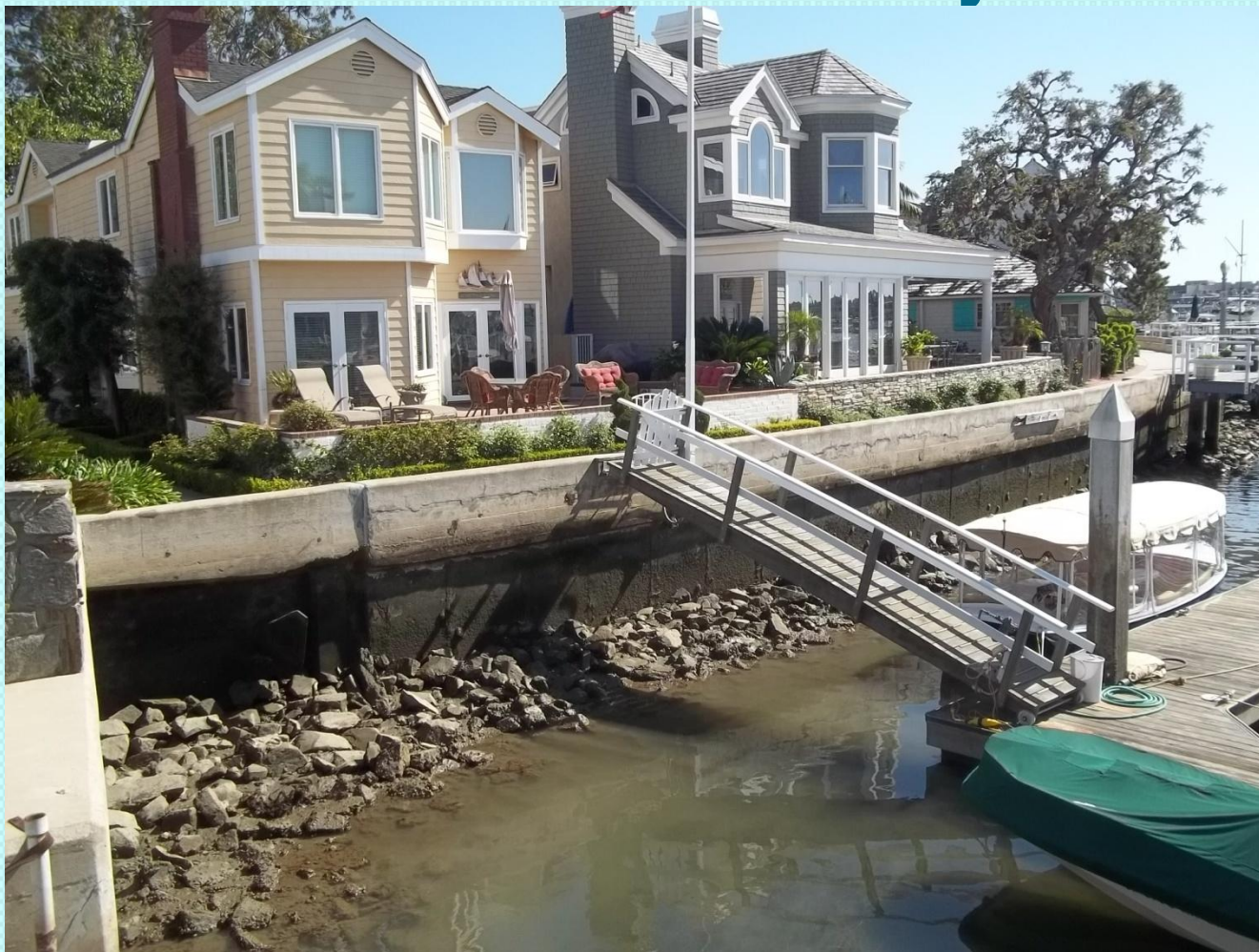


BALBOA ISLANDS SEAWALL REHABILITATION PROJECT



Tidelands Management Committee
September 17, 2014

Today's Topics

1. Signage: Proposed top of wall elevation.
 - Webpage
 - Emails and Phonecalls
2. Review Options for Top of Seawall Elevation
3. Expected Life of the Existing Seawalls
4. Wall Material: Steel Sheet Piles
5. Next steps for launching the design and permitting.

I. Signage

↑ 10.0' NAVD88

10.0' NAVD88 = 10.18' MLLW

The sign's top and bottom edges indicate two elevations being considered for the top of a new seawall cap constructed to provide flood protection from projected sea level rise.

Visit: www.newportbeachca.gov/seawalls

↓ 9.5' NAVD88

“Storyboard”



Webpage and Community Comments

City Webpage:

