PORT OF OAKLAND'S VISION 2000 MIDDLE HARBOR BASIN PROJECTS, OAKLAND, CA, USA

by

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ABSTRACT

The Port of Oakland is the primary and only bulkhead container port for the San Francisco Bay region and northern California. It is the fifth largest in the United States based on TEU cargo volume.

The purpose of this paper is to describe the Port of Oakland's Middle Harbor Basin Projects as an example of how a port can work with nature to achieve its navigation efficiency and capability enhancement goals in concert with its environmental and community goals.

The MHB Projects are also discussed as a case study in the PIANC Working with Nature (WwN) Work Group #176 Report currently being finalized for publication scheduled in 2018. ***

The MHB Projects evolved with the Port of Oakland's Year 2000 Vision Plan. The Plan was a $1.2 billion capital expansion plan to build a new modern port for the 21st century. It included several projects to fulfill both the Port's navigation mission by modernizing its terminals and deepening the Inner Harbor shipping channel; and its community and environmental stewardship goals by creating a public park space and shallow water habitat.

The Vision 2000 navigation projects included the dredging of the federal channel from -42' to -50'; building two new marine terminals, a joint inter-modal rail terminal, realignment of roadways, and conversion of the closed Oakland Army Base to maritime use.

The Vision 2000 community and environmental projects were: 1) a 38-acre Middle Harbor Shoreline Park (MHSP); and 2) a 181-acre Middle Harbor Enhancement Area (MHEA): a shallow water fish and wildlife habitat area to be created by beneficially reusing the approximately, 5.2 MCY of the 12-14 MCY of sand and mud from the proposed -50' channel deepening project.

This paper explains the process of how the Port followed the basic WwN template in the implementation of its Vision 2000 projects: **Step I: Establish project goals and objectives; Step 2: Understand the Environment; Step 3: Make meaningful use of stakeholder engagement; Step 4: Prepare project proposal/design to benefit navigation and nature; Step 5: Build/Implement; Step 6: Monitor, adapt, manage**

The Vision 2000 plan called for a new modern port to ensure the Port of Oakland's future economic and environmental success. This meant expanding the Port's shipping operational capacity and improving its cargo handling efficiency while simultaneously achieving its environmental and local community recreational goals.

*****NOTE:** PIANC's Environmental Commission (EnviCom) published a position paper, first in 2008 and later revised in 2011, that describes the Working with Nature (WwN) philosophy. The position paper defined the WwN concept and discussed, in general, how the approach can be applied to navigation and port infrastructure. The WwN approach provides a basis for maximizing opportunities for working with natural processes to deliver environmental restoration results that go beyond just avoiding or compensating environmental impacts. The Position Paper did not discuss specific tools and practices, Hence EnviCom established Working Group #176 to write a guide for WwN applicaton. The Report No. 176-2018 Guide for Applying Working with Nature to Navigation Infrastructure Projects will be published later in 2018. The following is a case study from the Report illustrating WwN principles at the Port of Oakland,

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MHB PROJECTS OVERVIEW

The MHB projects were developed as part of the Port of Oakland's (Figure 5.3-1) Year 2000 Vision Plan. Vision 2000 was a $1.2 billion capital expansion plan to build a new modern port for the 21st century. It included several projects to fulfil both the Port's navigation mission, by modernizing its terminals and deepening the Inner Harbour, and its community and environmental stewardship goals by creating a public park space and shallow water habitat area.

Vision 2000 included the dredging of the federal channel from -42 to -50 feet (-12 to -15 metre) deep, jointly cost-shared 50/50 between the port and the USACE; and the building of two new marine terminals, a joint inter-modal rail terminal, and the realignment of roadways

Figure 5.3-1. Port of Oakland looking west

The Vision 2000 community and environmental projects included a 38-acre (15-hectare) Shoreline Park, and a 181-acre (73-hectare) shallow water habitat area to be created by beneficially using the sediment from the proposed -50 ft. (-15 m) channel deepening project (Figure 5.3-2). The following narrative describes how the port followed the WwN six-steps process in the implementation of the Vision 2000 MHB Projects. .

Figure 5.3-2. Vision 2000 MHSP and MHEA Projects.

STEP 1: ESTABLISH PROJECT NEEDS AND OBJECTIVES

The Port of Oakland is the primary and only bulkhead container port for the San Francisco Bay region and northern California. It is the fifth largest port in the US. Vision 2000's call for a modern port that ensures the Port of Oakland's future economic and environmental successes meant expanding the Port's shipping operational capacity and improving its cargo handling efficiency to keep up with the growth of container traffic and size of ships.

