



# Santa Venetia Levee Upgrade Levee Alternatives

For Planning and Design only

September 14, 2022

# Team Introduction

## **District 1 Supervisor and Supervisor-Elect**

Damon Connolly

Mary Sackett

## **Marin County Flood Control and Water Conservation District**

Rosemarie Gaglione, Director

Berenice Davidson, Assistant Director

Liz Lewis, Water Resources Manager

Lu Damerell, Project Manager

## **Design Team**

Robert Stevens, Design Manager, CSW|ST2

Steve Kinsey, Communication, CivicKnit

# Meeting Purpose and Agenda

## AGENDA

1. Welcome and Introductions (5 min)
2. Response to Comments (10 min)
3. Flood Wall Options (15 min)
4. Questions and Answers (60 min)

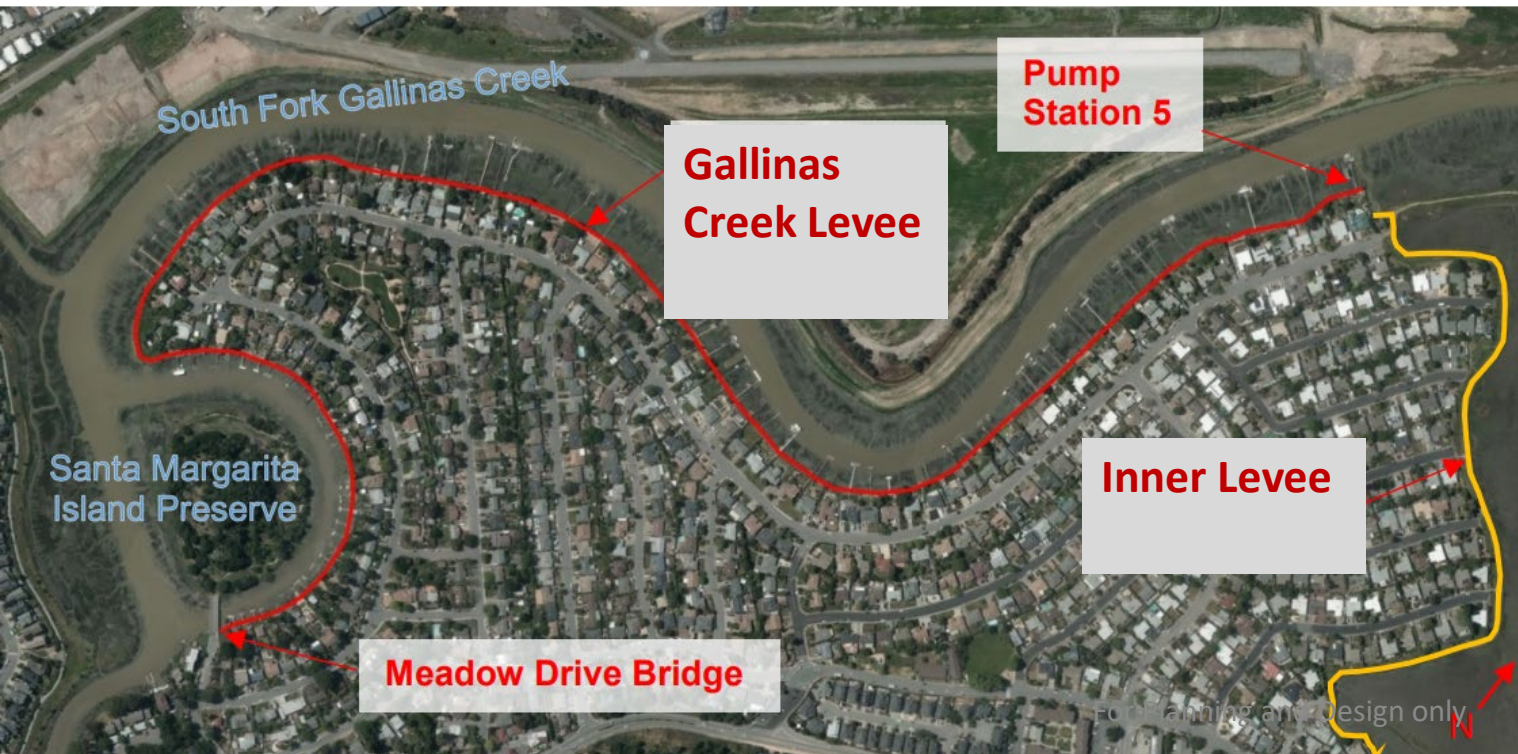
## MEETING PURPOSE

- **Clearly Explain Design Progress**
- **Respond to comments from July meeting**
- **Review flood wall design evaluation.**

***Completing this design by November will save \$1M in Federal funds***

# Where and Why?

1. Existing redwood box berm has exceeded its design life.
2. District budgeted \$150,000 for TRB maintenance this year.
3. Repair costs will continue to increase as the rate of deterioration accelerates.
4. Army Corps of Engineers notes failure is possible.