<http://www.newportbeachca.gov/seawalls>

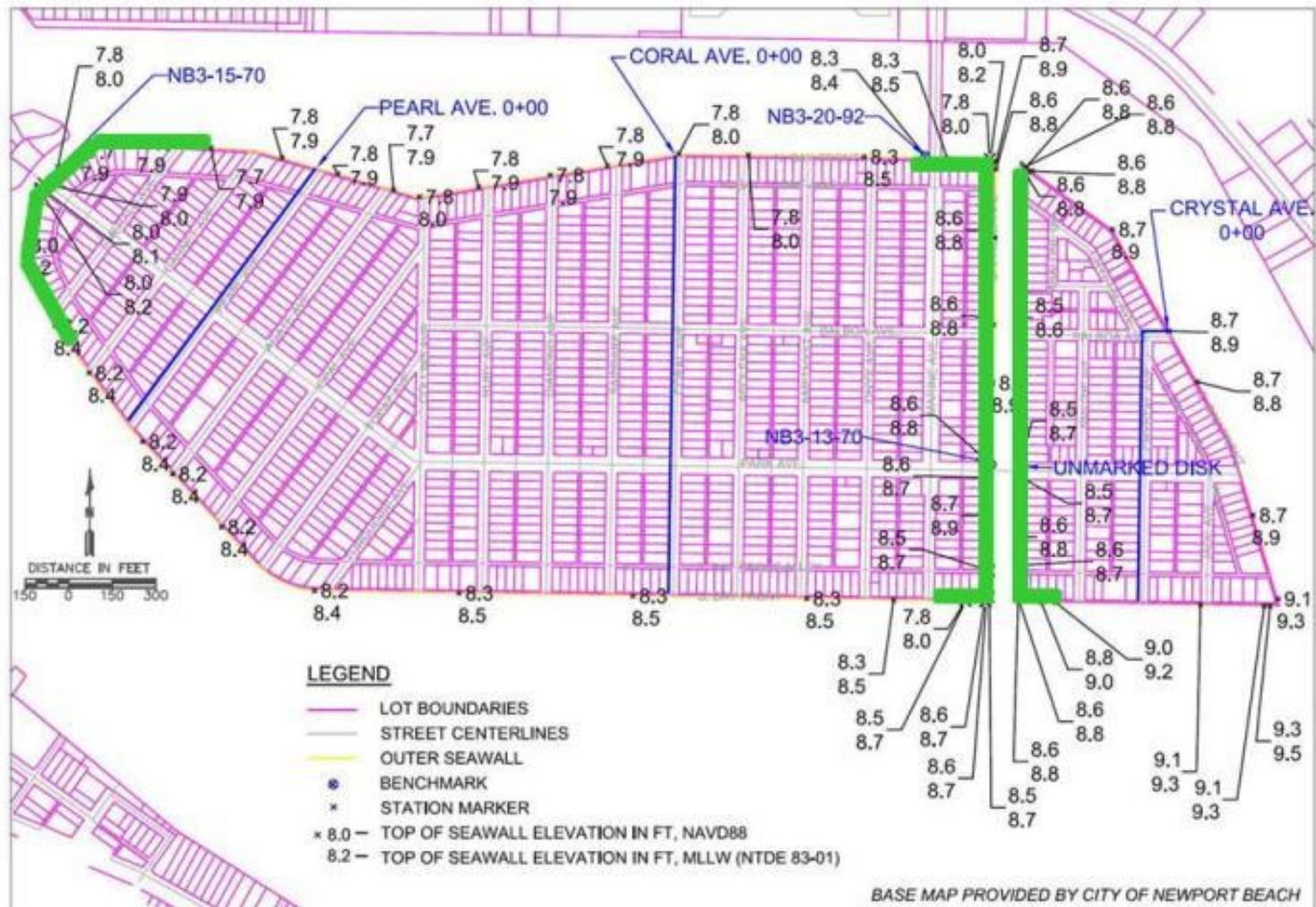
Comments and concerns:

seawalls@newportbeachca.gov

Staff contact:

Bob Stein, 949-644-3322

2. Options for Top of Seawall Elevation – Existing Elevations



Low Finish Floor Elevations



Low Finish Floor Elevation



2. Seawall Options (NAVD88 datum)

Option	West End and Grand Canal		South Side/ North Side		Estimated Costs	Flood Protection
	New Wall	Cap Extension	New Wall	Cap Extension		
1	10.0'		10.0'	10.0' (north side)	\$70,000,000	2063
2	9.5'		9.5'	9.5' (north side)	70,000,000	2056
3	9.5'/9.0'			9.5'/9.0'	34,000,000	2040*
4	10.0'			9.0'/9.0'	34,000,000	2040*
5		9.0' w/ anchors		9.0'/9.0'	27,000,000	2040*@

Existing wall elevation: North side of Balboa Island: ~7.8'

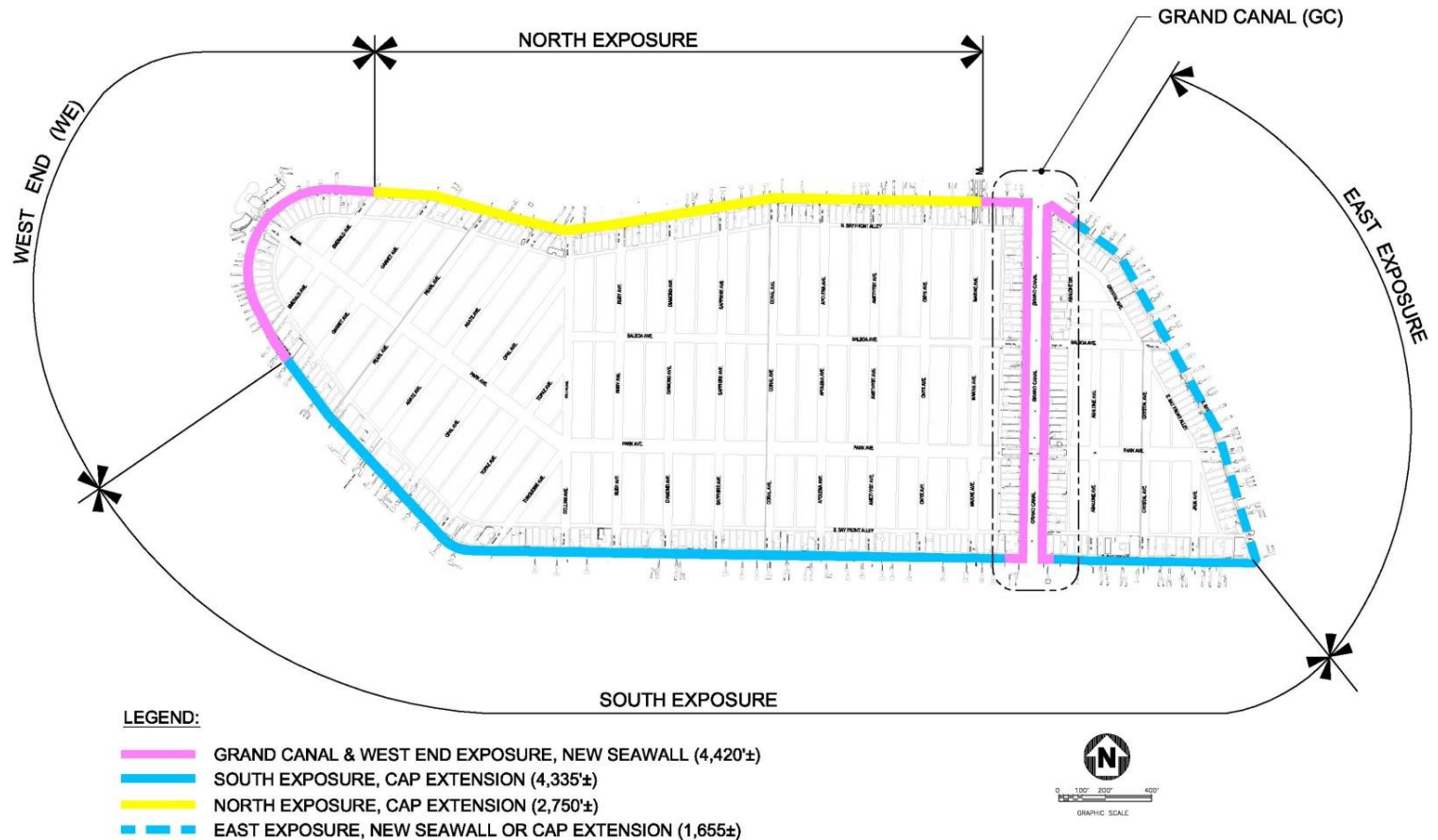
Existing wall elevation: South side of Balboa Island: ~8.2-8.3"

