Balboa Islands Seawall Rehabilitation Project

Tidelands Management Committee

October 29, 2014

Seawall Requirements

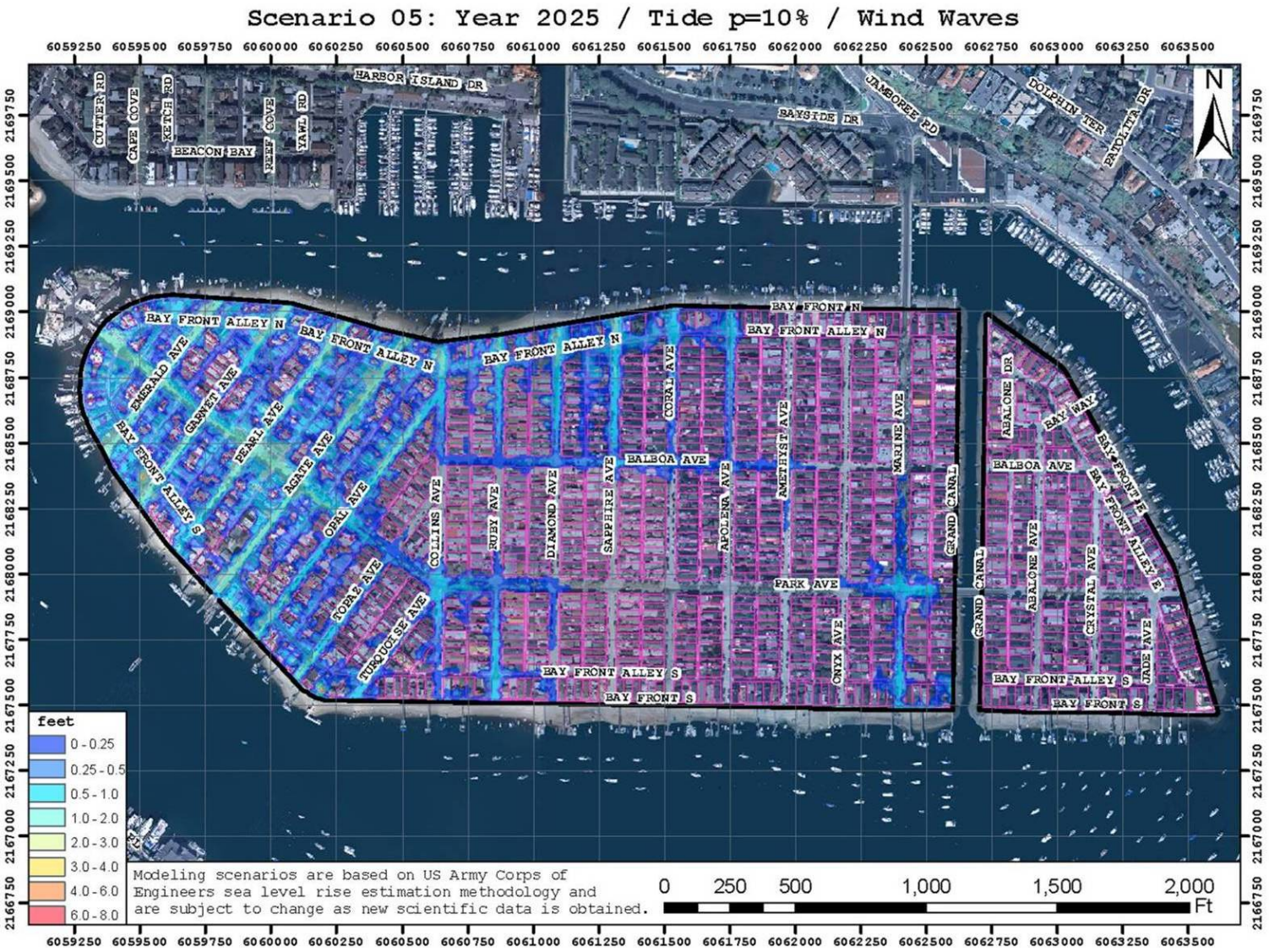
A. Structurally-sound seawall system
B. Islands protected from flooding
C. Docks and beach are accessible

North Side of Balboa Island

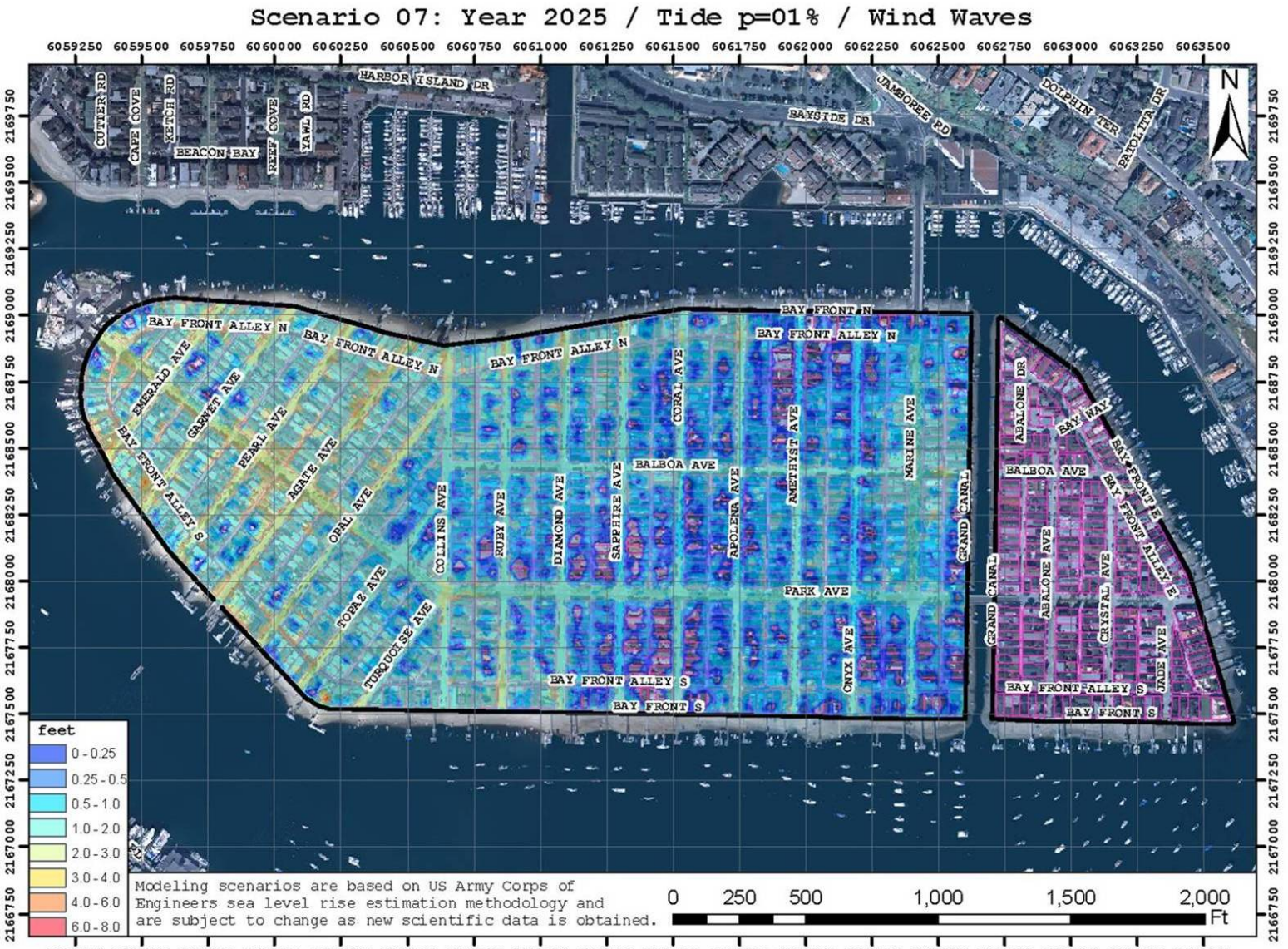
10/9/14 – 10 AM: 6.5’ High Tide (MLLW)

10 inches of freeboard!