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Response to July 27 Comments

# Response to Public Comments

- 1. No public access along the flood wall will be allowed.**
- 2. The flood wall footprint has been extended at each end.**
- 3. Space is needed on each side of floodwall for inspection & maintenance.**
- 4. Design Height of the Wall will remain at 11 feet.**
- 5. After review, the tide gate concept is not considered viable.**

# Project Limits have been extended



West End



East End

# Design Elevation

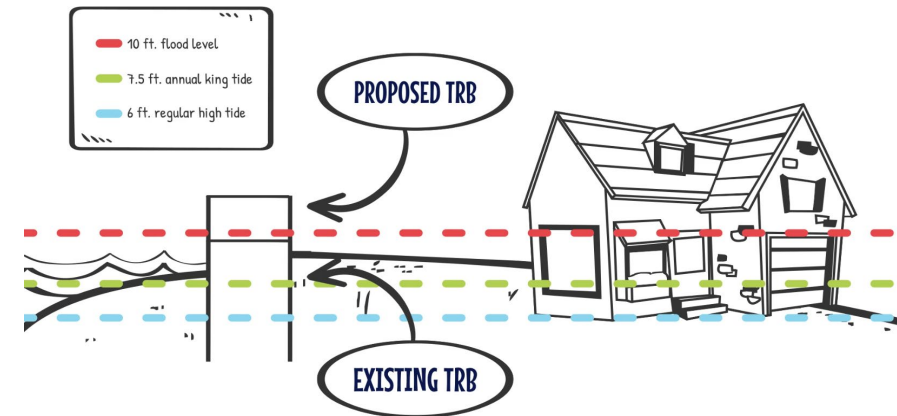
## The 11-foot wall elevation will

- Use USACE 100-year flood elevation @9.1 feet
- Allow OPC 66% probability 0.9 feet SLR by 2050
- Meet High end of settlement projection @1 foot

100-year Water Surface Elevation (NAVD88)		2050 Projected Sea Level Rise from OPC (published 2018)		Land Subsidence Estimates from 1990-2012 data by Kleinfelder (2018)	
USACE 2013	FEMA 2016	Low-end 66% Probability	1 in 200 Chance	Low	High
9.1	9.8	0.6	1.9	0.8	1

## The 12.5-foot wall elevation would

- Meet FEMA's 9.8 feet 100-year flood elevation
- Allow OPC 5% probability
- Comply with County's 2017 BayWAVE Vulnerability Analysis SLR estimated @1.7 feet
- Meet High end of settlement projection @1 foot