*assuming seawalls with cap extensions last another 25 years.

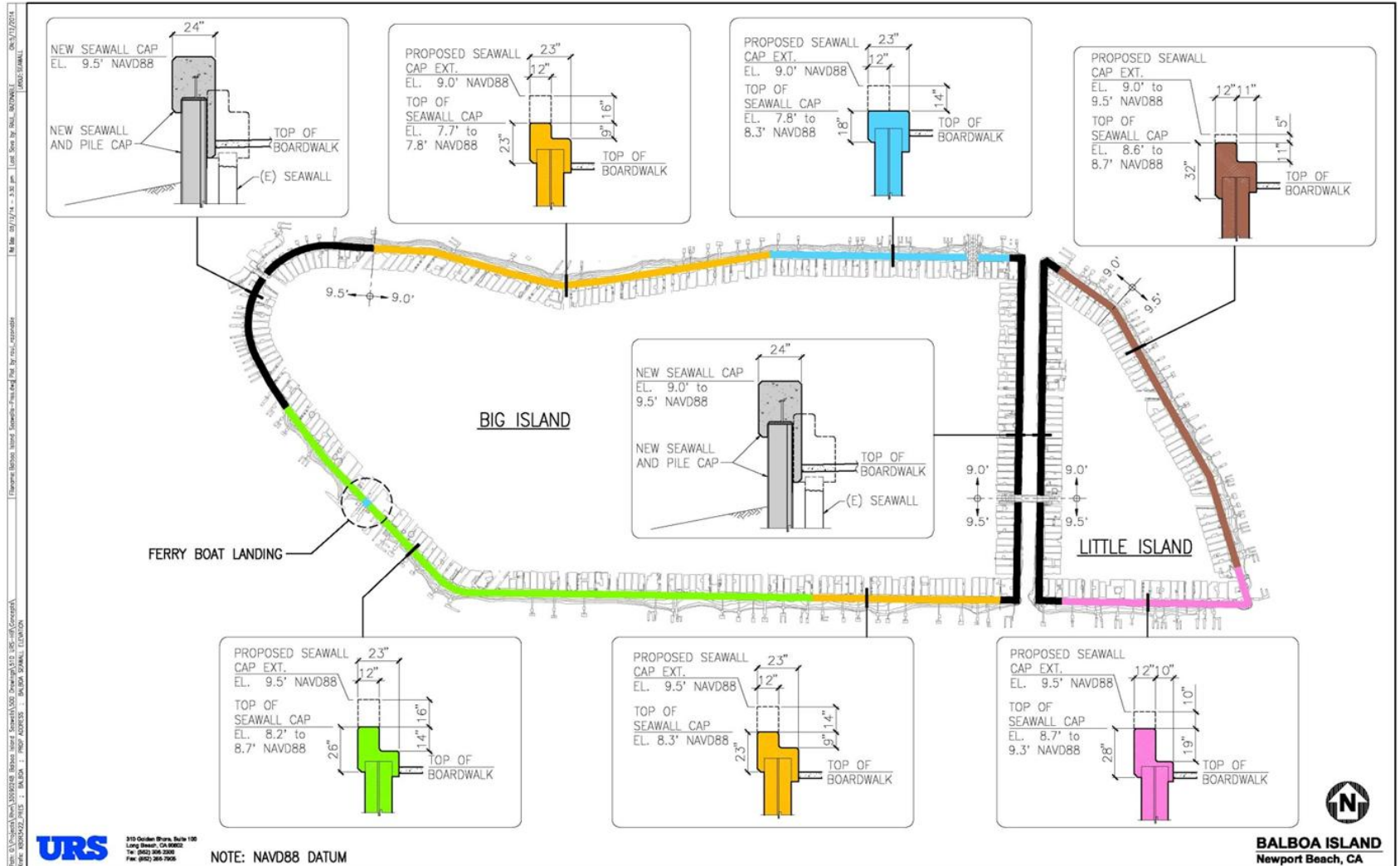
@ assuming wall/anchor systems lasts 25 years.

Option 1: 10.0' Top Elevation

Option 2: 9.5' Top Elevation



Option 3: 9.5'/9.0' Top Elevation



Seawall Options Summary

Option	West End and Grand Canal		South Side/ North Side		Estimated Costs	Flood Protection
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Existing wall elevation: North side of Balboa Island: ~7.8'

Existing wall elevation: South side of Balboa Island: ~8.2'

*assuming seawalls with cap extensions last another 25 years.

@ assuming wall/anchor systems lasts 25 years.