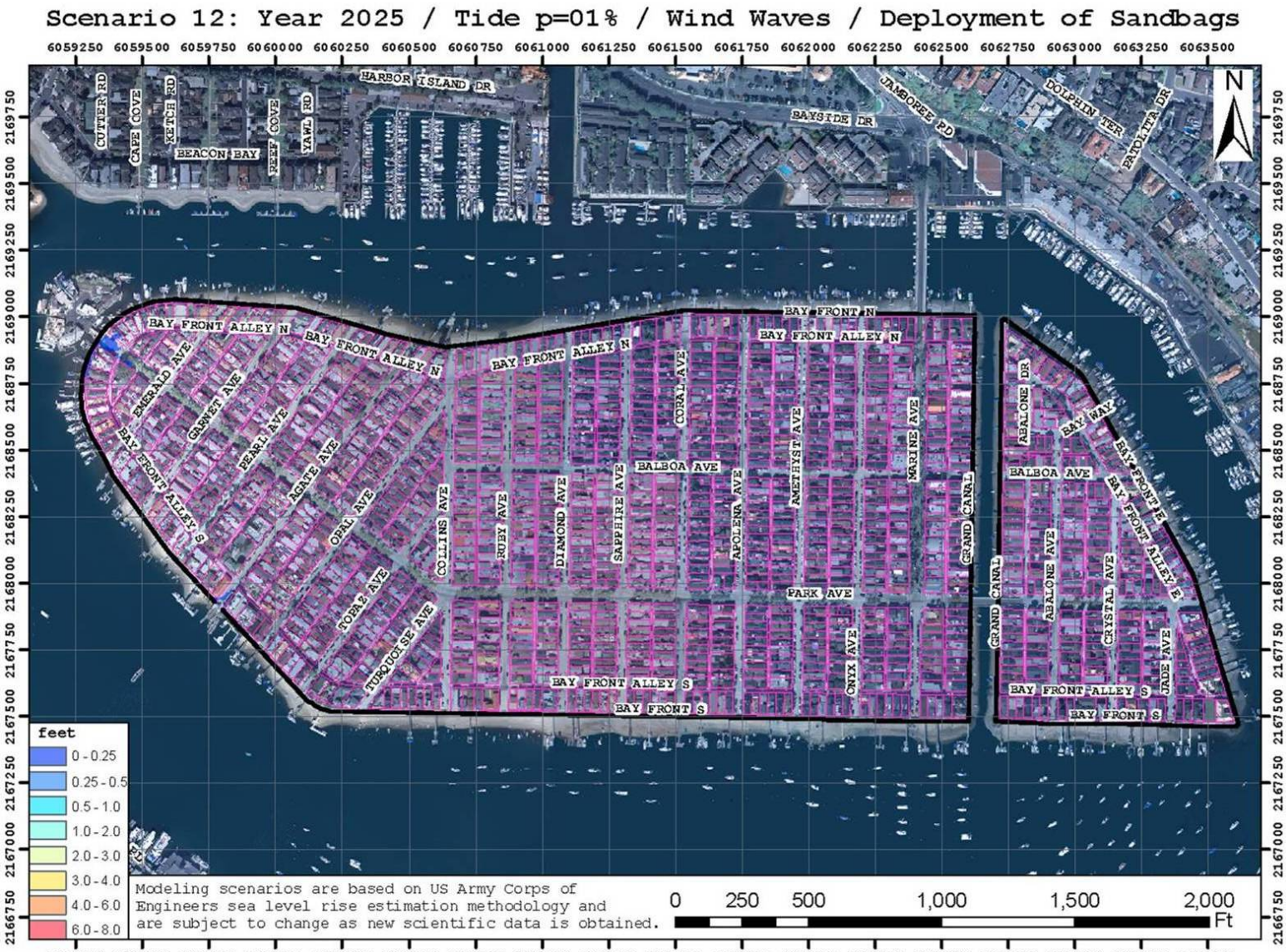
2025: Highest 10% Tides with Wind Waves



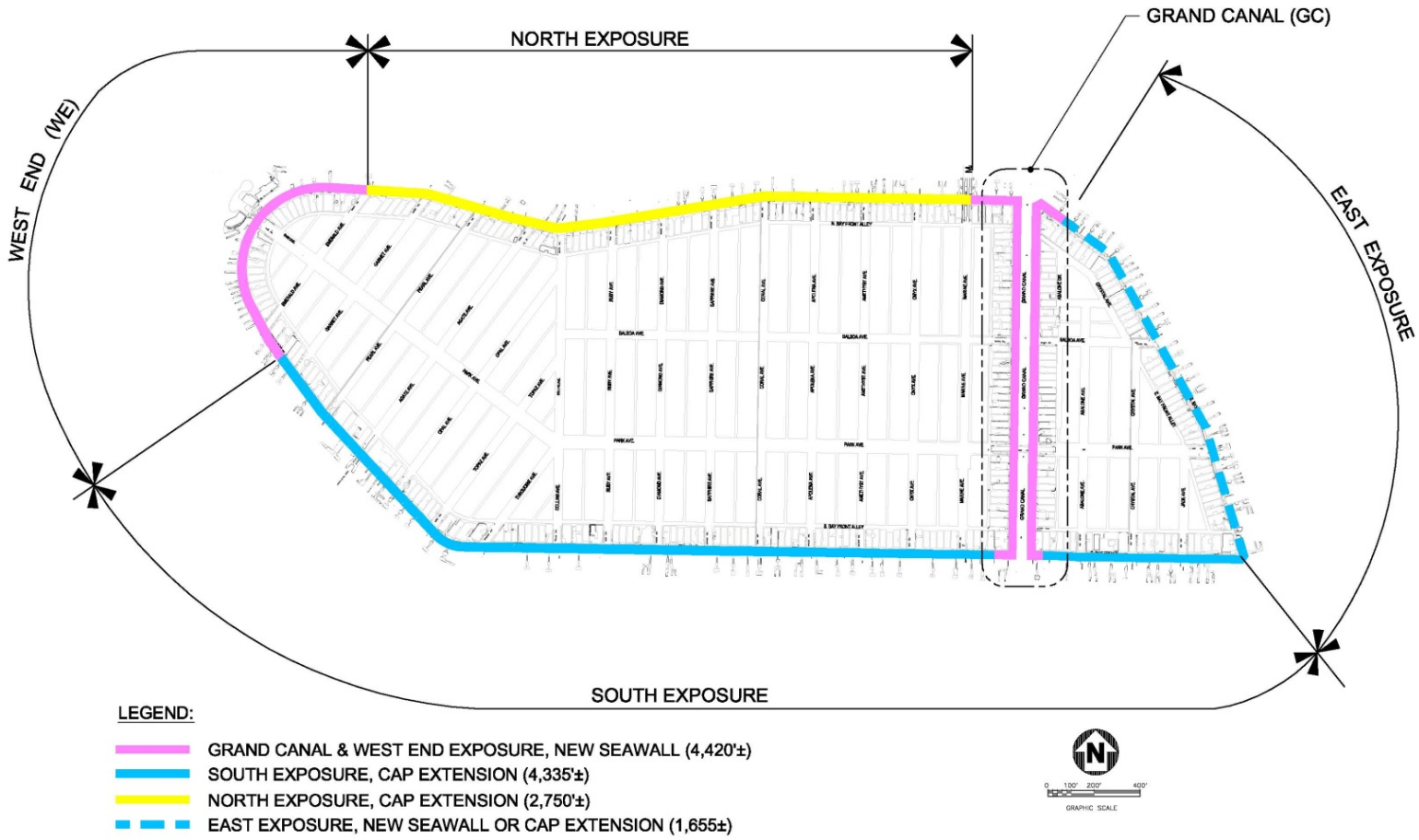
2025: Highest 1% Tides with Wind Waves



2025: No Flooding with Sandbags

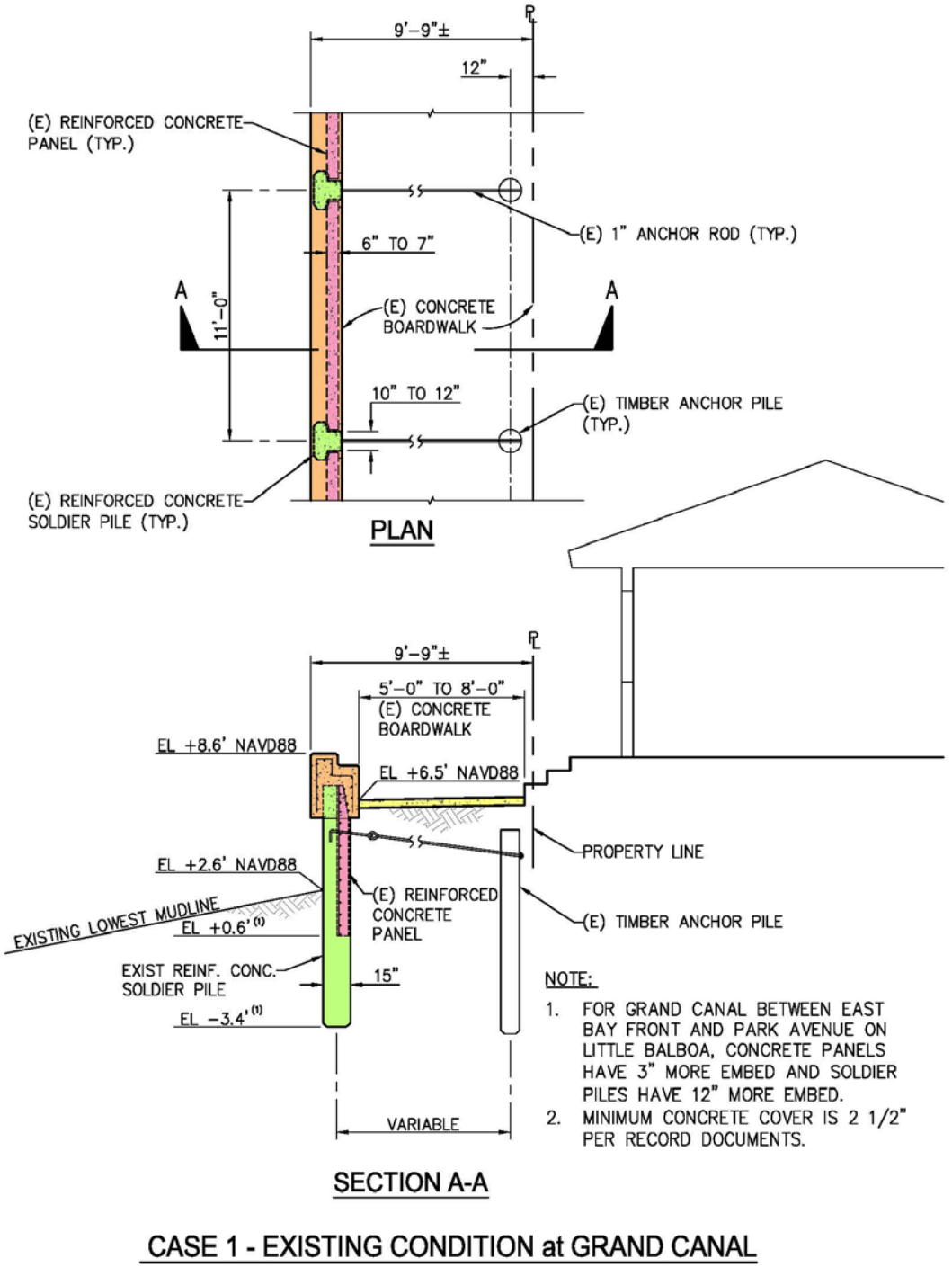


Locations for Seawall Rehabilitation and Capping



Existing Seawall Along Grand Canal

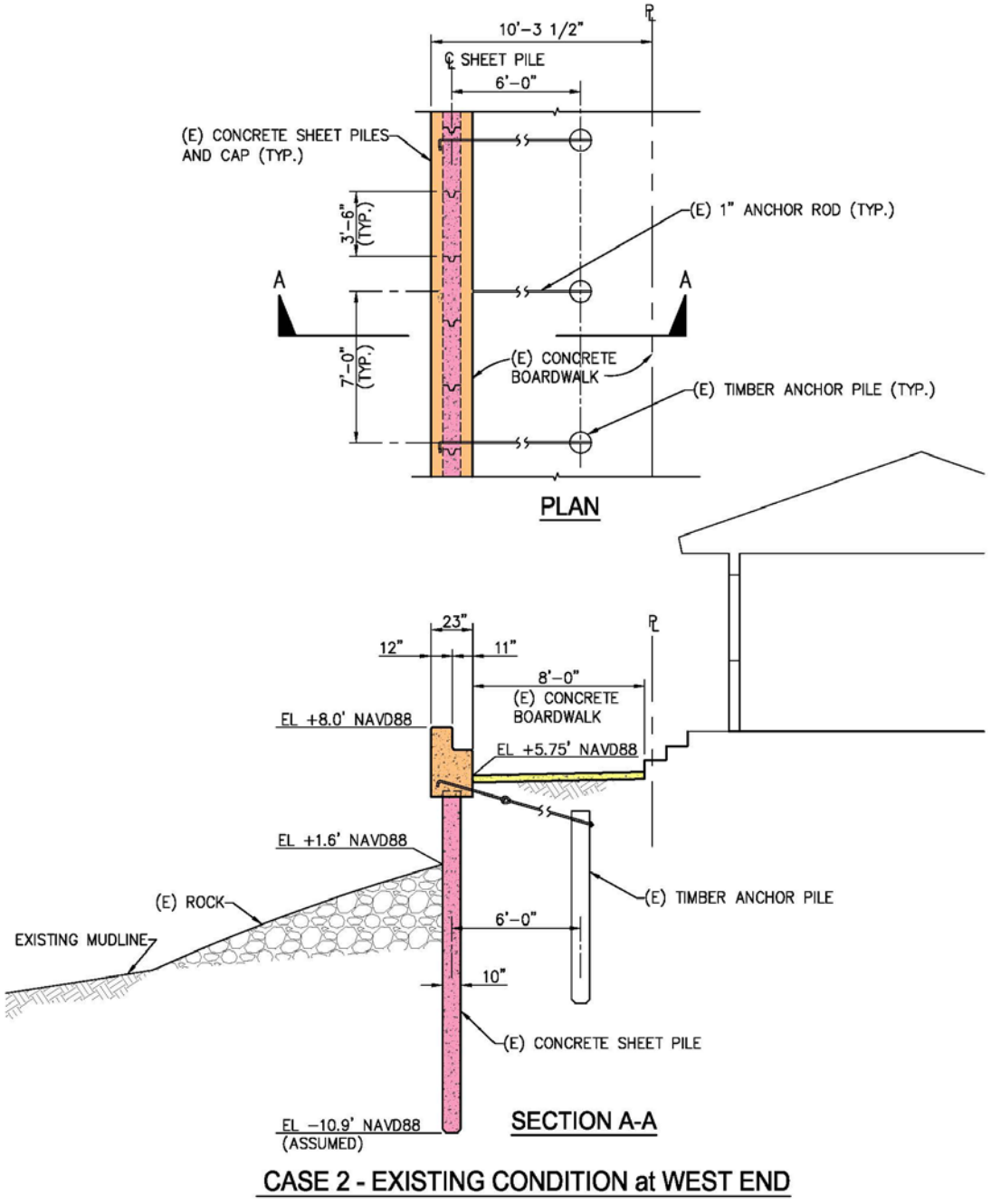
Constructed:
1930, 1935



Existing Seawall at Balboa Island West End

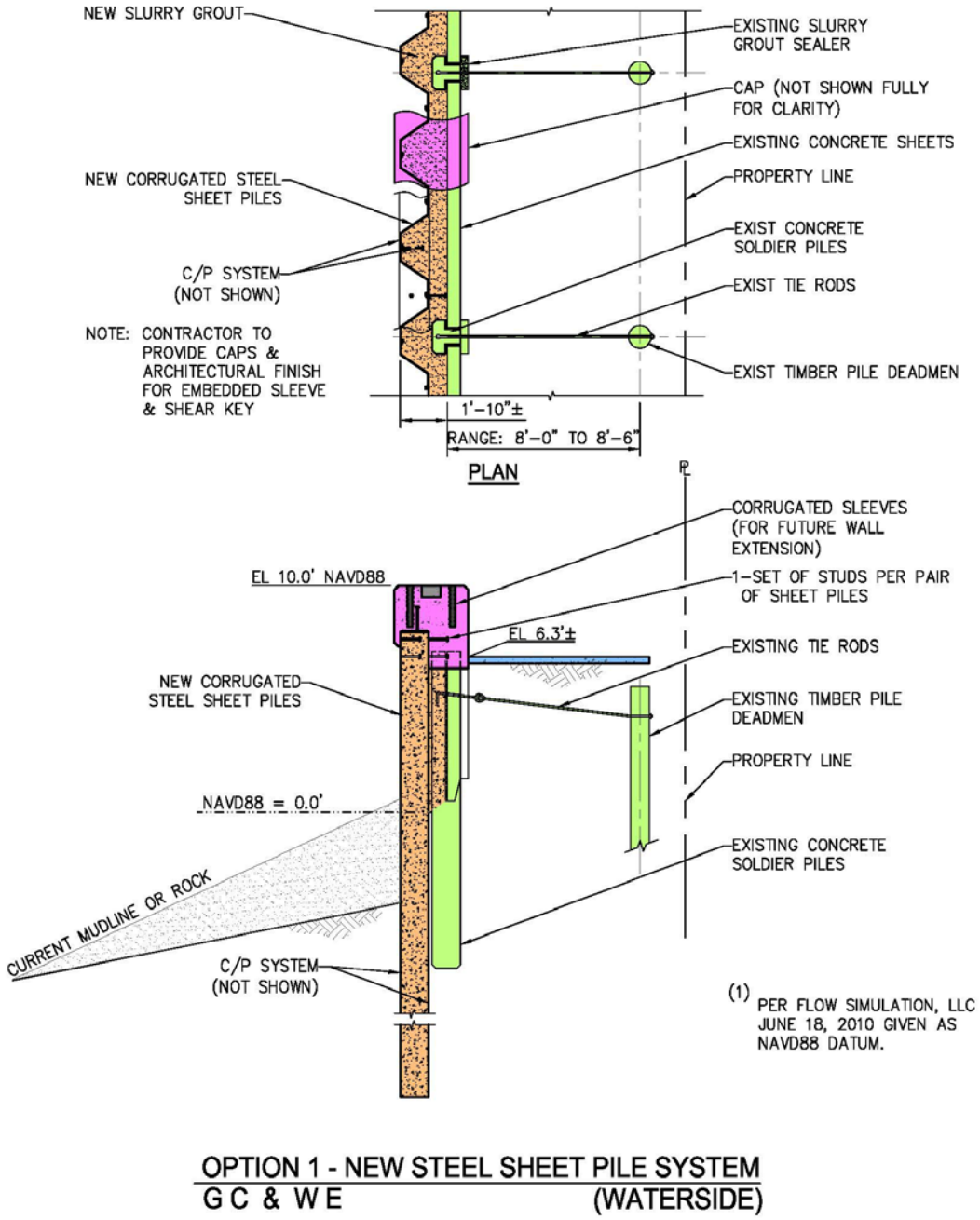
Constructed: pre-1935

Rock reinforcement installed 1985



New Seawall Option:

New Steel Sheet-Pile Walls along Grand Canal and West End



What about a Seawall Retrofit?

- If the seawalls along the Grand Canal and the West End are reinforced, can we expect another 20-25 years of service?
- Should the seawalls be tested to see if they are appropriate candidates for retrofit?

Existing Seawall Condition

- 85yr old walls, with an approx. 75yr original lifespan
- Walls are exhibiting obvious signs of deterioration and stress.
- Existing walls subject to seismic risk
- Depth of wall in the mudline is very shallow. (Grand Canal)
- Many unknowns: seawall rebar, sheetpile condition below mudline, tiebacks