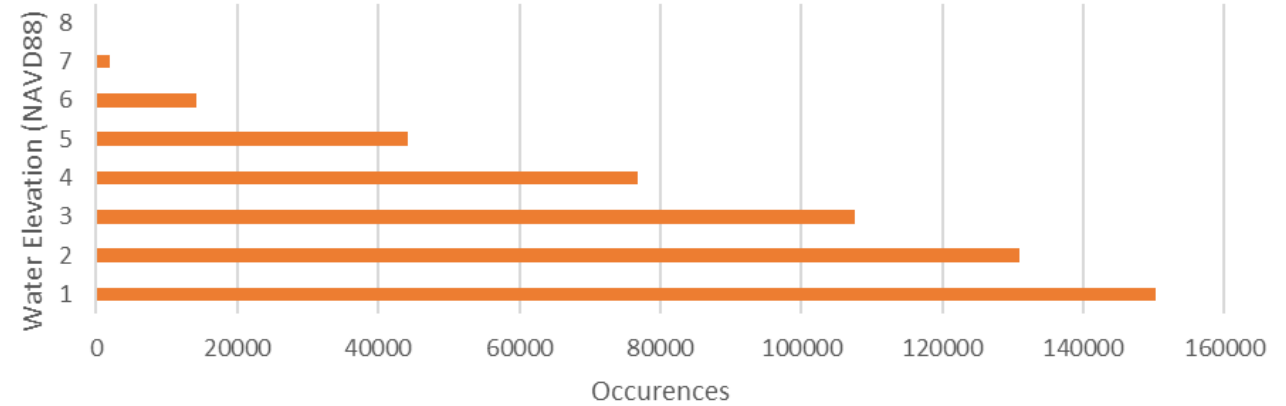




# Las Gallinas Tide Gate



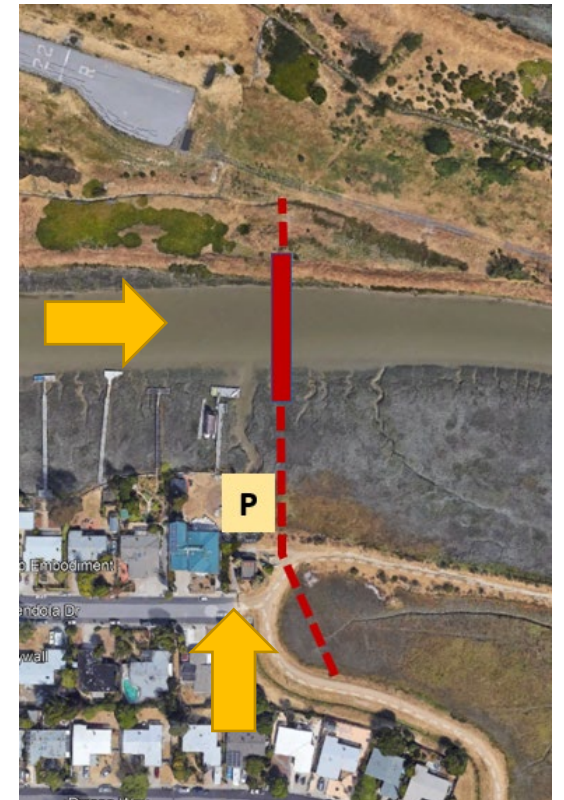
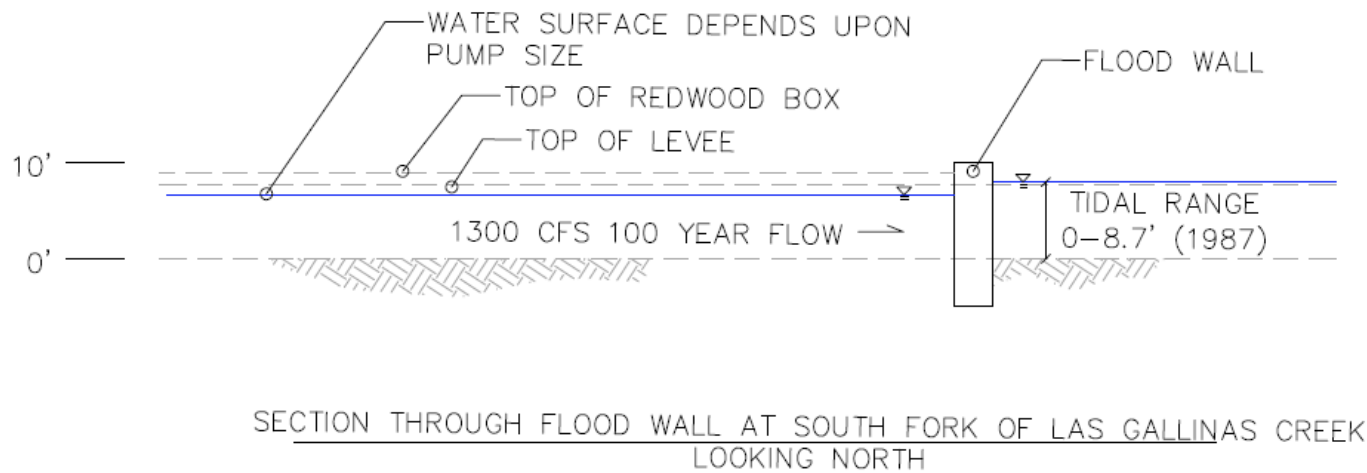
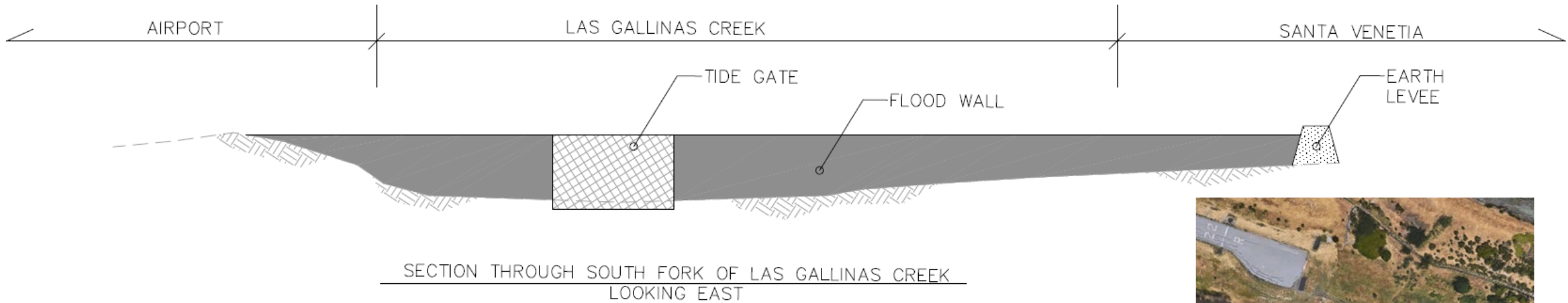
Las Gallinas Creek Water Surface Frequency  
11/2017 to 8/2022



