



Santa Venetia Levee Upgrade Zone 7 Flood Advisory Board

For Planning and Design only

October 13, 2022

Discussions

1. Project Background and schedule
2. Response to Comments
3. Flood Wall Options
4. Costs and Funding

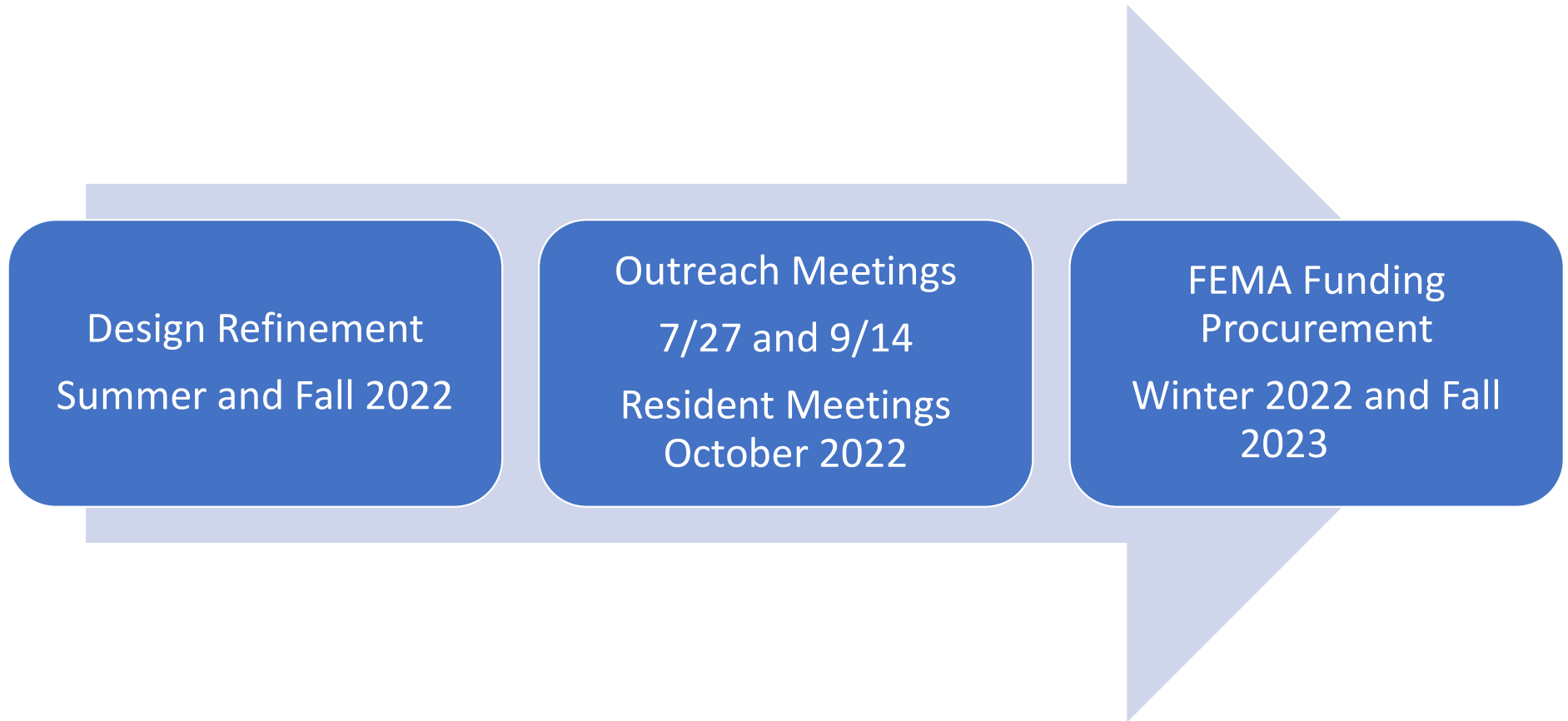
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Where and Why?

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.



Levee Replacement Process



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Response to 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.**
- 6. Drainage law allows the District to make improvements to protect property.**
- 7. Airport's levee modification has limited impact on Santa Venetia.**

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Project Limits have been extended