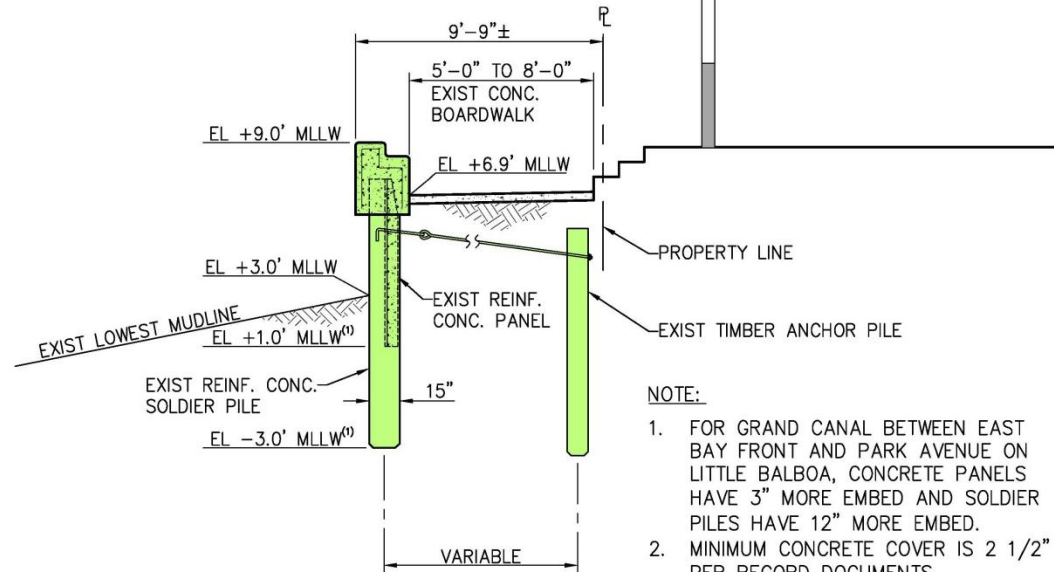
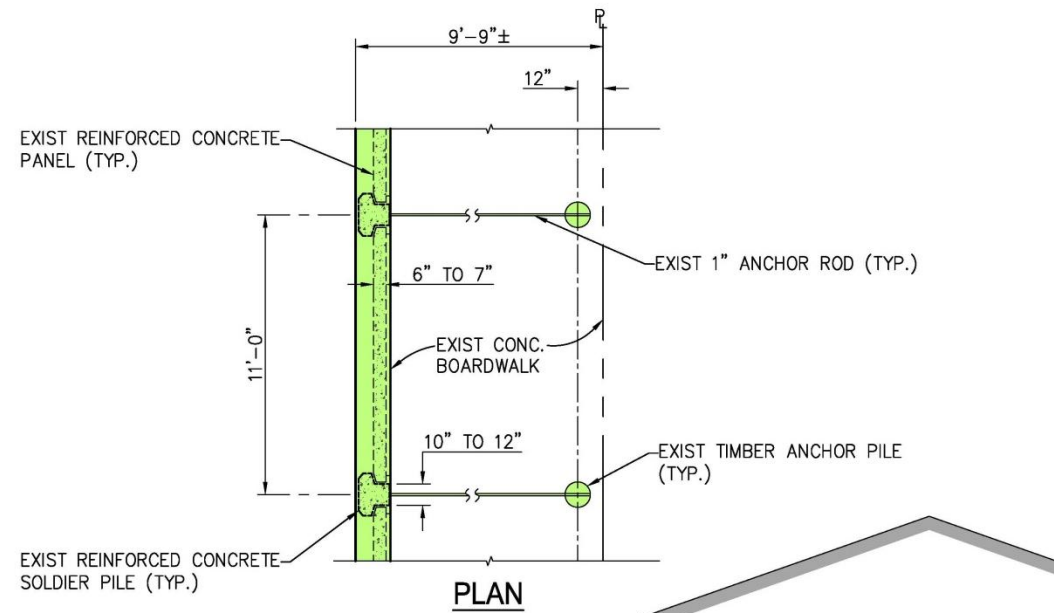


3. Expected Life of Seawalls

- a. Current Seawall Condition: Signs of Distress
- b. Destructive Testing
- c. Retrofit vs. Replacement