1. 1983 tide peaked at **8.7 feet** & 1998 tide reached **8.4 feet**
2. Since November 2017 creek has reached above **8 feet 12 times**.
3. 100-year flow in Las Gallinas Creek is **1,300 CFS**.

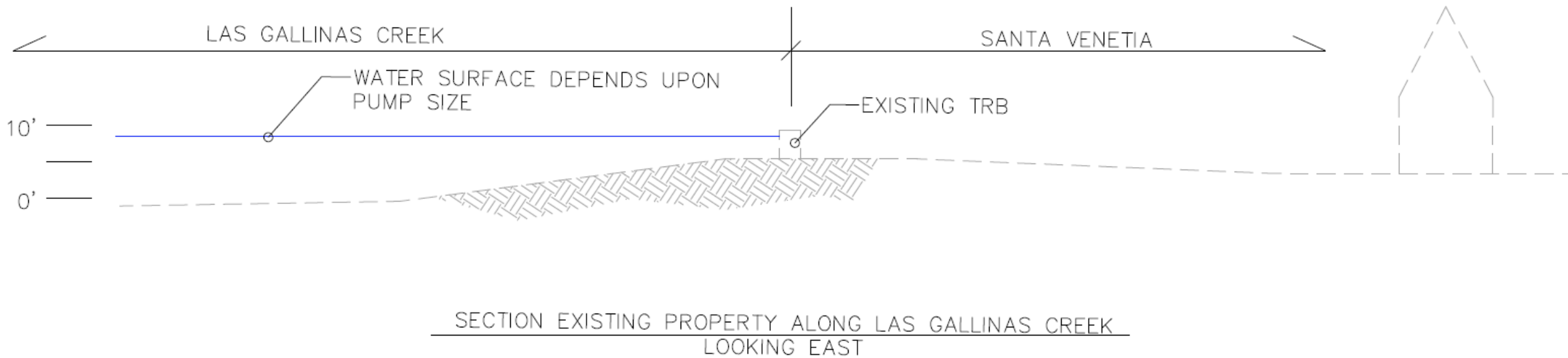
Extreme Tide Elevation							
FEET-NAVD88							
1-YR	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	500-YR
7.40	7.71	8.13	8.45	8.90	9.26	9.67	10.75