General Wall Condition Summary

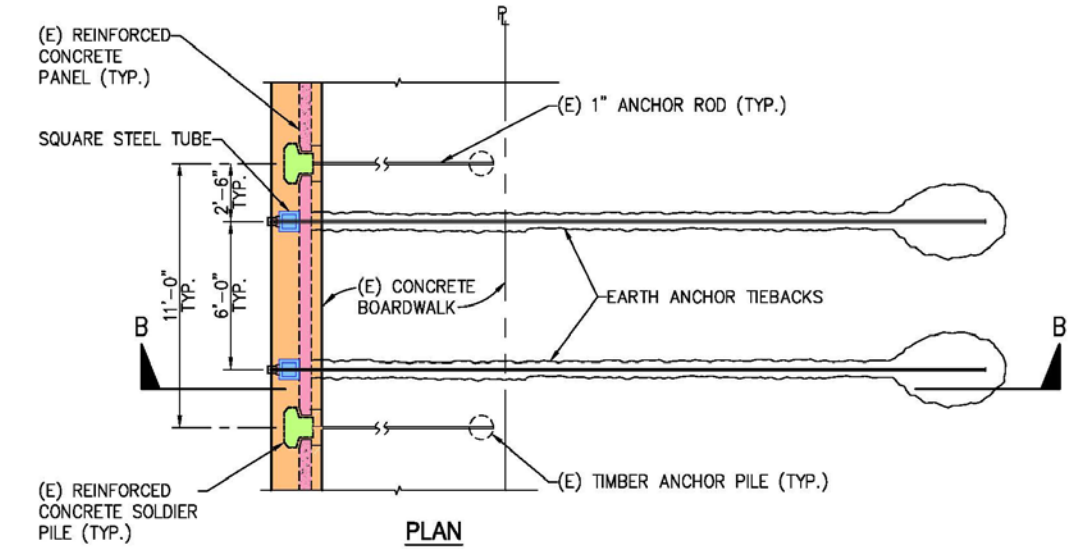
	Knowns		Unknown
	Positive Indication	Negative Indication	
Condition of Concrete		Exposed aggregate	X
Tie-Rod Corrosion/ Condition (Prior Knowledge)		Corroded or broken	
Rebar Condition			X
Rebar Corrosion	Not evident		
Sheet Pile Cracks			X
Performance of Wall Repairs and Maintenance	X		
Sheet Pile Condition Below Mudline			X
Signs of Settlement		X	
Signs of Wall Movement		X	
Seawall Age		X	

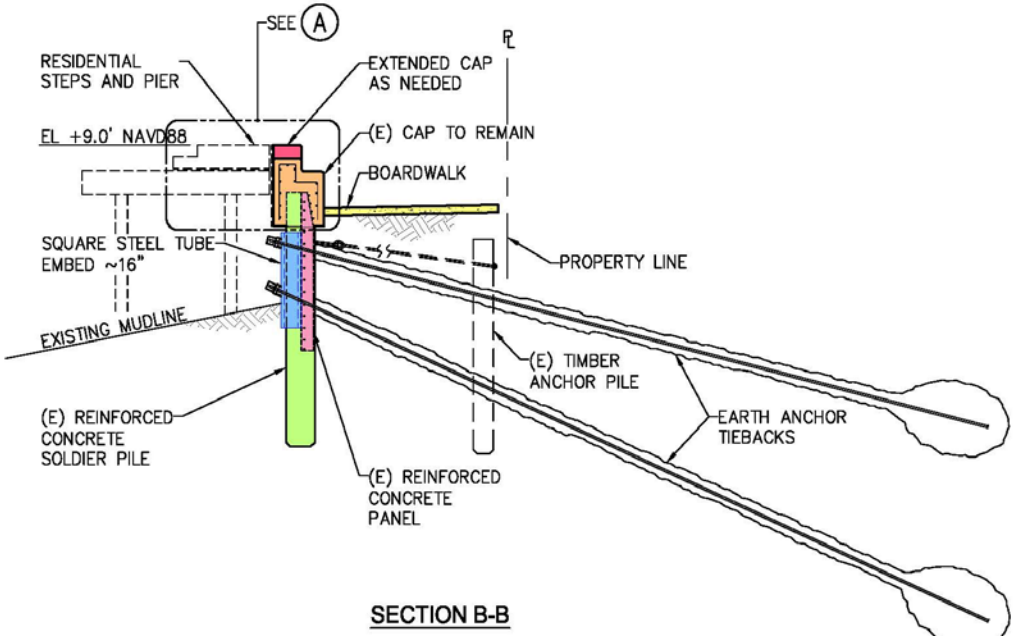
Testing Program Costs

- Cost for core samples, lab tests, report, and presentation at Grand Canal & West End Only:
  - Sampling at approx. 200ft intervals
  - Samples at 3 heights (low, mid and top)
  - $150,000 to $200,000

Possible Retrofit Option:

Vertical Struts with Tiebacks along Grand Canal





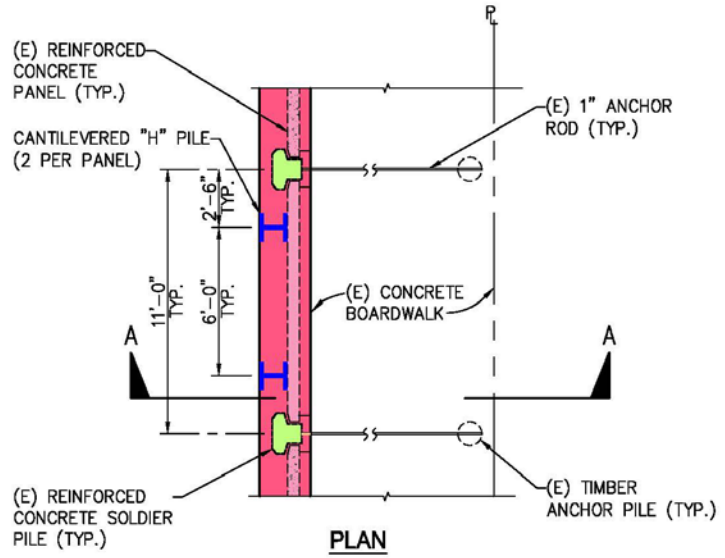
Option 1 - Grand Canal

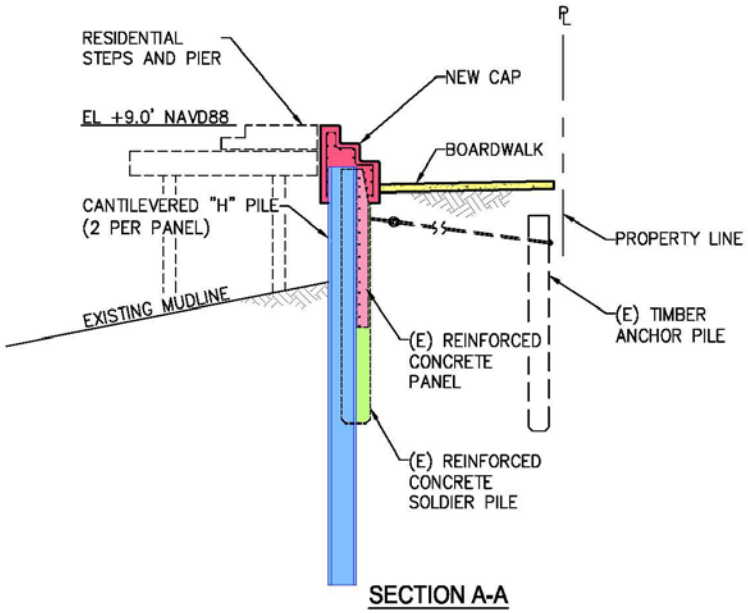
Vertical Struts/Tiebacks (Grand Canal): Challenges and Concerns

- Installation of lower tieback for the vertical strut will be negatively impacted by tides, thus extending the overall schedule to complete.
- The success of this retrofit is dependent upon the structural integrity of the concrete panels (Grand Canal) and concrete piles (West End).
- Compared to a new wall, there is no cost advantage. Option rejected.

