Environmental Assessment

Elliott Bay Seawall, WA

Seattle, Washington
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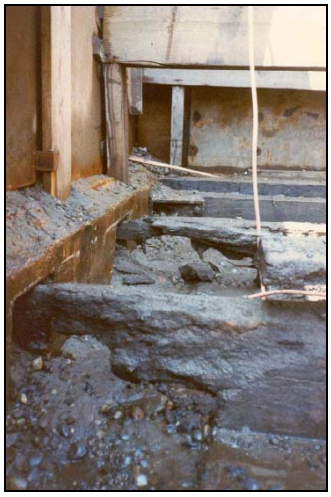

US Army Corps
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Seattle District

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1. Background. The Elliott Bay Seawall, more commonly known as the Alaskan Way Seawall, extends for a distance of approximately 7900 feet along Elliott Bay, between Washington Street to the south and Bay Street to the north. The seawall structure is at the end of its design life and will require continual maintenance to remain functional. Without extensive and continual repair, further deterioration of the existing seawall will lead to a structure incapable of supporting current static loads. This portion of the Seattle waterfront supports a dense and highly developed portion of the city that includes major transportation corridors such as the State Route (SR) 99 Alaskan Way Viaduct, passenger and vehicle ferry terminals and rail lines; commercial and non-commercial activities including retail, wholesale, museums, tourist attractions, a fire station, coast guard facility, and high density residential housing; and public utilities, including water, electric, gas/petroleum, steam, communications, sanitary sewers and storm water drainage. Failure of the seawall could potentially cause substantial damages to these structures. Disruption of any of these systems at the very least could cause minor inconvenience to those affected to a shut down of the central downtown business district for an undetermined amount of time.

The City of Seattle has requested Corps assistance in their efforts to repair or replace the Alaskan Way Seawall. In 2003, the Corps completed a reconnaissance report which demonstrated that there is a federal interest in pursuing a feasibility study for seawall rehabilitation. The feasibility report will identify solutions to address the degraded condition of the Alaskan Way Seawall and recommend either for or against the Corps to cost share in the construction of a recommended alternative. In accordance with the National Environmental Policy Act (NEPA), this environmental assessment (EA) provides a preliminary assessment of possible environmental impacts of seawall rehabilitation efforts in order to determine whether they would result in any significant environmental effects.

2. Authority. Committee on Transportation and Infrastructure, U.S. House of Representatives, House Resolution 2704, September 25, 2002, reads as follows:

> *Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, that the Secretary of the Army is requested to review the Comprehensive Study of Water and Related Land Resources for Puget Sound and Adjacent Waters, State of Washington, dated 1971, and other pertinent reports to determine whether modification and recommendations contained therein are advisable at the present time in the interest of storm damage prevention, shoreline protection, environmental restoration and protection, and related purposes in Elliott Bay, Washington, including the rehabilitation of the Alaskan Way Seawall.*

3. Purpose and Need. The Alaskan Way Seawall is experiencing significant decay and deterioration, leading to structural instability along the Seattle waterfront and central business district. Seawall structural instability is putting a tremendous amount of public and private infrastructure, development, and transportation linkages at risk of damage due to wave and tidal

erosion, and hence potential for undermining and collapse. In addition, the failure of the seawall would result in a high risk to public safety and environmental damage.

The purpose of the proposed rehabilitation effort is to protect the public facilities and economic activities along the Elliott Bay shoreline from storm damages associated with failure of the existing seawall.

4. Relationship to Alaskan Way Viaduct Replacement. The Corps' feasibility study is closely related to the proposed replacement of the SR99 Alaskan Way Viaduct, which runs parallel to a portion of the seawall. The SR 99 Alaskan Way Viaduct and Seawall Replacement Project Draft Environmental Impact Statement (AWVSRP DEIS) was published in March 2004 by the U.S. Department of Transportation Federal Highway Administration (FHWA), Washington State Department of Transportation (WSDOT), and City of Seattle. The AWVSRP DEIS evaluated the rebuilding or replacement of the Alaskan Way Seawall because it is essential to the function of the transportation facilities and is at risk of collapsing in a large earthquake. The geographic area covered in the AWVSRP DEIS is virtually the same as the area to be evaluated in the Corps' feasibility study. However, the Corps' feasibility study will evaluate the seawall from a storm damage reduction perspective; the seawall will be the primary focus of the analysis rather than a secondary project element as in the AWVSRP.

The Corps is reviewing the existing body of work and coordinating closely with the City of Seattle, FHWA, and WSDOT to incorporate all relevant material from AWVSRP DEIS, share information, and reduce duplication of efforts. Because of the vast amounts of data compiled and analysis completed for the AWVSRP DEIS, the Corps intends to utilize all pertinent information to reduce cost and create efficiencies. Where appropriate, this would occur through incorporation by reference of technical information, and partial adoption of analysis and conclusions drawn from the existing body of work.

5. Alternatives. Since the structural integrity of the Alaskan Way Viaduct is dependent on the structural integrity of the seawall, design and review of seawall rehabilitation alternatives was initiated as part of the AWVSRP. Three seawall replacement options (with 36 design variations) and three Seawall retrofit options (with 16 design variations) were developed and evaluated by WSDOT, the City of Seattle, and FHWA.

The AWVSRP partners then developed and applied screening criteria to identify the seawall design options which warranted further development and eliminate those which were either impractical or had undesirable constructability issues. Those concepts that failed to meet the screening criteria and/or provided no benefit over the other options considered were eliminated from further consideration. In general, the concepts that used uncommon construction techniques, were prohibitively high in cost, and/or appeared to have more obvious impacts to the businesses located along the waterfront were eliminated. Three seawall replacement options – rebuild, frame, and tunnel wall – remained and were carried forward and evaluated in the March 2004 AWVSRP DEIS.