In 1998, the Port acquired the US Naval Supply Center, a 500-acre (200-hectare) site adjacent to the Middle Harbor Basin (Figure 5.3-3).

The Vision 2000 strategy was to redirect the navigation use for the US Navy's maritime operations away from the Middle Harbor Basin to the Port's Inner Harbor, the locus of the majority of its terminals. This redirection of the Basin's navigation function would open the Basin and shoreline space for implementing the Port's community and environmental restoration goals.

Figure 5.3-3. 1999 Oakland Naval Supply Centre shortly after transfer from US Navy to port

A commensurate objective was to establish a site for dredged material placement and beneficial use for the 12-14 million cubic yards (9.2-10.7 million cubic metres) of dredged material from the Inner Harbor channel-deepening project. The proximity of Middle Harbor, adjacent to the Inner Harbor, provided a cost-effective solution as a placement site for a portion of the dredged material from the proposed deepening project, the specific amount to be determined. Port of Oakland and U. S. Army Corps of Engineers (USACE) (1998)

The primary community goals for the shoreline park were to gain physical and visual access to the shoreline for the public, which had been closed by the military since World War II; to create a place

for learning about the local history, natural environment, and maritime activities; and to foster stewardship for the environment.

STEP 2: UNDERSTAND THE ENVIRONMENT

The Port of Oakland participated in a San Francisco Bay region environmental study in the joint state-federal program known as the *San Francisco Bay Long Term Management Strategy (LTMS) for Dredged Material Placement* (1990-2002). The LTMS's goal was to establish a new environmental dredging plan for San Francisco Bay and an improved and coordinated permit process. (USACE et al, 2001)

The LTMS conducted comprehensive studies of the navigation and biological environment using sediment transport, hydrographic, and biological surveys. The cornerstone of the LTMS was the principle that dredged material is a resource, not a waste, and should be used beneficially to restore tidal marshes, wetlands, levees, and other infrastructure features. The LTMS dredging study, its findings, and the resulting LTMS Management Plan served as the environmental framework for the Port's Vision 2000, including the design and construction of the Middle Harbor Shoreline Park (MHSP) and Middle Harbor Enhancement Area (MHEA) projects.

In addition to the LTMS Management Plan, the Port created a Habitat Technical Advisory Committee (TAC) whose members included state and federal wildlife biologists, including eelgrass specialists, and members of the local community. The goal of the TAC was to develop more detailed environmental information and a site-specific design for the MHEA site. The proposed MHEA restoration target was to be a mosaic of shallow water habitats including sand and mudflats, eelgrass habitat, bird roosting areas, and a small marsh. It was to be implemented and managed through the application of adaptive management principles which were formulated in the *Construction Period and Long-term Monitoring, Maintenance and Adaptive Management Program* adopted by the TAC in 2001. (Winzler & Kelly, Merkel & Associates 2001-2002)

A key restoration engineering challenge was establishing suitable elevation and sandy material conditions for growing eelgrass in the transition from a deep-water navigation basin to a shallow water habitat. An uncertainty was whether the Oakland Inner Harbour dredged material, which is comprised primarily of silt, clay, and some sand, would be sufficiently stable to remain in place to maintain target elevations for each of the various targeted habitats—eelgrass, bird roosting islands, and the marsh.

STEP 3: MAKE MEANINGFULUSE OF STAKEHOLDER ENGAGEMENT TO IDENTIFY POSSIBLE WIN-WIN OPPORTUNITIES

Stakeholder involvement for MHEA began with the Port's participation in the LTMS stakeholder group during development of the LTMS Management Plan (1990-2001) and its implementation, which continues to date, and through engagement with the TAC.

The planning and design of MHSP was done through extensive community involvement in multiple meetings with residents of Oakland and nearby communities in Alameda County. The Port's active engagement in the LTMS stakeholder workgroup coupled with the stakeholder TAC of agency and environmental experts was critically important for moving the Vision 2000 projects forward. MHSP and MHEA were envisioned as win-win solutions, benefiting navigation, the environment, and the community.

The LTMS planning process, including the development of the TAC adaptive management program, was instrumental in achieving public support and the issuance of federal and state permit authorisations for the Vision 2000 projects: the construction of the new marine terminal in the Inner Harbour, dredging of the channel entering the Port to a depth of -50 feet (-15 metres), and construction of MHSP and the MHEA projects. The permit authorisations occurred almost simultaneously with the adoption of the LTMS Plan's dredge-material placement strategy of 40%

upland placement; 20% ocean placement; and 20% in-Bay placement, thereby establishing a new direction for dredged material management through beneficial use.