Another possible retrofit option:

H-Pile Supports along Grand Canal





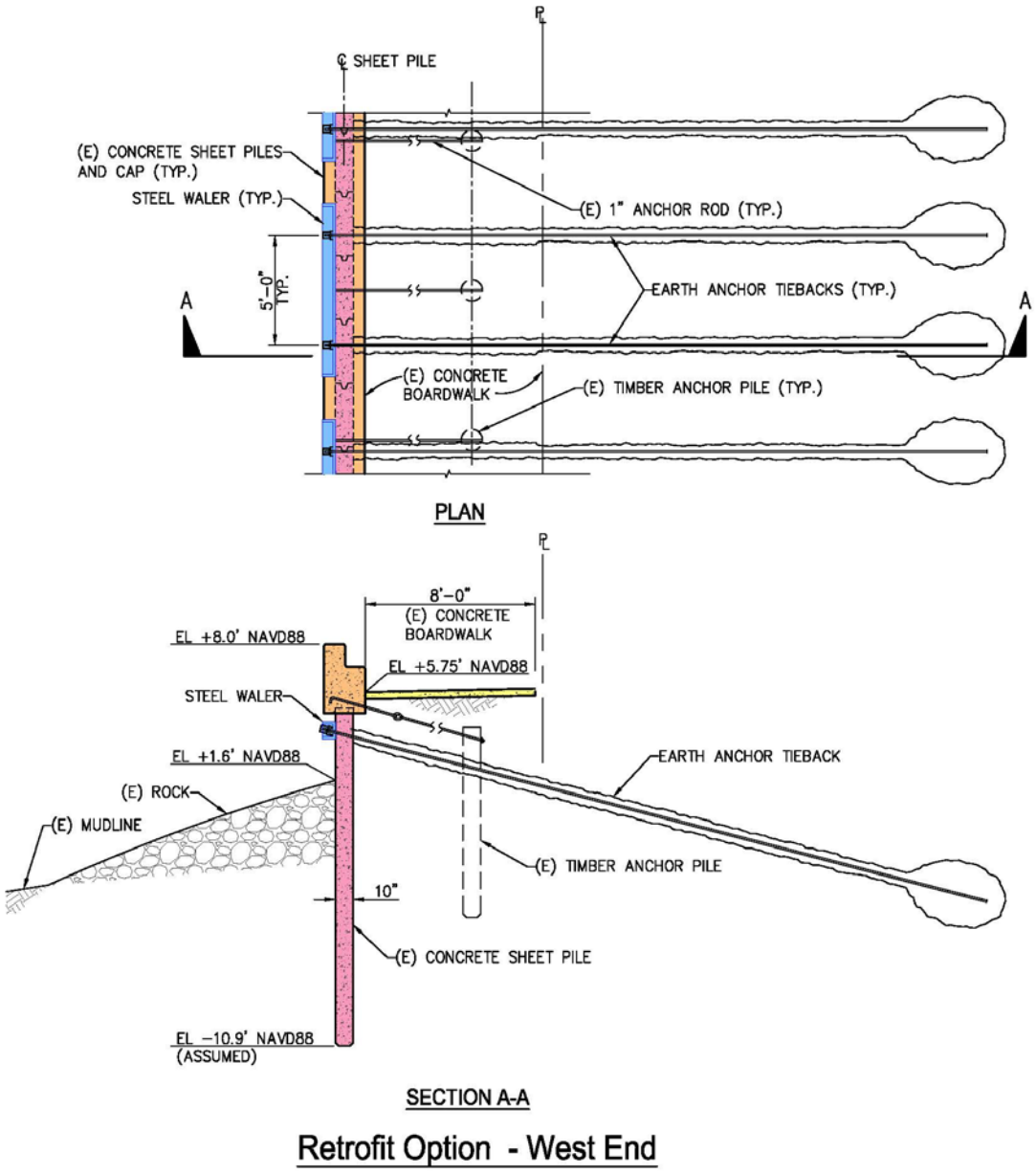
Option 2 - Grand Canal

3. H-Pile Supports along Grand Canal: Challenges and Concerns

- There will be noise and vibration impacts of diesel hammer equipment to install H-Piles.
- There is the potential for additional damage to seawall during retrofit, as well as residential disturbance/damage.
- Testing required. Compared to the cost for new seawalls, this is a favorable, short-term option.

Retrofit option for the West End:

Beam Sections with Anchors



Beam Segments with Anchors

Beam Segments with Anchors

Beam Segments/Anchors at West End: Concerns

- The success of this retrofit using beam segments/anchors is dependent upon the structural integrity of the concrete piles (West End). Testing required.

Costs: Grand Canal & West End Seawalls

	Seawall Replacement or Rehabilitation	Contin-gency	Estimated Cost	Lifespan (Approx.)
1	New Seawalls	15%	$22 million	100 years
2	Vertical Struts & Beam Segments	25%	$21 million	25 years?
3	H-Pile Supports & Beam Segments	25%	$10 million	25 years?

Total Estimated Costs

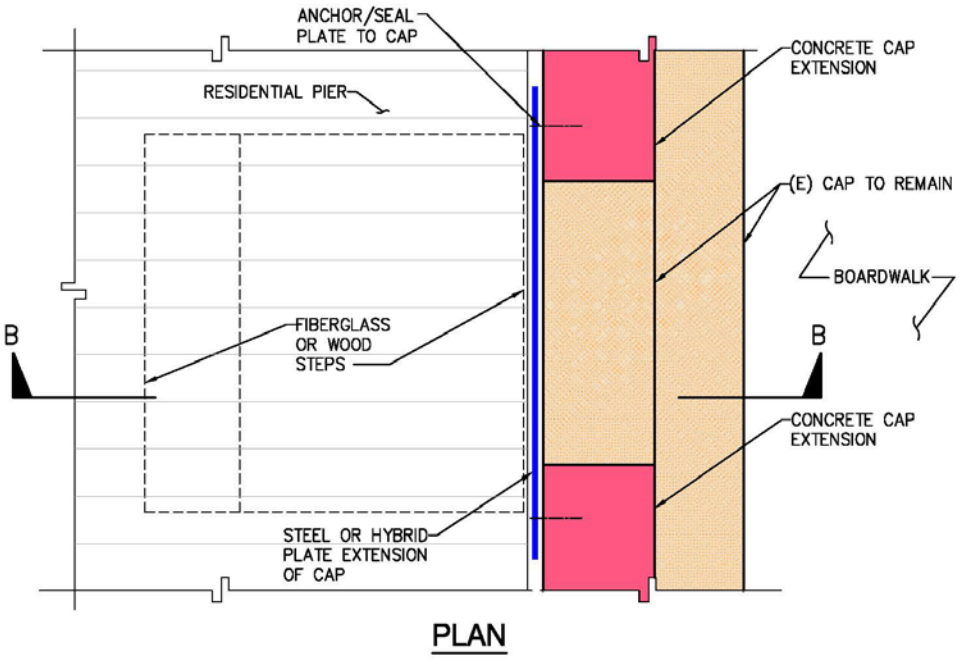
	Seawall Rehabilitation[1]	Total Cost[2]
1	New Seawalls and Capping[3]	$35 million
2	H-Pile Supports Retrofit[3] + Beam Segments/Anchors Retrofit[3] and Capping[3]	$20 million