3a. Existing Seawall Along Grand Canal

Constructed: ~1935

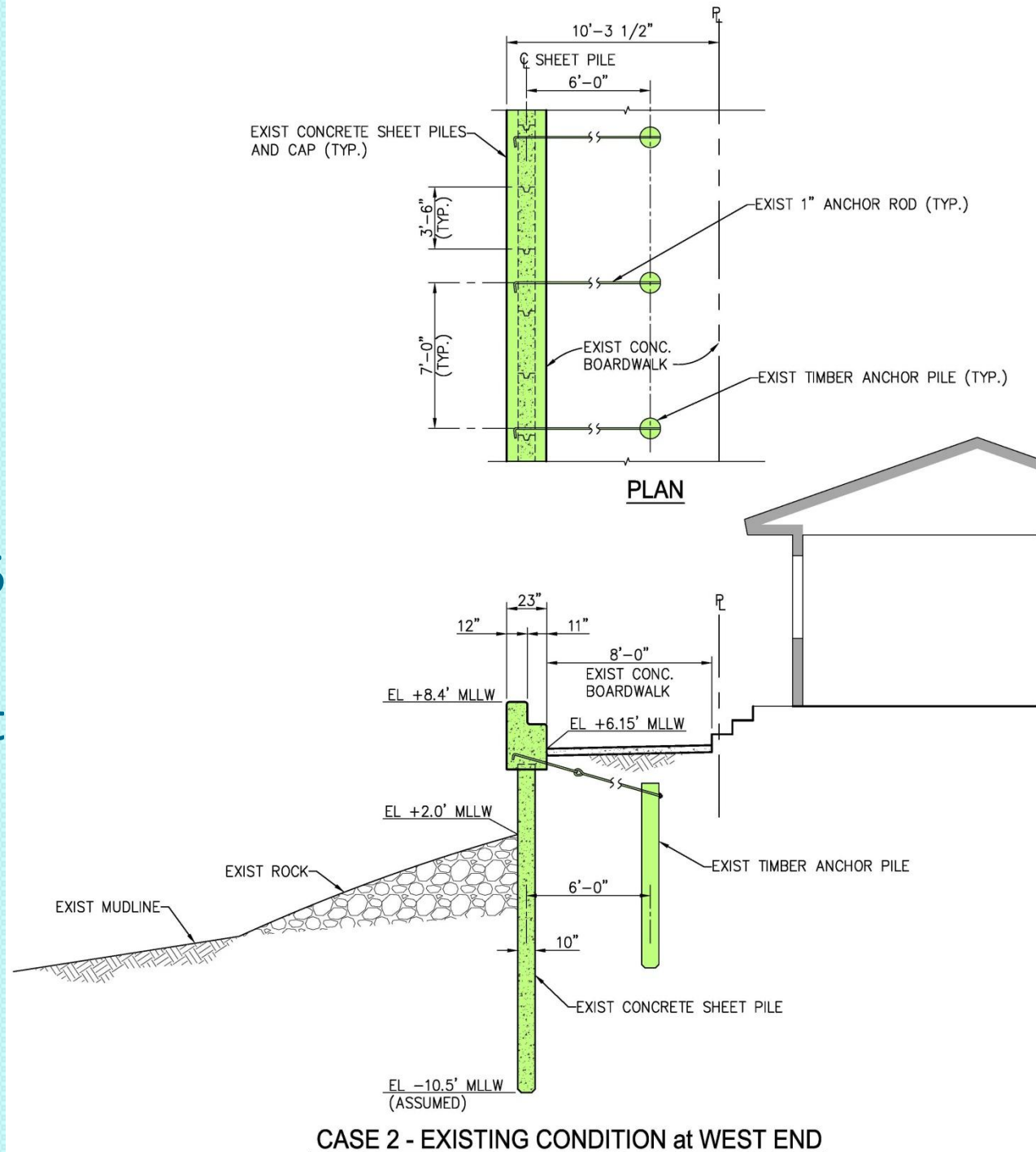


CASE 1 - EXISTING CONDITION at GRAND CANAL

Existing Seawall at Balboa Island West End

Constructed: ~1935

Rock reinforcement
installed 1985



Collins Island Bridge

Sheet Piles at Park Avenue Abutment



West End Wall at Park Avenue

Spalled Concrete Repairs



Spalled Concrete at West End Wall



West End Wall – Cap and Sheet Pile

Cap Spalls – repaired. Vertical cracks observed.



Sidewalk Settlement at West End Wall



Sheet Pile Movement at West End Wall



West End 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	Not widespread		
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	

Candidate for Seawall Retrofit?

- 85yr old walls, with an approx. 75yr original lifespan
- Modern seawalls: 85 to 100yr lifespan expectancy
- 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

3b. Enhanced Testing Program

- Coring Samples
 - 2" – 3" diameter samples – full penetration
 - 3 cores per panel at 200' intervals
 - 3 cores per soldier pile at 200' intervals
 - Thin part of soldier piles only 8" – 10" wide
 - 65 core samples for Grand Canal & West End
 - 200 core samples for entire island
 - Concerns: Core samples/reinforcing adjacency, un-sampled areas.

Enhanced Testing Program Cost

- 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

3c. Short-Term Seawall Retrofit Options

- Grand Canal
 - 300 total ex. soldier piles → 600 new tiebacks with cap extension to 9.0'
 - Incorporate an exterior steel tube (either in a horizontal or vertical orientation)
- West End
 - New Tiebacks @ every-other sheet (approx. 5 feet on center) → 200 earth anchors with cap extension to 9.0'
- Total Cost = \$11,500,000

Seawall Retrofit Costs:

	Total Cost	Life Span
Short-Term Seawall Retrofit w/ Tie-backs and Walers (un-escalated 2014 costs)	\$11,500,000	25*
Then New Seawall (un-escalated 2014 costs)	\$21,500,000	100

* Conditional Life Span. Throw away when new seawall is installed after 25 years.

Short-Term Seawall Retrofit Program Concerns

- Although New Tiebacks are installed, no improvement of Soldier Pile structural integrity is provided with this option.
- Concrete Planks between Soldier Piles are still subject to failure.
 - Shallow embedment into mudline.
 - Lower sheets embedded in salt-laden sediments which promotes corrosion (the reason Naples seawalls are being replaced).

Case Examples in Southern California

- Seawall Failures in:
 - Newport Beach
 - Long Beach
- Naples LB Seawall Replacement Plan

Newport Marina Villas Townhomes

Seawall Failure – Shallow Pile Embedment



Newport Marina Villas Townhomes

New Seawall after Repairs



Naples Seawall Failure (1933)

