

Flood Zone 4

MARIN COUNTY FLOOD CONTROL AND WATER
CONSERVATION DISTRICT

ADVISORY BOARD MEETING
JULY 25, 2023



Matt Smeltzer, PE
Engineer/Geomorphologist
Geomorph Design Group

Hannah Lee, PE, CFM
Senior Civil Engineer
County of Marin

Agenda

- Approval of Meeting Minutes: April 25, 2023
- Evaluation of Channel Capacity Improvements at East and West Creek
- Greenwood Bay Condominium Seawall Project
- Open Time for Items Not on the Agenda
- Next Meeting



Item 1. Approval of Meeting Minutes

Recommended Action: Approve the minutes



Item 2. Evaluation of Channel Capacity Improvement Options

East and West Creek



Background

- In 2022 Geomorph used models developed by others (in 2007/2008 and 2017) with minor adaptations to generally evaluate effectiveness of potential flood risk reduction measures for East and West Creeks.
- The Advisory Board then directed District staff to develop costs for “design alternatives” for each creek, ranging from:
 - Minimum Plan (i.e., repeat channel clearing and other maintenance measures similar to status quo) to
 - Maximum Plan (e.g., heavy-equipment implemented channel enlargement combined with modification or replacement of certain key roadway and utility crossing infrastructure features).



Summary of Tasks

- Task 1 – survey channels at key locations for updating the existing conditions models
- Task 2 – use updated existing conditions models to evaluate effectiveness of modifying or replacing certain roadway and utility crossings
- Task 3 – use models to develop preliminary recommended “Minimum”, “Medium”, and “Maximum” Plans for both creeks
 - These are being presented to the advisory board at this meeting



East Creek Crossing Infrastructure

Crossing	Stakeholder	Description
Greenwood Cove Dr	County of Marin	Two 60" CMP culverts slip-lined with 52" HDPE plastic pipes all or part of the approx. 280-ft-long distance from the north edge of Greenwood Cove Drive to outfall in Richardson Bay
SR 131 (Tiburon Blvd)	Caltrans	Two approx. 120-ft-long 66" RCP culverts extending from the vertical concrete headwall at north edge of Tiburon Blvd to two 36" RCP risers between Tiburon Blvd and Greenwood Cove Drive
Grouted Rock Channel	Richardson Bay Sanitary District (RBSD)	Approx. 180-ft-long grouted rock rip-rap lined channel transitioning from the grouted section at the overhead sewer crossing downstream to the Tiburon Blvd culvert headwall
Sanitary Sewer Crossing	RBSD	Overhead sewer pipeline crossing with narrow, elevated grouted rock channel section (4.7' invert)
Cecilia Way	Town of Tiburon	Approx. 30-ft-long 5'x10' concrete box culvert (6.9' culvert invert) with approx. 25-ft-long 10-ft-wide open concrete rectangular channel transition upstream and overhead sanitary sewer pipe crossing



Lower East Creek



Looking downstream to
the original double-
barrel 60" CMPs
outfalling in Richardson
Bay

January 19, 2023

Lower East Creek



Another view of the East Creek culvert outfalls in Richardson Bay. The original double-barrel 60" CMPs appear to have been slip-lined with 52" HDPE plastic pipe culverts

January 19, 2023

Lower East Creek



Looking downstream from right bank of the grouted rock channel to the vertical concrete headwall inlet to the State Route 131 66" RCP "double-barrel"

December 16, 2022

Lower East Creek



Looking downstream to Lower East Creek. The grouted rock-lined channel extends from the sanitary sewer crossing to the State Route 131 “double-barrel” culverts headwall seen in background of view

December 16, 2022

Lower East Creek



Looking from left bank to right bank along the sanitary sewer crossing and narrow grouted rock channel with 4.7' invert on the pipeline section

December 16, 2022

Upper East Creek



Looking downstream from inlet to the 10-ft-wide open concrete box culvert and overhead sanitary sewer pipe crossing to 5'x10' Cecilia Way concrete box culvert downstream in background of view

August 3, 2022

Upper East Creek



Looking upstream to the outlet of Cecilia Way culvert. This is the maintained condition following sediment removal completed in October 2022.