The screening process conducted by the AWVSRP partners was reviewed by Corps of Engineers staff and found to be valid and legitimate.[1] Accordingly, the following four alternative construction techniques were evaluated for the purposes of this EA.

Alternative 1 – No action: The no action alternative consists of continuing to repair and maintain the existing seawall. As the structure continues to deteriorate, the risk of seawall failure due to static loads would increase. In order to remain serviceable, the seawall would require extensive monitoring and advanced repairs, in addition to the regular maintenance activities. Over time, the costs of repairs are likely to increase considerably. In addition, any seismic event could cause significant seawall damage. A seismic event causing soil liquefaction would likely result in catastrophic seawall damage requiring extensive repairs and potentially replacement.

Alternative 2 – Vertical face wall with structural frame: Alternative 2 consists of two concrete walls connected by a concrete T-beam. A drilled shaft secant pile wall would be built behind the existing seawall. It would be connected to the existing seawall, but the existing seawall would not contribute to load bearing capacity. The second wall would be a bulkhead constructed of drilled shafts located 30 to 60 feet east of the secant pile wall. The shafts making up the bulkhead would anchor the secant pile wall. The T-beam deck, consisting of multiple bulkhead cap beams, would be located below the roadway surface to accommodate utilities and provides structural support for the secant wall and bulkhead. The frame measure would require significant excavation to construct the new seawall and relocate utilities. This alternative is the same as the frame seawall alternative in the AWVSRP DEIS.

Alternative 3 – Drilled shaft wall with soil improvements: Alternative 3 involves strengthening the weak soils behind the existing seawall and adding a drilled shaft secant pile wall to provide needed lateral and vertical support. The soil improvements would prohibit liquefaction of the loose soils contained by the existing seawall. Soils would be strengthened through a process called jet grouting, where soils are mixed with a cement grout stabilizer. This involves drilling a hole through the existing ground surface, then inserting a rod containing a jet through which cement grout is pumped at high pressures. The high-pressure grout penetrates the existing soils, enhancing their strength. The jet is rotated while being drawn out of the hole, forming a column of improved soil. Numerous columns at close intervals are used to create a block of improved soil. The drilled shaft secant pile wall would be constructed behind the existing seawall to provide remaining required lateral resistance. This alternative is the same as the rebuild seawall alternative in the AWVSRP DEIS.

Alternative 4 – Tunnel wall: Alternative 4 would replace the seawall with the outer wall of a tunnel between S. Washington Street and Pike Street, consistent with the proposed tunnel alternative in the AWVSRP DEIS. The selection of Alternative 4 by the Corps could not occur unless FHWA signed a record of decision for the AWVSRP selecting the tunnel alternative. Alternative 4 would be combined with Alternatives 1, 2, and/or 3 for the remaining segments of the seawall.

[1] As documented in a 17 January 2006 memorandum *Elliott Bay, Seattle, Washington, Alaskan Way Seawall Flood and Coastal Storm Damage Reduction Project, Formulation and Screening of Design Concepts and Alternatives.* The AWVSRP alternatives, screening criteria, and screening results are also summarized in this memorandum.

Opportunities to improve habitat values for fish and wildlife, aesthetics, and public access along the Seattle waterfront would be considered for application to any of the alternative construction techniques described above. The alignment of most segments of the seawall would be at or inside (landward) of the existing seawall. The tunnel wall alignment may deviate waterward at the Coleman Curve in the central waterfront, as described in the AWVSRP DEIS.

Additional alternatives and/or specific opportunities for enhancing physical attributes along different segments of the seawall may be identified during the scoping process.

6. Major Environmental Impacts. Several major environmental impacts could result from implementation of these alternatives. They include:

a. impacts to water quality during several years of construction activities
b. impacts to marine habitats – under some alternatives portions of the seawall may be realigned waterward into Elliott Bay or landward towards Alaskan Way
c. impacts to species listed under the Endangered Species Act, particularly Chinook salmon and bull trout
d. impacts to historic properties
e. impacts related to exposures to potentially contaminated materials landward and waterward of the seawall
f. infrastructure required for post-construction storm water management
g. impacts associated with the no action alternative – catastrophic failure of the seawall would lead to major impacts on the environment, as well as public facilities and infrastructure located landward of the seawall
h. impacts to transportation corridors during construction activities
i. impacts to businesses and residences from noise levels during construction activities
j. socio-economic impacts associated with a large, multi-year construction project
k. cumulative impacts – other major construction projects are located in the vicinity (including Alaskan Way Viaduct replacement, Coleman Dock upgrades) and there is limited availability of suitable habitats within Elliott Bay due to historic development activities

7. Conclusion. Implementation of any of the alternatives would significantly affect the quality of the natural and human environment as defined by the Council on Environmental Quality NEPA regulations (40 CFR Part 1500). Additionally, Paragraph 6 of U.S. Army Corps of Engineers Procedures for Implementing NEPA (33 CFR 230.6(a)) lists feasibility reports for authorization and construction of major projects as an action normally requiring an Environmental Impact Statement (EIS). Therefore, preparation of an EIS is recommended.

The Corps cannot adopt or supplement the AWVSRP DEIS because it describes actions that are results of a transportation purpose and need. This is solely a consequence of the differing missions, sources of authority, and procedural obligations of the two federal lead agencies. The

objective of the Corps' feasibility study, and hence the purpose and need of the Corps' NEPA document, must focus on the Corps' authority to undertake storm damage reduction activities. To fulfill its water resources planning obligations, the Corps must confirm that there is a risk of damage of a nature and cause that falls within the rigid parameters of the Corps authority.