GRUNION GAZETTE

CELEBRATING 25 YEARS

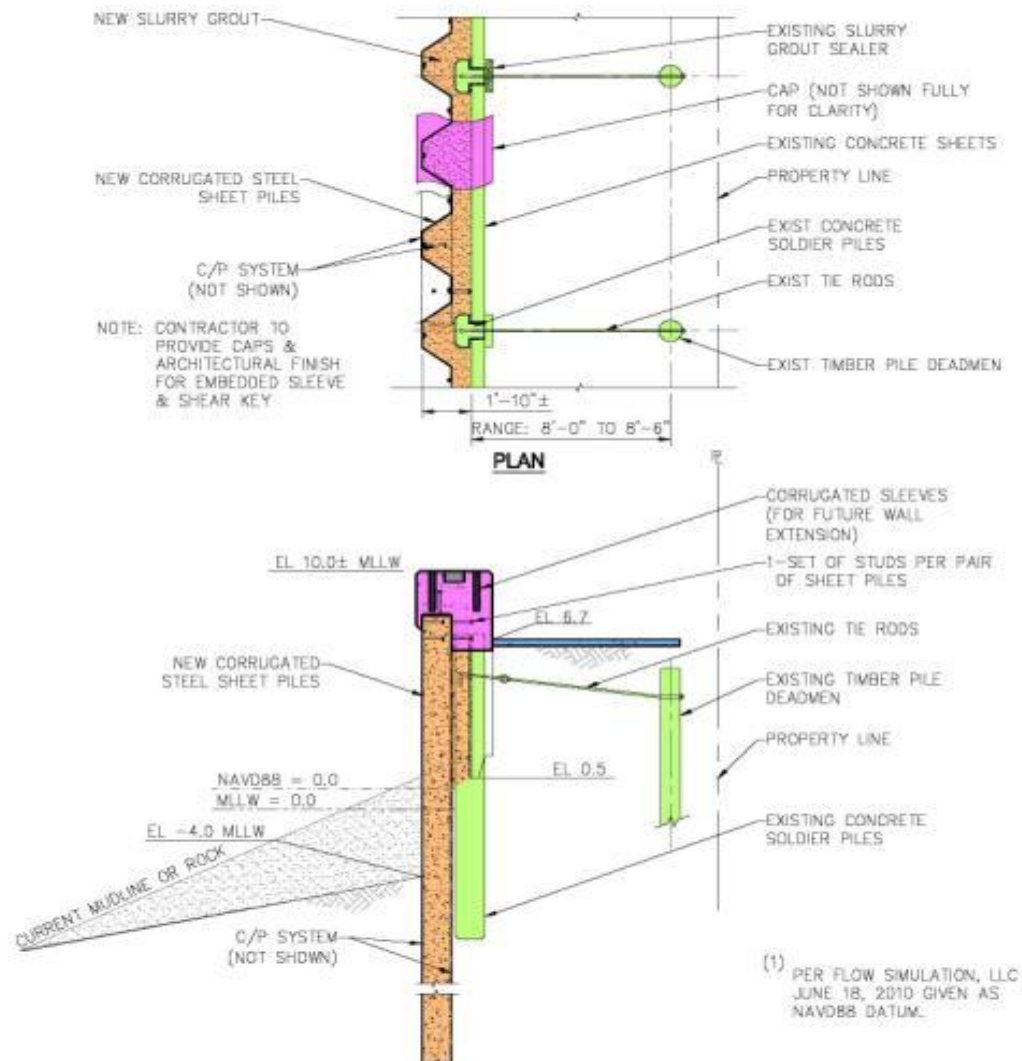
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EARTHQUAKE DAMAGE. The Naples sea wall suffered extensive damage, as did much of the Long Beach area, in the 1933 earthquake. —Photo courtesy Historical Society of Long Beach

4. Steel Sheet Pile Bulkhead (No Tie-Backs) = Smaller Construction Impacts!





1 **OPTION 1 - NEW STEEL SHEET PILE SYSTEM**
C-2 **GC & WE** **(WATERSIDE)**

Bay Island: Steel Sheet Piles and Cap



Bay Island Sheet Piles and Cap



5. Next steps for launching the design

- a. Finalize Approach
- b. Community Outreach Steps
- c. Bring consultant's amended contract to City Council on October 14: Option 3.
- d. Special Topics Meeting? (sea level rise, flood insurance)



