resiliency are supportive of the Pilot Project and have requested the data and results for use on other projects around the Bay.

Project Phasing, Schedule, and Cost

[3] http://www.sfbaylivingshorelines.org/sf_shorelines_about.html

The Pilot Project has spent almost $740,000 to date for development, design, fabrication, installation, Year 1 monitoring, the first event of Year 2 monitoring, and interim reports. The total cost estimate to construct the Pilot Project, monitor for two years, report findings, and remove the experiment is approximately $900,000, with a total project budget of $1.04 million with the inclusion of a 15% project contingency. A 15% contingency was applied considering the current inflation pressure on the cost of construction materials and the inherent uncertainty of experimental scientific work.

Cost to date:

Type	Cost	Timeframe
CH2M Hill Engineers	$313,562.64	Through March 2024
Port Labor	$335,958.99	Through April 2024
Port Materials/Services	$89,917.69	Through April 2024
TOTAL	**$739,439.32**	

The SERC's work on the Living Seawall Pilot Project was initially funded under the PEC Contract. As described at the December 12, 2023 Port Commission meeting, contract capacity under that contract will be exhausted this year. Port staff is working to develop a new contracting strategy to support the Waterfront Resilience Program going forward, using multiple contracting vehicles, which will be presented for the Port Commission's consideration at a future meeting.

The proposed grant to the SERC is part of that strategy to support the completion of the Living Seawall Pilot Project through the full second year of monitoring and development of a final report.

The grant request is for $285,300 to conduct two monitoring events to complete the full Year 2 monitoring, lab processing, report writing, participation in public education events, and grant writing. Proposition A will fund all current planned scope, with a significant proportion of construction funding supporting Port Maintenance Staff salaries.

Scope	Schedule	Estimated Cost	Status
Monitoring - Phase 3: Two remaining field surveys, report interim scientific findings.	2 events over 6 months	$165,000	Planned
Analysis, Interpretation of Results, and Experiment Removal - Phase 4: Lab processing. Final scientific report on experiment results and findings. Remove frames and patch anchor holes at the conclusion of monitoring.	3 months	$95,300	Planned
Participation in Public Education Events		$15,000	Planned
Grant Writing		$10,000	Planned
TOTAL GRANT COST		**$285,300**	

GRANT DETAILS

The proposed resolution would approve a sole source grant to complete the Living Seawall Pilot Project, including monitoring, data collection, taxonomy/identification, lab processing, and reporting, and assist in grant writing and educational opportunities.

Sole Source Grant: The SERC

Scope of Work – The SERC will continue to work with the Waterfront Resilience Program team and Port Maintenance staff to conduct the monitoring of the Living Seawall Pilot Project test tiles.

This scope includes the following:

- Conduct second and third monitoring events for year 2 monitoring
- Final live tile microscopic analyses (lab processing)
- eDNA soak analyses of tiles (lab processing)
- Ecosystem functioning analyses (lab processing)
- Interim Report
- Final Report

Sole Source Grant Authority: San Francisco Administrative Code Chapter 21G governs the award of grants and requires the Port to follow a competitive solicitation process to award a grant unless an exception to the solicitation requirement applies or a sole-source award is approved in accordance with the Purchaser's rules and regulations and is approved by a department's commission or board. The Purchaser's rules and regulations governing sole source approval include a provision for services available only from a sole source (Admin Code § 21.5(b)). A sole source grant to the SERC, a non-profit scientific institution associated with the public institution of the Smithsonian Institute, is justifiable because a competitive solicitation may result in another team of scientists being awarded the grant and interrupting the living seawall study and jeopardizing the results.

The SERC scientists assisted in the development and design of the Pilot Project, including the development of the Health and Safety Plan to safely conduct the monitoring. The SERC scientists conducted the first year of monitoring and the first event for the second year of monitoring. This type of experiment should not change scientific teams (biologists, ecologists) in the middle of an experiment. Changing teams in the middle of an experiment can be significant and can result in unreliable data sets, misidentified species, and conclusions that potentially are not scientifically supported.

According to the SERC scientists, there is no standard taxonomy for the species being studied and each set of scientists will have to develop their unique identification system. A change in teams would require a hand-off and training and education between teams on taxonomy and methodology mid-study which is unusual and not part of the current team's agreement. It is important, then, to have one consistent team of scientists using standard references and resources for taxonomy, which is the science of identifying and classifying species. Standard and consistent taxonomy and consistent methodology throughout the study are required for clear and reliable scientific conclusions. A high-quality data set is required for strong scientific conclusions.

About the Awardee

The SERC is a non-profit organization and the leading environmental research institute of the world's largest museum complex. The SERC provides science-based knowledge to meet critical environmental challenges. The SERC leads objective research on coastal ecosystems – where land meets the sea – to inform real-world decisions for wise policies, best business practices, and a sustainable planet. The SERC is exploring the most pressing issues affecting the environment, including toxic chemicals, water quality, invasive species, land use, fisheries, and global change. The SERC also explains environmental science in innovative ways that change how people view the biosphere and inspire them to take an active role in sustainable stewardship of the Earth. The SERC leads networks of research and education extending across both coasts of the U.S. and around the planet.

RECOMMENDATIONS

Port staff recommends that the Port Commission approve Resolution 24-27 authorizing the award of a sole-source grant to the SERC in the amount of $285,300 for a duration of one and a half years for monitoring and reporting for the Living Seawall Pilot Project.

Prepared by: Kelley Capone, Project Manager
Mathew Bell, Project Engineer

Prepared for: Brad Benson, Waterfront Resilience Director

PORT COMMISSION
CITY AND COUNTY OF SAN FRANCISCO

RESOLUTION NO. 24-27

WHEREAS, The Port of San Francisco seeks to complete this innovative experimental project to provide design guidance for the Port of San Francisco's Embarcadero Seawall renovation; and

WHEREAS, The Port developed the Living Seawall Pilot Project to examine ways to modify traditional seawall structure to enhance ecological community diversity and function, while also meeting engineering requirements for seismic safety and sea level rise; and

WHEREAS, As part of the Living Seawall Pilot Project SERC will coordinate with Port Maintenance and Divers to conduct monitoring; and

WHEREAS, San Francisco Administrative Code § 21.5(b) allows the award of a sole source grant to a non-profit scientific institution for programs, activities, or services that can be practically performed only by that particular entity; and

WHEREAS, SERC provides science-based knowledge specific to SF Bay, has undergone intensive Health and Safety training, and conducted all Year 1 monitoring and the first monitoring event for Year 2 monitoring; and

WHEREAS, Issuing this grant will allow the Port to complete the Living Seawall Pilot Project for design input for a new or renovated seawall; now therefore be it

RESOLVED, That the San Francisco Port Commission hereby authorizes Port staff to enter into a sole source grant in the amount of $285,300 for a length of one and a half years, to the Smithsonian Environmental Research Center for the purposes of completing the Living Seawall Pilot Project; and be it further

RESOLVED, That the Port Commission authorizes Port staff to take further actions in connection with the award of this grant as necessary to achieve the purposes described in this Resolution.

I hereby certify that the foregoing resolution was adopted by the Port Commission at its meeting of June 11, 2024.

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Secretary