West End



East End

Design Elevation

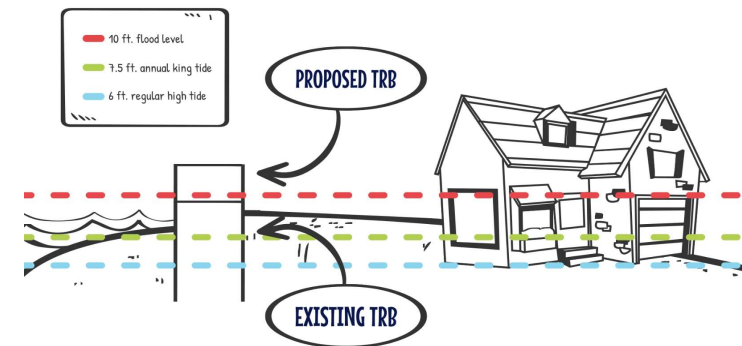
The 11-foot wall elevation will

- 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

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

| 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 |

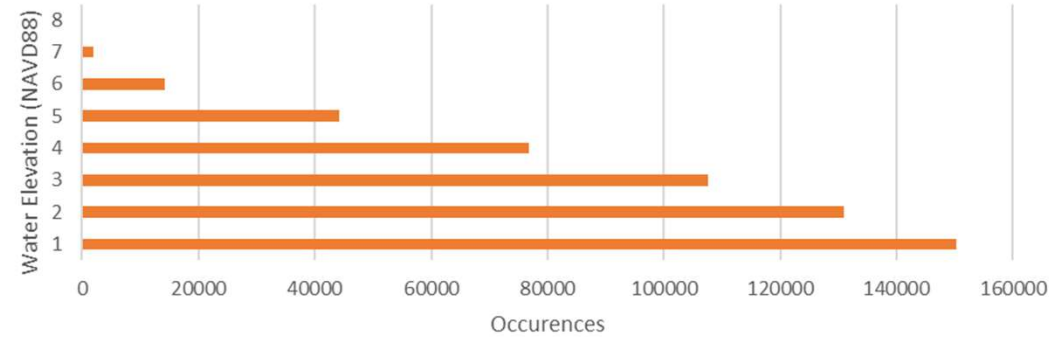


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Las Gallinas Tide Gate



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

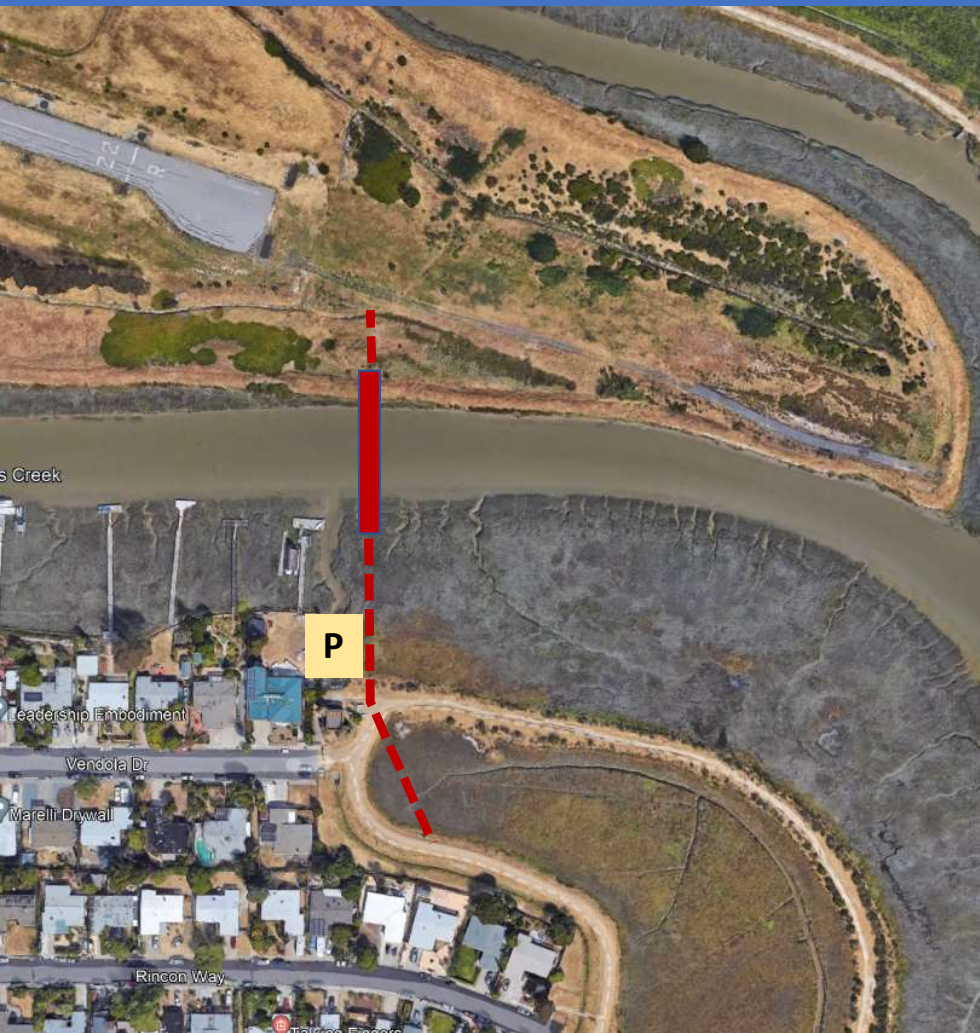


1. 1983 tide peaked at **8.7 feet** & 1998 tide reached **8.4 feet**
2. Since November 2017 creek has reached above **8 feet 12 times**.
3. 100-year flow in Las Gallinas Creek is **1,300 CFS**.