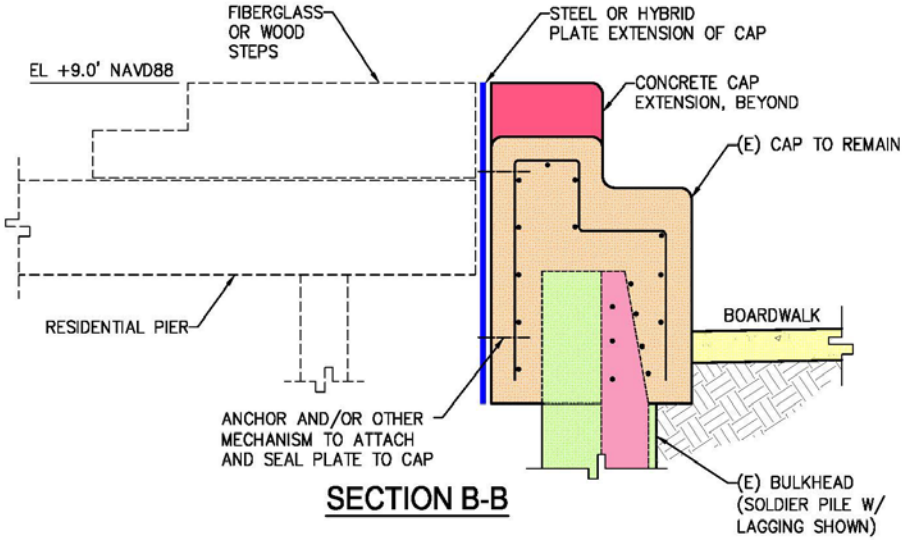
Notes:

1. Assume 9.0' top of wall elevation. (NAVD88)
2. Includes 15% or 25% contingency.
3. Capped walls and retrofit walls assumed to have a 20-25 year lifespan.