# Las Gallinas Tide Gate



# Las Gallinas Tide Gate

If peak flow in creek coincides with high tide, the pump station cannot manage it completely. Water will be “stored” in Las Gallinas Creek. Its elevation will rise, potentially overtopping the existing earthen levee.



# Las Gallinas Tide Gate



## Tidal Gate Challenges

1. Las Gallinas Creek is a navigable waterway.
2. State and Federal regulatory agencies.
3. The cost to construct is high.
  - A. Las Gallinas pump station \$15+ million
  - B. Tidal Gate and flood wall \$25+ million
  - C. Levee construction \$5 million
  - D. Mitigation and other costs \$10+ million
  - E. Total cost \$55 +/- million.
4. Levee is still required on properties.

For reference, the bid value for the San Quentin Pump Station in San Rafael capable of pumping 300 cfs was \$6 million in August 2022

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# Flood Wall Options

# Alternatives Considered



## Cost of the Flood Barrier is the only variable in Project Costs

1. Clearing and Grubbing – Same for all
2. Finish grading and restoration – Same for all
3. Stairs and Access – Same for all
4. Permitting, Environmental, and Administration- Same for all

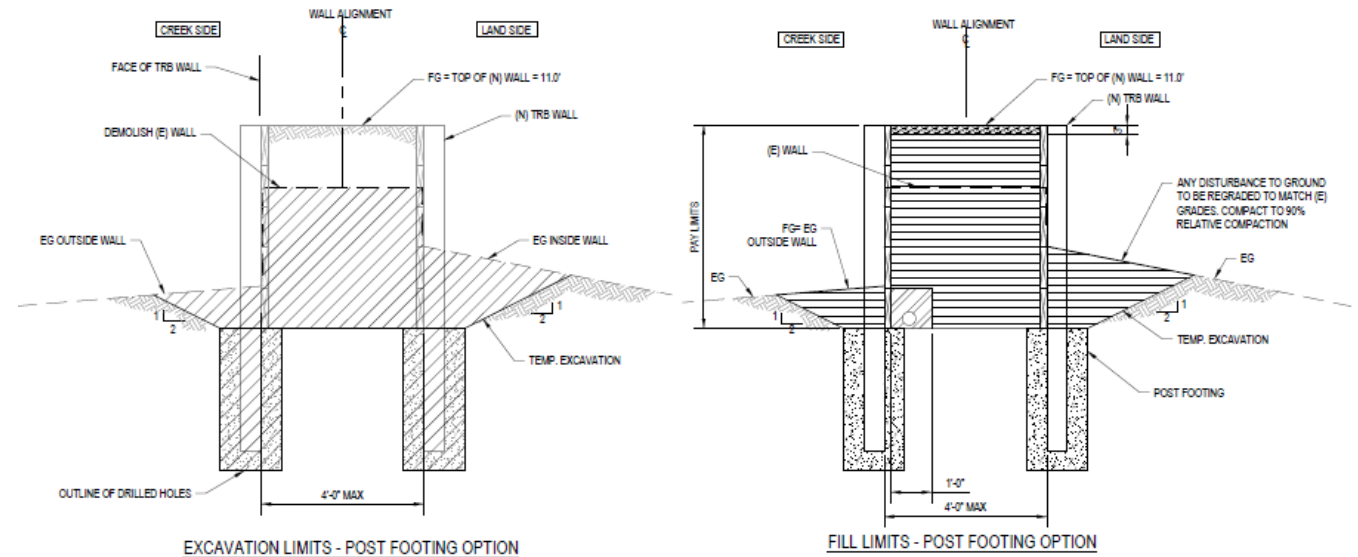
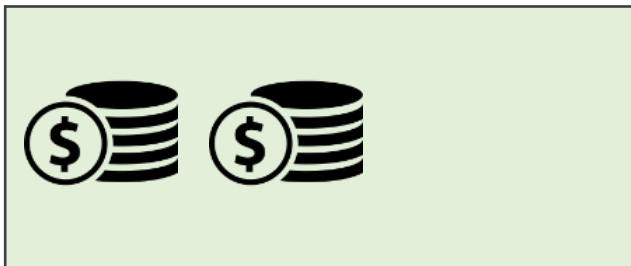
# Timber Reinforced Berm (TRB) Wall