| 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 |

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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

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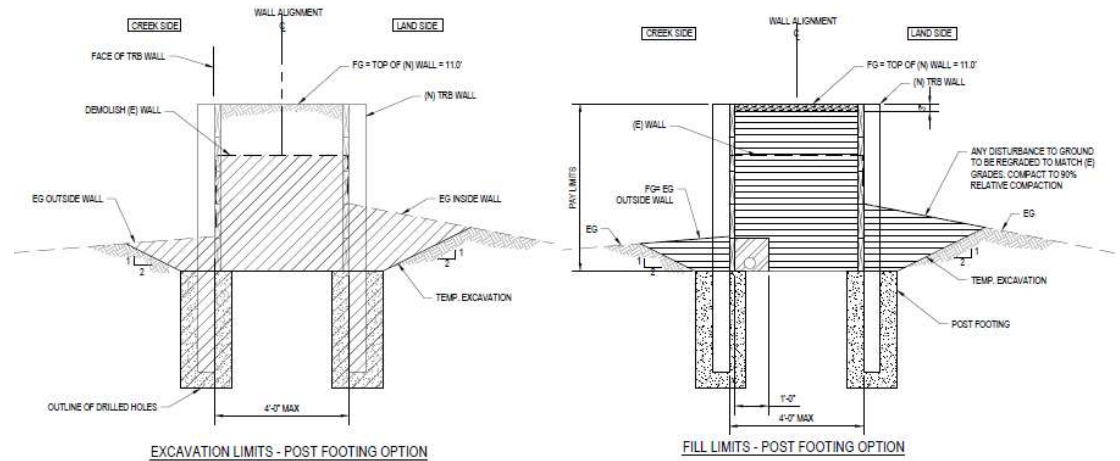
Timber Reinforced Berm (TRB) Wall

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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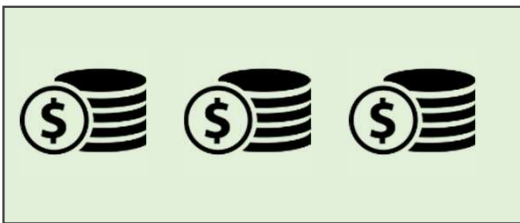
Precast Concrete Floodwall

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



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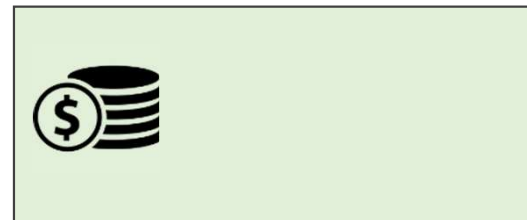
Vinyl Sheet Pile