Seawall Options Summary

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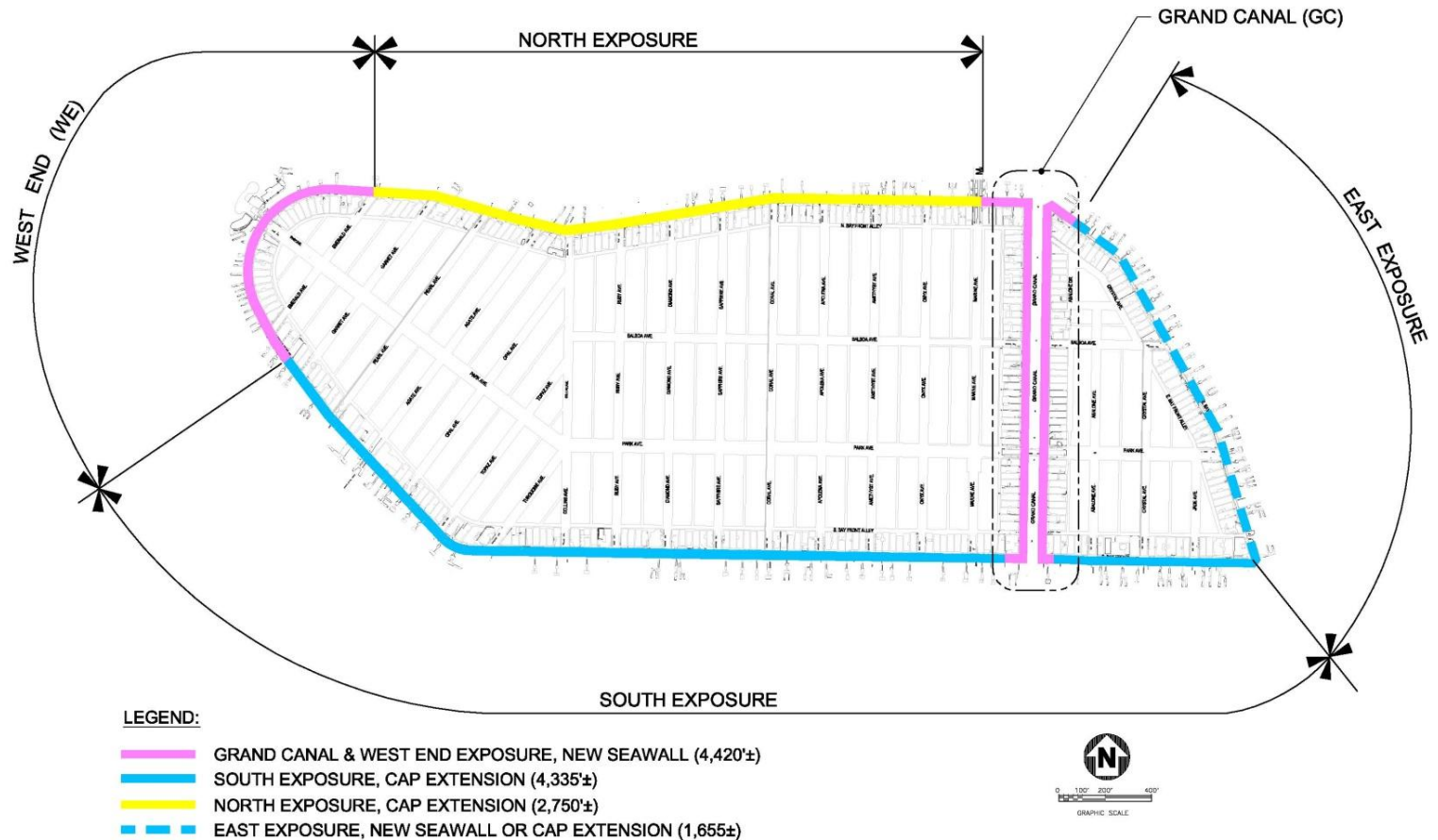
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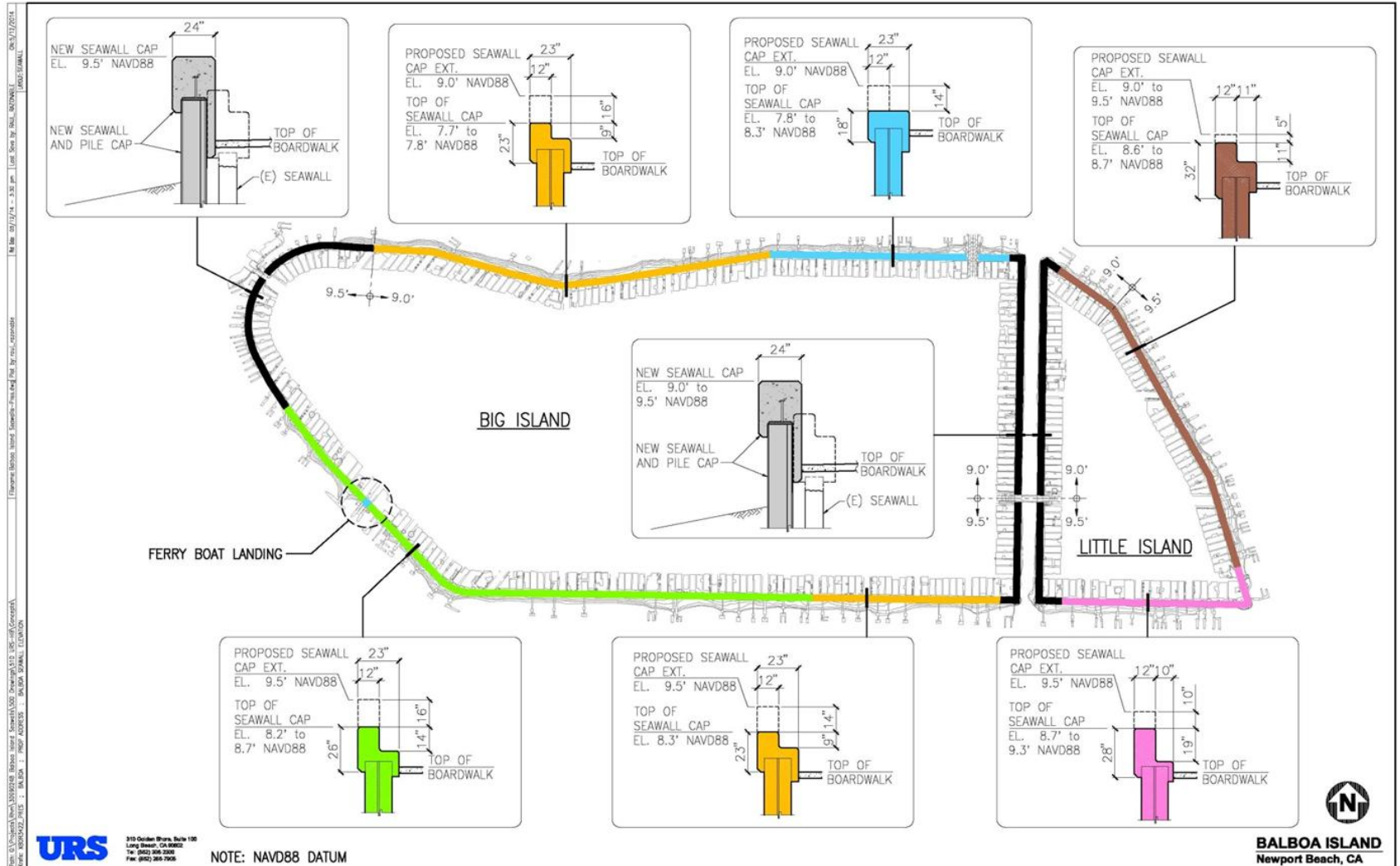
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