## Advantages

1. Design complete
2. Basic Construction technology
3. Similar aesthetic, though taller

## Disadvantages

1. Labor intensive construction w/ concrete and soil import/export
2. Shorter life span w/ greater inspection and repair
3. Seepage risks continue
4. Adds plastic material into the environment



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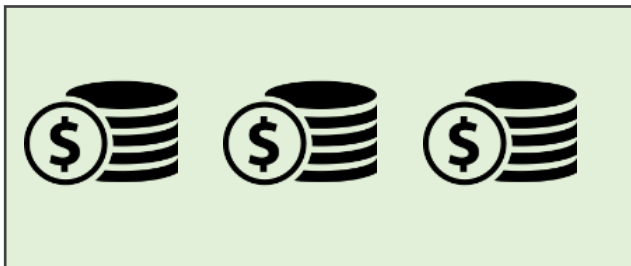
# Precast Concrete Floodwall

## Advantages

1. Low maintenance, durable material
2. Long life expectancy
3. More Architectural possibilities

## Disadvantages

1. Costly Construction
2. Difficult to install
3. Young Bay Mud soil likely to settle, may require many piles beneath the wall





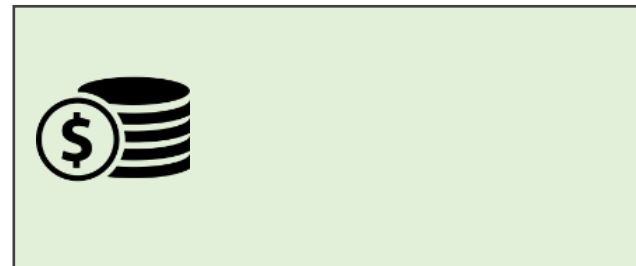
# Vinyl Sheet Pile

## Advantages

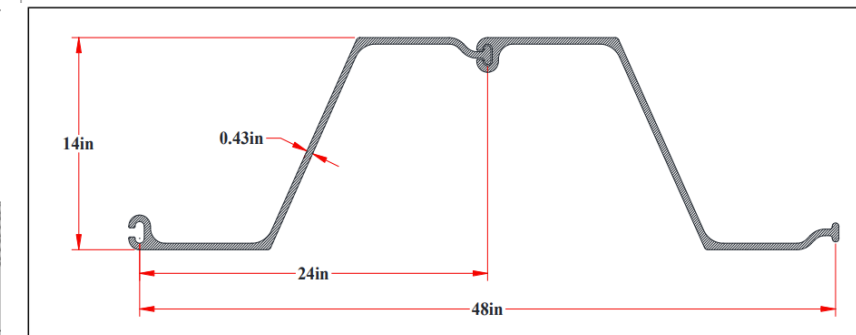
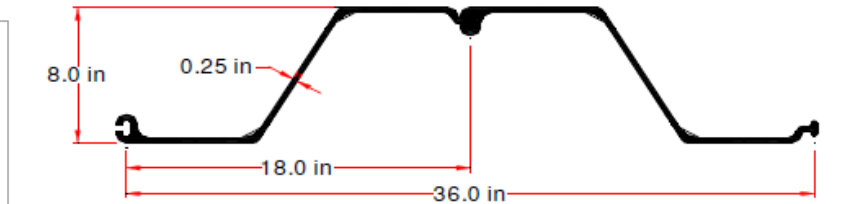
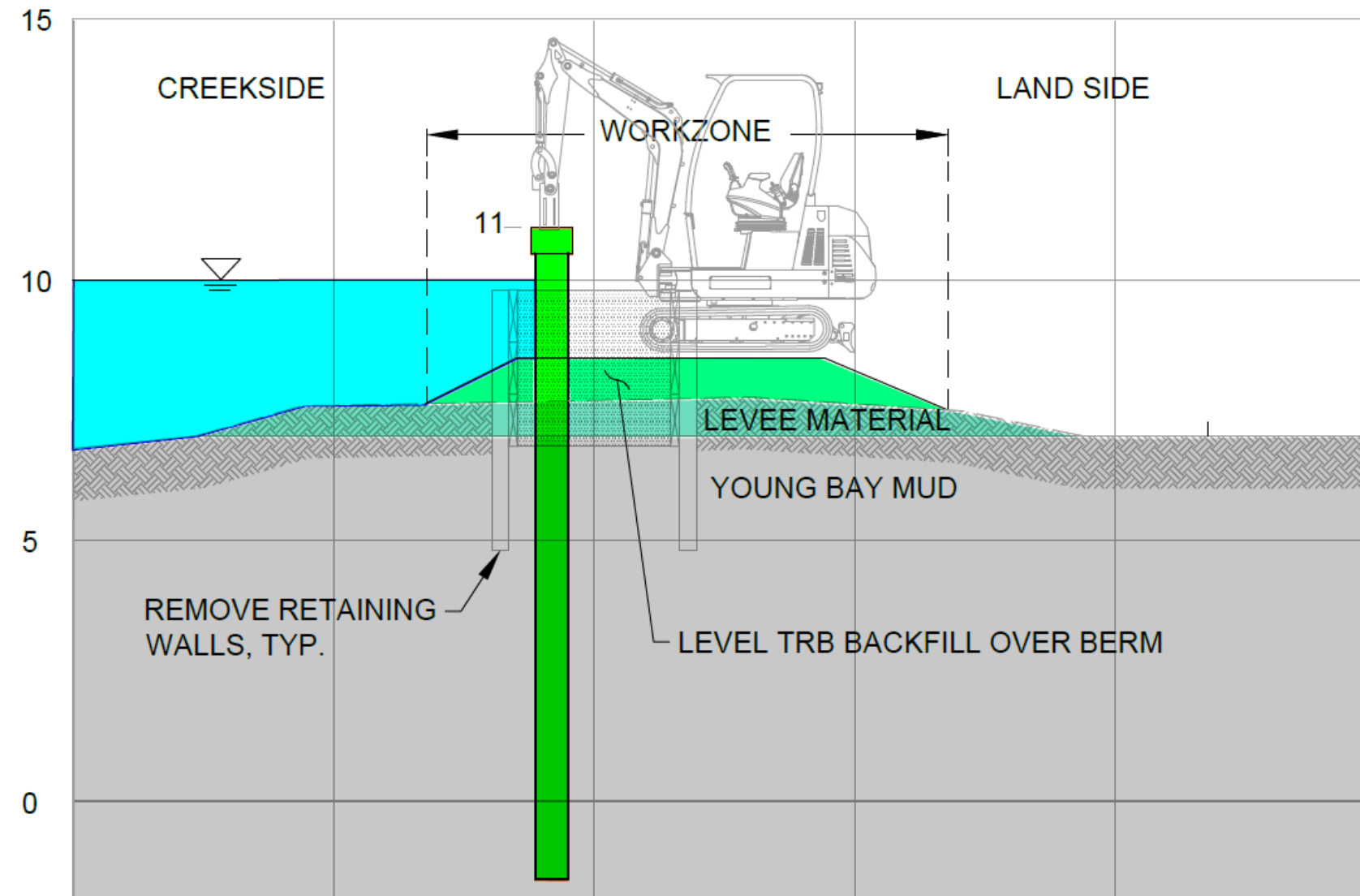
1. Lowest cost to construct
2. Long life expectancy w/ negligible settlement
3. Resilient in seismic event
4. Low maintenance /Ease of inspection
5. Standardized construction process