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

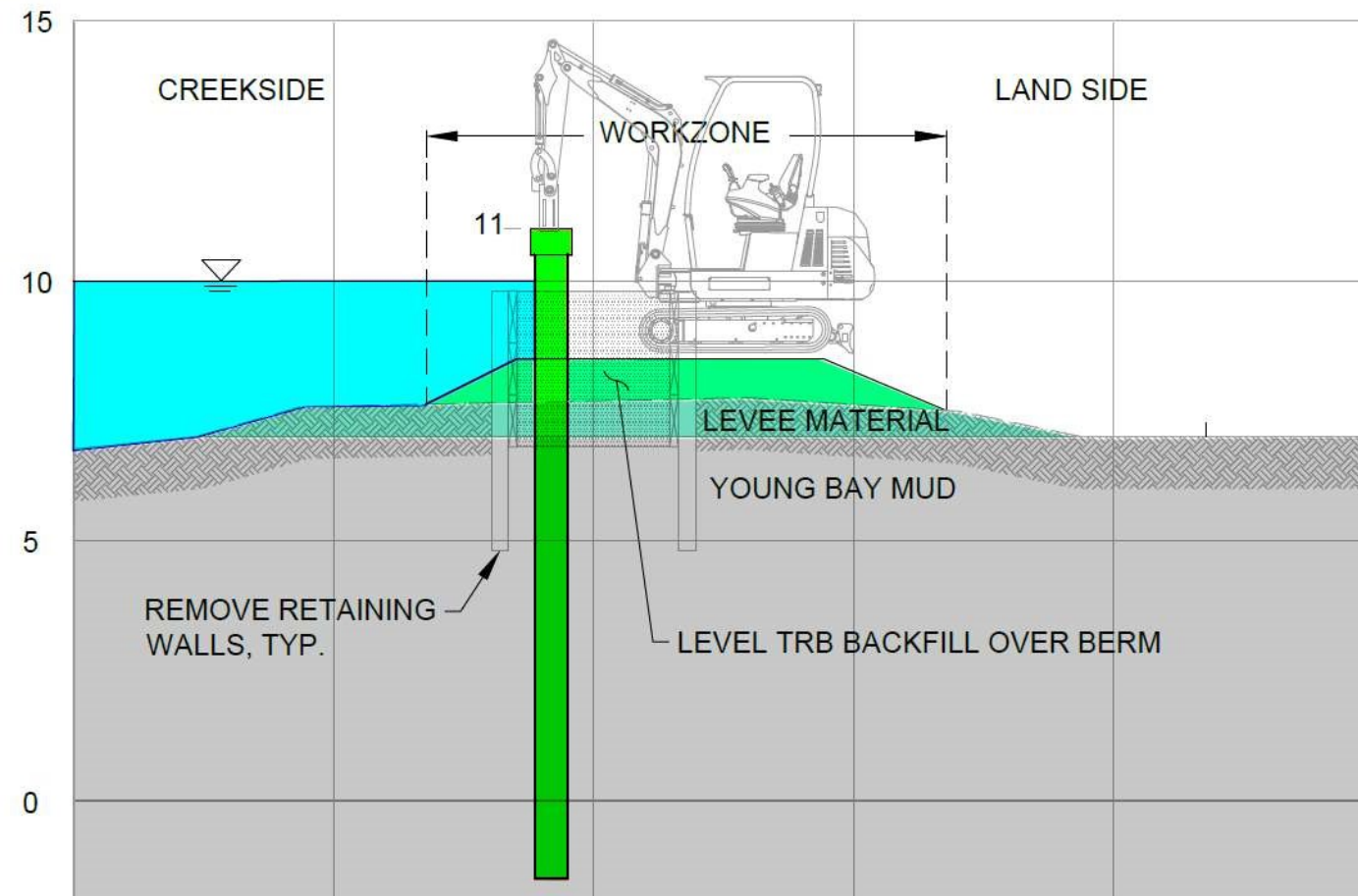
Disadvantages

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

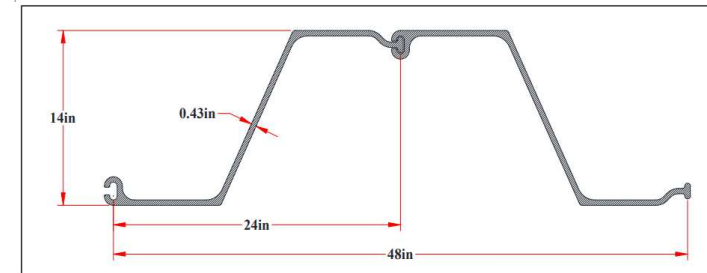
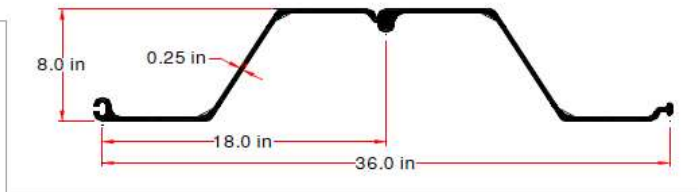


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Vinyl Sheet Pile



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| 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 |

*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 |
| Score | 13 | 13 | 19 |

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.

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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

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Costs and Funding

| Santa Venetia Project Costs | | | |
|-----------------------------|---------------------|----------------------|-----------------------------|
| Element | Floodwall Option | | Notes |
| | TRB | Composite Sheet Pile | |
| Planning and Design Costs | \$617,549 | \$617,549 | Existing Design Agreement |
| Construction Cost (2025) | \$16,000,000 | \$12,000,000 | Estimated Construction Cost |
| Total | \$16,617,549 | \$12,617,549 | |

| Santa Venetia Funding | | |
|-----------------------|-------------|-------------|
| Element | Value | Notes |
| FEMA and Zone 7 Funds | \$1,000,000 | Design Only |

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



Next Steps

Next Steps

1. Site review of properties as needed or at owner's request October 6th to 21st.
2. Complete detailed design by November 2022 to qualify for FEMA reimbursement.
3. Present design to the Board of Supervisors on November 15, 2022
4. CEQA Addendum and Environmental Permitting will follow Board of Supervisors review.
5. Seeking funding now.