

INTRODUCTION

Environmental Science Associates (ESA) is working for the City of Seattle Parks and Recreation (Seattle Parks) on a design at Lowman Beach Park in West Seattle. The project will include removal of the existing seawall with the goal of creating a natural sloping beach with large wood and native vegetation to provide marine nearshore habitat. The City has indicated that they will be proceeding with Alternative 2 (Modified seawall), instead of Alternatives 1 (replace with seat-wall) or Alternative 3 (rebuild seawall). The project will consist of a small portion of soldier-pile seawall, a retaining wall, a pocket beach, and a path.

Reid Middleton, ESA's subconsultant, is responsible for the structural design of the seawall and retaining wall. ESA is responsible for coastal/civil engineering, and geotechnical engineering is being performed by the City of Seattle Public Utilities Materials Lab.

SEA WALL & RETAINING WALL

Water levels: Structures will be designed based on water level data provided by ESA, the following are the design water levels.

Water Level	Elevation (NAVD88)
Mean Higher High Water (MHHW)	TBD
NAVD88	+ 0.00
Mean Lower Low Water (MHHW)	TBD

Seawall and Retaining Wall Layout: Reid Middleton is responsible for determining a layout that is constructible within the parameters set by ESA. ESA is responsible for ensuring that the layout is adequate from a coastal engineering perspective with consideration for erosion/scour/sedimentation/accretion.

Seawall and Retaining Wall Elevations: Reid Middleton is responsible for the structural design of the seawall and retaining wall. Top of wall and toe elevations were determined by ESA.

Composition: The seawall will consist of precast concrete panels and caps supported by auger-cast steel w-shape piling. A temporary steel pile drill casing will be used to prevent tidal waters from inundating the shaft and mixing with uncured grout. The visible portions of the seawall will consist of pre-cast concrete.

Temporary Steel Pile Drill Casing: The temporary steel pile drill casing is intended to create a seal into the underlying clay layer to prevent tidal waters entering the shaft. The toe elevation of the casings are to be determined by the SPU materials lab geotechnical engineer.

Geotechnical Design Parameters: Geotechnical design parameters were provided by SPU through a series of emails.

- A soil pressure diagram was provided (attached)
- A 250 psf surcharge load, at the request of Reid Middleton (attached).
- Water levels were provided for the design case, both behind and in front of the seawall
- Weep drains similar to the Jet Filter System should be installed approximately every 4 feet.
- Backfill behind the wall should be generally free draining, such as Type 17 as defined in the City of Seattle standard specifications.
- Construction equipment should be kept at a distance from the existing failing seawall equal to the height of the existing seawall.
- Construction equipment and significant surcharge loading should be kept a minimum of 5 feet from all existing structures, including the outfall pipe.
- Minimum pile spacing to use specified parameters, in terms of the diameter of the augured shaft (2D, 3D, etc.): **TBD**

Work Adjacent to the 66-inch CSO Outfall: ESA is responsible to coordinate with the City regarding how close the intended construction activities can occur to the existing 66-inch outfall pipe without causing damage, including the location of the new seawall and retaining wall, construction equipment access, and construction activities.

Adjacent Retaining Wall: There is a concrete retaining wall to remain that is adjacent to the new seawall and retaining wall. As-built records of the retaining wall have not been provided, and the toe elevation is unknown. Temporary shoring may be required during construction to facilitate installation of the seawall.

Property Ownership: The existing seawall, and adjacent retaining wall are both on Seattle Parks property based on drawings provided by ESA.

Concrete Finishes: The precast concrete will not have a stamped or form liner finish.

Deformed Bar Reinforcement: Given the investment to install the seawall, rebar shall be 316SS to add longevity and reduce lifecycle cost.

PROPERTY OWNERSHIP

The City owns the property in question, and the property line for the Parks parcel is beyond the existing retaining wall that is to remain.

CODES AND REFERENCES**General**

- City of Seattle Municipal Code
- 2015 International Building Code
- ASCE 7-10 Minimum Design Loads for Buildings and Other Structures
- ASCE 37-02 - Design Loads on Structures during Construction
- Coastal Engineering Manual (CEM), Rock Manual

Concrete

- ACI 318-11 Building Code Requirements for Structural Concrete
- PCI Design Handbook Precast and Pre-stressed Concrete, Seventh Edition (2010)

Steel

- AISC 325-11 Steel Construction Manual, 14th Edition (2011)
- AISC 360-10 Specification for Structural Steel Buildings
- AWS D1.1-2010 Structural Welding Code – Steel

DATUMS

Vertical: NAVD88

MATERIAL PROPERTIES**Concrete**

Type
Precast Panels

Normal Weight
 $f'_c = \text{TBD}$

Grout

TBD

Reinforcing Steel

Typical Reinforcing

2205 Duplex Stainless Steel

Steel Piling

W14x

Duplex coating: Hot-Dip Galvanized and Painted,
 $f_y = 50\text{ksi}$