STEP 4: PREPARE INITIAL PROJECT PROPOSAL/DESIGN TO BENEFIT NAVIGIATION AND NATURE

Based on comprehensive environmental investigations and stakeholder involvement, the Port finalized its dual MHB Projects' designs, which were approved unanimously by the state and federal government permits in 2003. The following features were included in the designs:

- A 38-acre (15-hectare) MHSP, providing public access to the shoreline and the Bay with benefits for nature education and beach recreation (Figure 5.3-4).
- A 181-acre (73-hectare) beneficial use MHEA Project providing shallow water and eelgrass habitat, created with approximately 4-6 million cubic yards (3.1-4.6 million cubic metres) of sediment (Figure 5.3-5) from the Oakland Harbor channel deepening.
- A 5-acre (2-hectare) demonstration marsh; bird island(s) for roosting; and a 10-year habitat performance evaluation.
- The regulatory agencies supported the concept of the co-existence of the proposed MHSP and the MHEA as an ecological reserve of shallow bay and shoreline habitats with its commensurate goal as a beneficial reuse site for the Inner Harbour deepening. This habitat would be important for many species, such as Dungeness crab, flatfish, anchovy, herring, and perch and would serve the purpose as an environmental educational laboratory for the study of habitat restoration and marine biology.

Figure 5-3.4. MHEA and MHSP today

STEP 5: BUILD AND IMPLEMENT

MHSP was completed in 2006-07. Construction of MHEA took place in 2003-2007, concurrent with the commencement of dredging operations for the Inner Harbour navigation channel. The Inner Harbour deepening to -50 feet (-15 metres) was completed in 2008, and almost 6 million cubic yards (4.6 million cubic metres) of dredged material was placed in the MHEA. The US Army Corps of Engineers completed a geotechnical study in 2010/2011 to verify the MHEA's geotechnical conditions. The study's conclusion was that the building/establishment of the MHEA was incomplete.

During monitoring and adaptation discussed in Step 6, the issues for the incomplete construction and establishment of the MHEA were addressed.

Figure 5-3.5. Middle Harbor bird roosting islands

STEP 6: MONITOR, EVALUATE AND ADAPT

The greatest uncertainty to achieving the desired habitat objectives in the MHEA resided in the design predictions that were made regarding the sediment consolidation rates and hydrodynamics. The Habitat Design Criteria Model agreement prepared by the TAC in 2003 contained habitat

elevation guidance for the proposed timing of the eel grass planting. The main design concept allowed the dredged material to settle and consolidate after placement, letting nature take its course to foster plant and benthic community growth.

Ongoing monitoring during and after the 2003-2007 channel dredging and dredged material placement phase identified physical constraints within the Middle Harbor sediment transport system that presented challenges to constructing the wetlands portion of the project. In short, the dredged material was settling without sufficient consolidation to enable the eelgrass planting. The USACE geotechnical study referenced in Step 5 concluded that additional material would be needed to further the restoration objectives and recommended a revised sand and mud redistribution plan.

Following the recommendations in the revised sand and mud redistribution plan, approximately 400,000 cubic yards (300,000 cubic metres) of sand was redistributed within the site to further stabilise the sediments.

In 2014, the Port and USACE returned to the regulatory agencies and presented their findings that the creation of the shallow water habitat area was taking longer than originally planned and permitted in 2003, and that they would reconvene the TAC and refine the adaptive management program. (BCDC Staff Report and Meeting Minutes 2014 and 2015)

In February 2017, the TAC concluded that more regular meetings and presentations of monitoring results were needed. An unanticipated benefit during the many years of construction monitoring has been that the Middle Harbor site is proving to provide benefits to address sea level rise and flood protection, and may serve as a demonstration project to address sea level rise in other Bay Area locations. (Port of Oakland 2017)

In 2017, the TAC further concluded that the MHEA site is now stabilised, and interim shallow water habitat has been created. The roosting bird islands and a demonstration marsh have been created. Phase 1 of the eelgrass planting is planned for 2019 with a second phase scheduled for 2020. It is anticipated that the 10-year habitat performance evaluation will begin in 2019.

This case study highlights a universal challenge for ports and the maritime industry to succeed on multi-lateral fronts in the 21st century and illustrates the path to success by working with nature (WwN).

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