Topic C: Dock and Beach Access

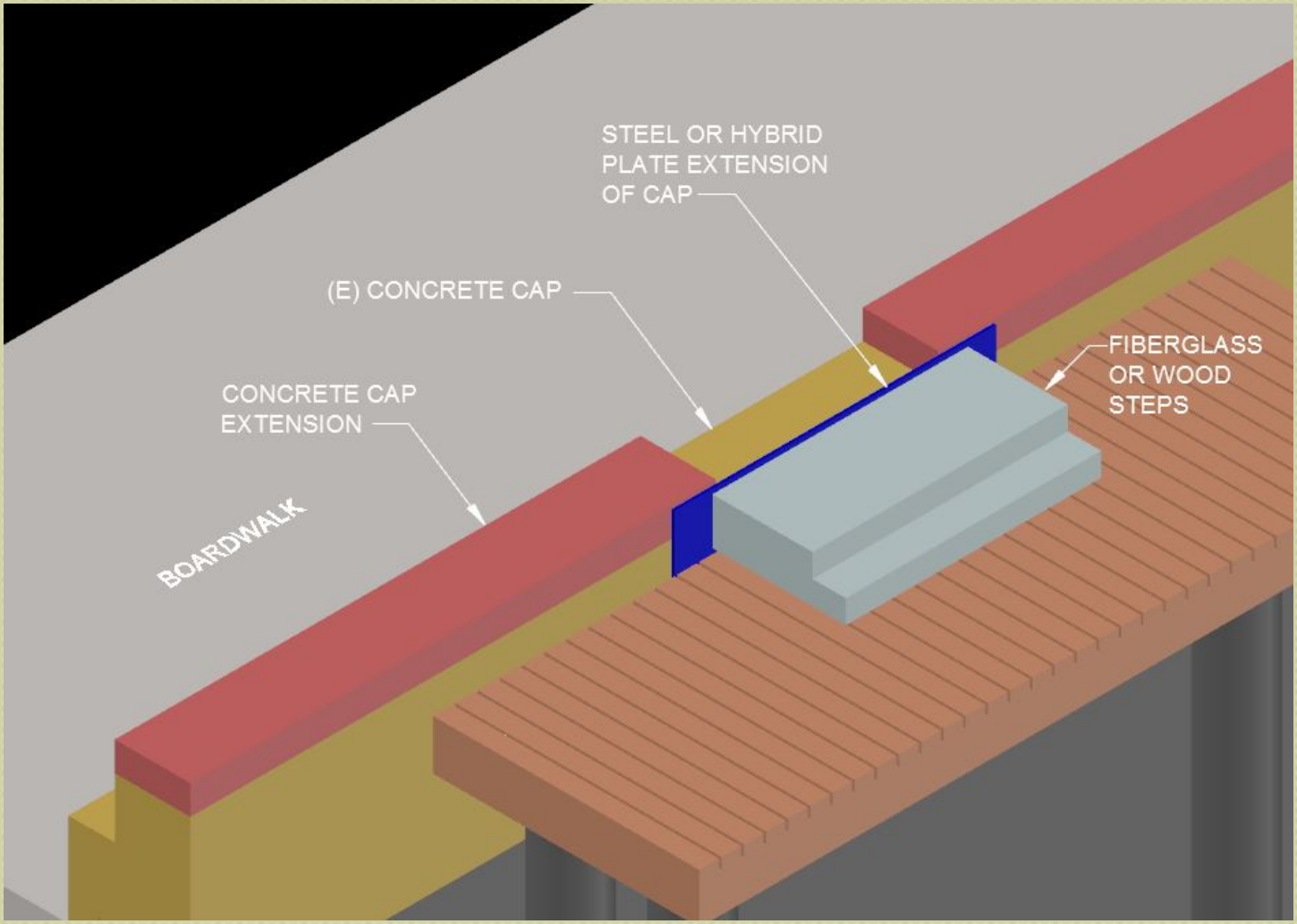
Proposed Steps Over Extended Cap



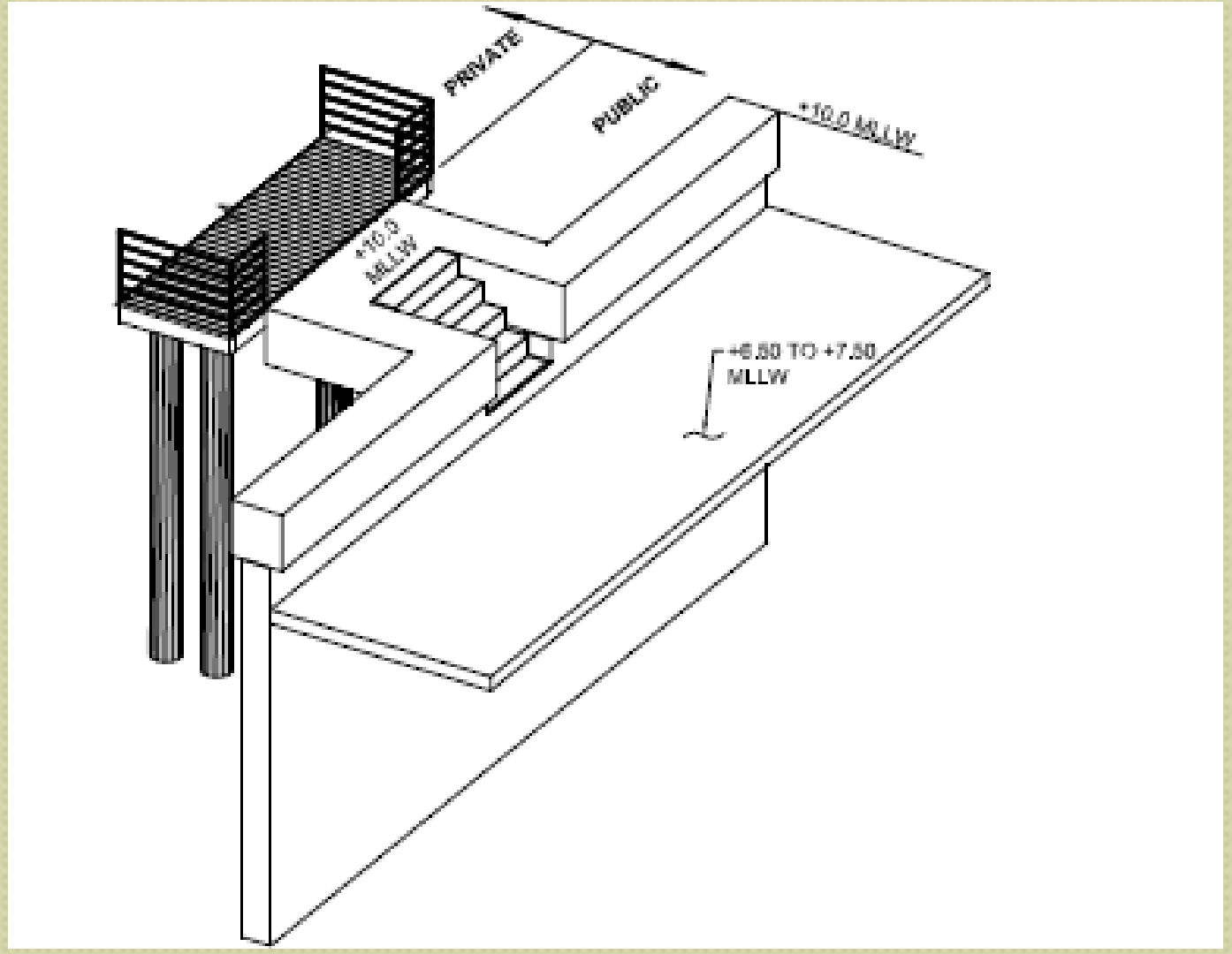


DETAIL A - CONCEPT
(Steps Over Cap Extensions)

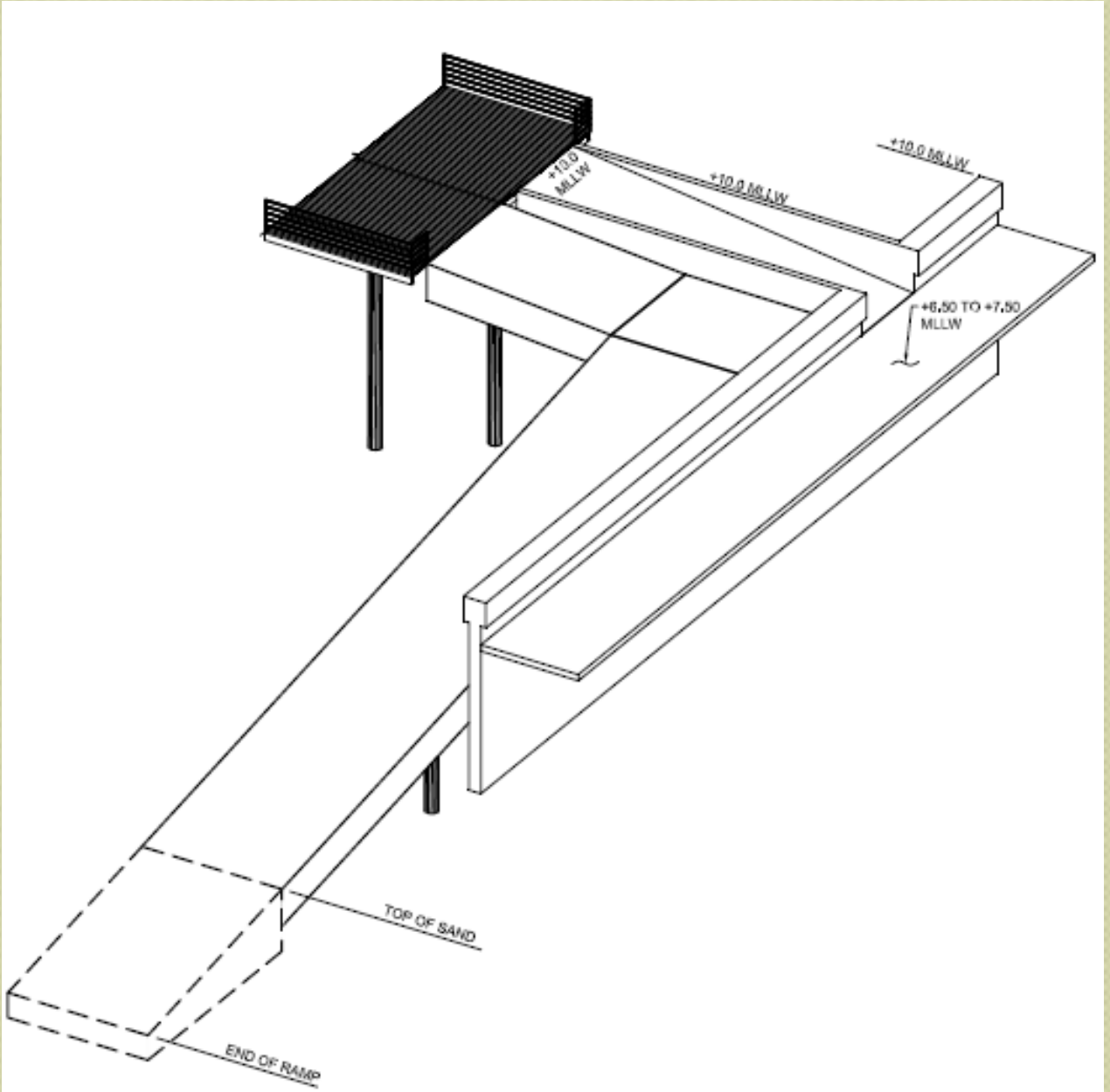
Private pier access



Private Pier Access from New Seawalls



Public Pier and Beach Access



Beach Access Concept

Webpage and Community Comments

City Webpage:

http://www.newportbeachca.gov/seawalls

Comments and concerns:

seawalls@newportbeachca.gov

Staff contact:

Bob Stein, 949-644-3322

END

Top of Seawall Elevation (NAVD88 datum)

Option	West End & Grand Canal		South Side/ North Side	Estimated Costs (million)	Notes
	New Wall	Retro-fit	Cap Extension*		
1a	10.0’		10.0’	$40	FEMA Insurance benefit
1b	9.5’		9.5’	36	
1c	9.0’		9.0’	31	
2		9.0’	9.0’	30	Vertical Struts/ Tiebacks + Beam Segments/Anchors
3		9.0’	9.0’	17	H-Pile Supports + Beam Segments/Anchors

* Capped and retrofit walls to be replaced in about 20-25 years.

Top of Seawall Elevation (NAVD88 datum)

Option	West End & Grand Canal		South Side/ North Side	Estimated Costs** (million)	Notes
	New Wall	Retro-fit	Cap Extension*		
1	9.0’		9.0’	31	
2		9.0’	9.0’	30	Vertical Struts/ Tiebacks + Beam Segments/Anchors
3		9.0’	9.0’	17	H-Pile Supports + Beam Segments/Anchors

* Capped and retrofit walls to be replaced in about 20-25 years.

** With 15% contingency

Seawall Rehabilitation Options: Grand Canal and West End

	Grand Canal	West End of Balboa Island
1	New Sheet Pile Seawall	New Sheet Pile Seawall
2	Vertical Struts with Tiebacks	Beam Sections with Anchors
3	H-Pile Supports	Beam Sections with Anchors

Top of Seawall Elevation (NAVD88 datum)