## Disadvantages

1. Less natural
2. Subsurface conditions may affect construction
3. Requires more Environmental and permitting
4. Flexibility risk under the load of storm water
5. Increased Construction access challenges



# Vinyl Sheet Pile



Sheet Size	Length (ft)
Exposed Height	1.5 to 6
Average Exposed Height	4
Average Total Length*	16
Maximum Total Length*	24
Minimum Total Length*	6

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\*Based upon 3x embedment

# Existing Condition



# Vinyl Sheet Pile Visual Simulation



# Alternative Ranking

Item	TRB	Concrete	Vinyl
Flood Protection	X	X	X
FEMA Funding	X	X	X
Low Impact to Residents	XX	X	XXX
Consistent with Environmental Document and Permit	XXX	X	XX
Long Design Life and Low Maintenance Cost	X	XXX	XX
Allows Water Access	X	X	X
Lowest Cost	XX	X	XXX
Limits Seepage	X	XX	XXX
Speed to Construct	X	XX	XXX
<b>Score</b>	<b>13</b>	<b>13</b>	<b>19</b>

## Comparison Notes

1. Concrete is not possible given soil conditions and access restrictions.
2. TRB maintains the status quo and is simple to repair.
3. Vinyl sheet piles are the contractor's choice but require additional design analysis for high exposed face.
4. Vinyl has minimal maintenance.
5. Vinyl has narrower width.
6. Vinyl potentially has less restrictions on adjacent uses.

# Design Considerations

1. September to January work period
2. Within the work zone:
  - A. Remove existing TRB in sequence with new construction
  - B. Spread TRB fill materials if possible.
  - C. Remove stairs and dock to nearest support.



# Typical Fence and Staircase Design

Fence and staircases installed at property upon owner's request.



**Fence and Gate – Wood**



**Staircase – Wood**



**LEVEE**  **UPGRADE**  
FOR A FLOOD-SAFE SANTA VENETIA



**Next Steps**



# Next Steps

1. Site review of properties as needed or at owner's request.
2. Finalize structural analysis for vinyl sheet pile flood wall.
3. Complete detailed design by November 2022 to qualify for FEMA reimbursement.
4. Present design to the Flood Advisory Board in October 2022 – in person.
5. Present design to the Board of Supervisors on November 15, 2022
6. CEQA Addendum and Environmental Permitting will follow Board of Supervisors review.
7. Seeking funding now.

**Contact [floodinginquiry@marincounty.org](mailto:floodinginquiry@marincounty.org)**



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Questions For Planning and Design only and Answers

# Public Comment

1. To speak In person, please following the directions of the clerk. **In person comments will be taken first.**
2. To speak in Zoom, please use the Reactions link and select the Raise your Hand option. Speakers will be invited to do so by the meeting manager in the order of submittal.
3. For those calling in, press \*9 on your phone. The meeting manager will ask you to unmute when it's your turn. At that time, Press \*6 to speak.



We will be limiting comments to 2 minutes to allow everyone's participation and complete the discussion by 8:00 PM.

# Learn More

<https://www.santavenetialevee.org/>

Important Updates

Existing Levee

References

*Proposed*  
**SANTA VENETIA  
LEVEE UPGRADE PROJECT**



[floodinquiry@marincounty.org](mailto:floodinquiry@marincounty.org)

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