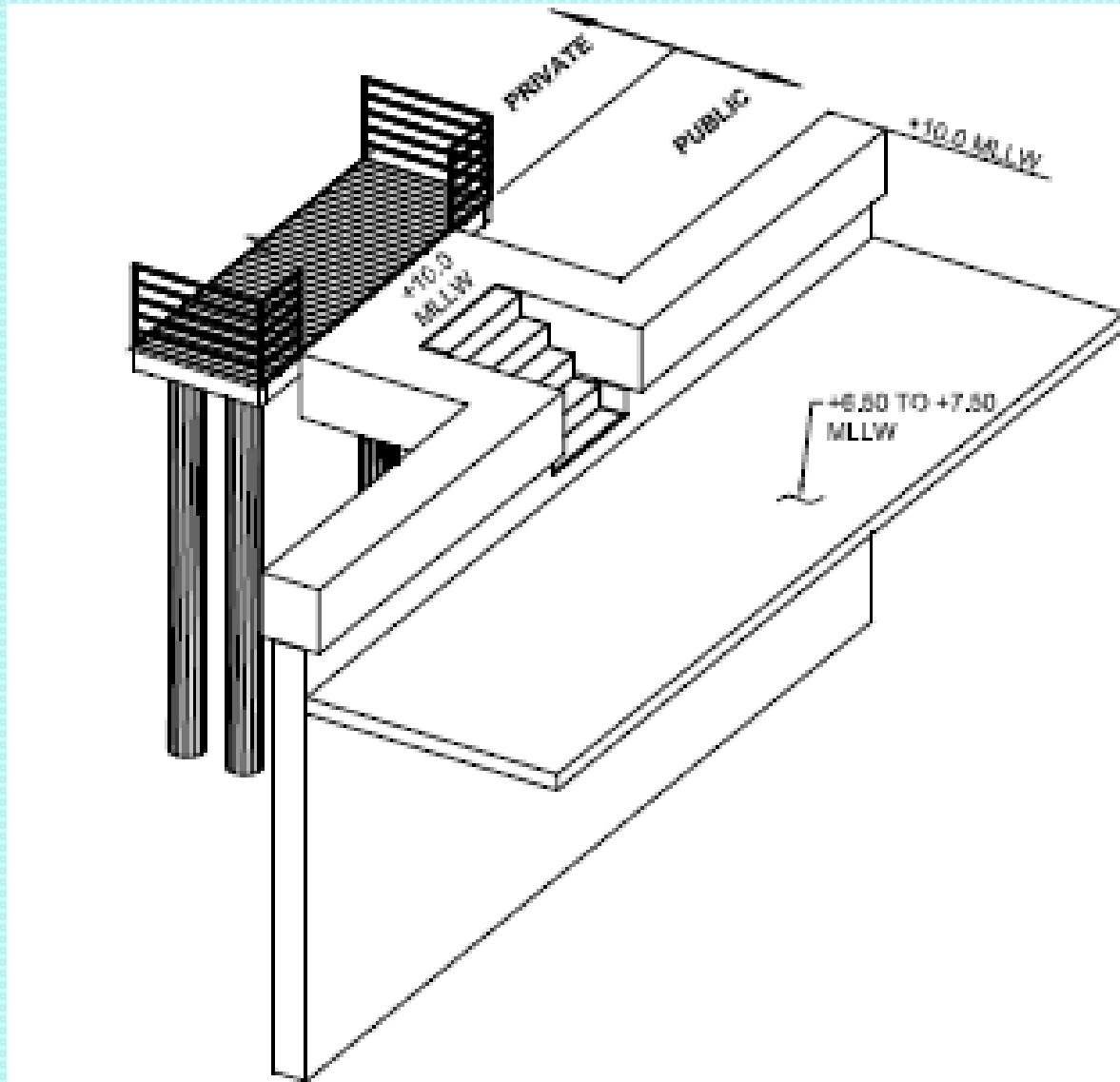
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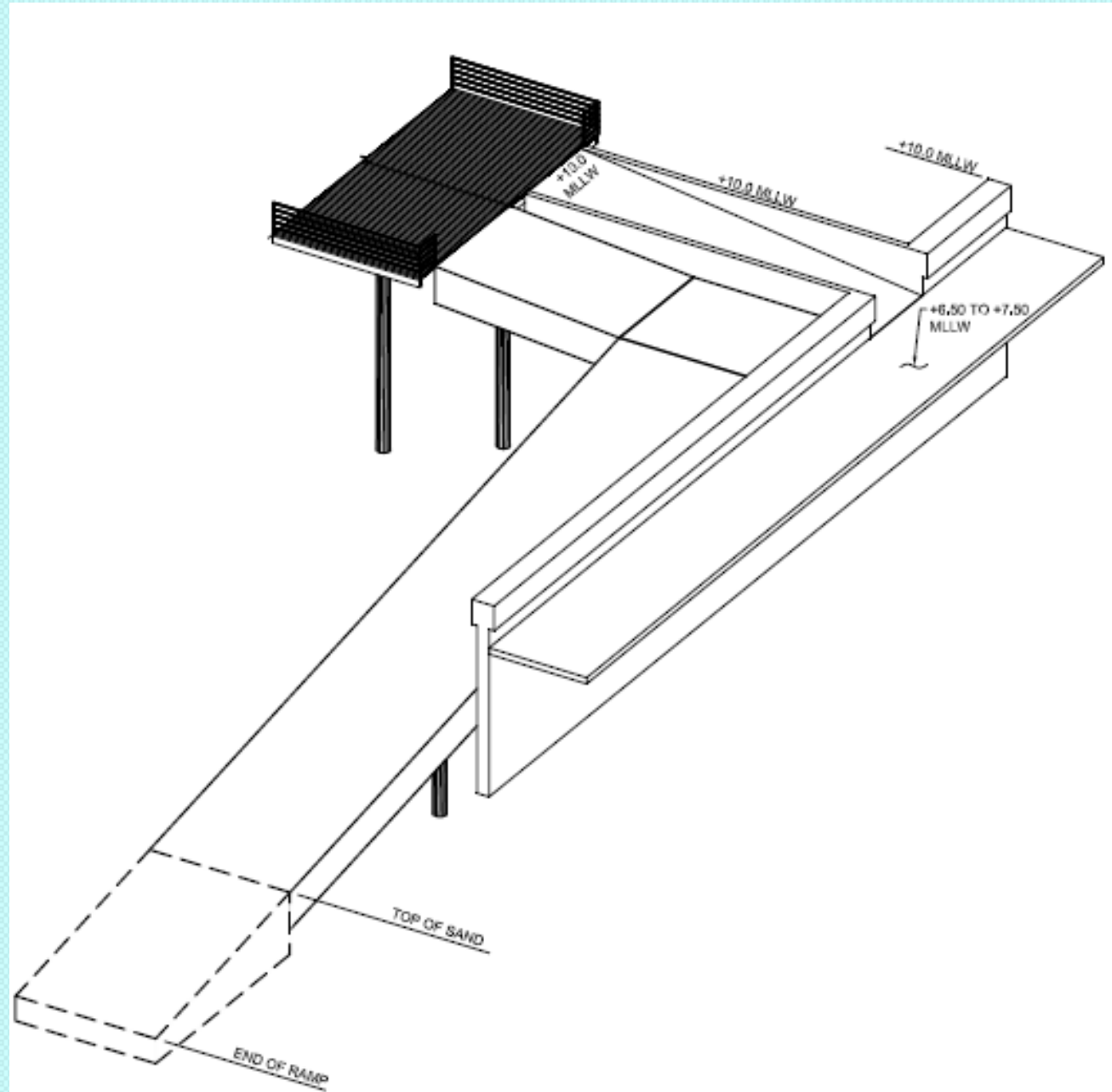
Option 3: 9.5'/9.0' Top Elevation



PRIVATE PIER ACCESS



PUBLIC PIER AND BEACH ACCESS



BEACH ACCESS CONCEPT