December 16, 2022

Upper East Creek



Looking upstream to the outlet of culverts originating at or upstream from Karen Way. This is the maintained condition

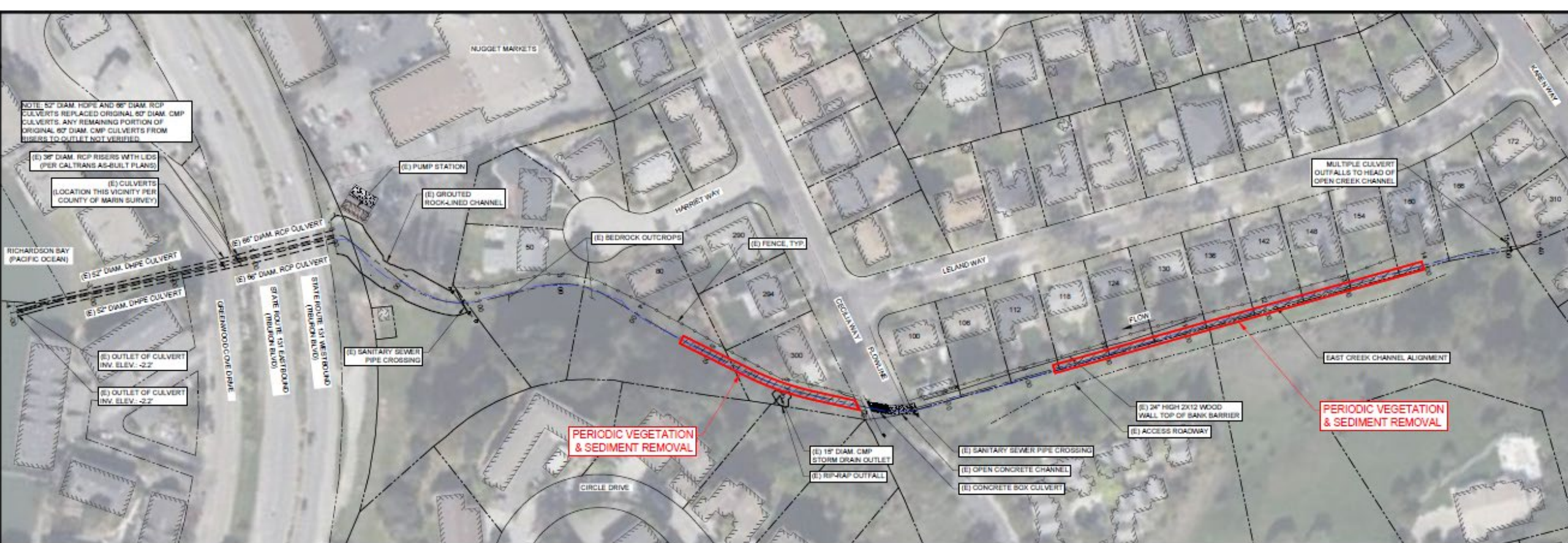
December 16, 2022

East Creek Minimum Plan

• \$45k*

- Status Quo
- District continues current program of periodic as needed vegetation and sediment removal
 - Accessible
 - Permitted
 - Similar to current Zone maintenance costs
 - Benefits are not sustainable

*Preliminary estimate, for planning purposes only



NOTE: 52" DIAM. HDPE AND 66" DIAM. RCP CULVERTS REPLACED ORIGINAL 80" DIAM. CMP CULVERTS. ANY REMAINING PORTION OF ORIGINAL 80" DIAM. CMP CULVERTS FROM RISERS TO OUTLET NOT VERIFIED.

(E) 36" DIAM. RCP RISERS WITH LIDS (PER CALTRANS AS-BUILT PLANS)
(E) CULVERTS (LOCATION THIS VICINITY PER COUNTY OF MARIN SURVEY)

(E) 52" DIAM. HDPE CULVERT
(E) 52" DIAM. HDPE CULVERT

(E) OUTLET OF CULVERT INV. ELEV. -2.2'
(E) OUTLET OF CULVERT INV. ELEV. -2.2'

(E) 66" DIAM. RCP CULVERT
(E) 66" DIAM. RCP CULVERT

(E) SANITARY SEWER PIPE CROSSING
(E) GROUTED ROCK-LINED CHANNEL

(E) BEDROCK OUTCROPS
(E) FENCE, TYP.

(E) PUMP STATION
(E) OPEN CONCRETE CHANNEL

(E) 15" DIAM. CMP STORM DRAIN OUTLET
(E) RIP-RAP OUTFALL

(E) SANITARY SEWER PIPE CROSSING
(E) CONCRETE BOX CULVERT

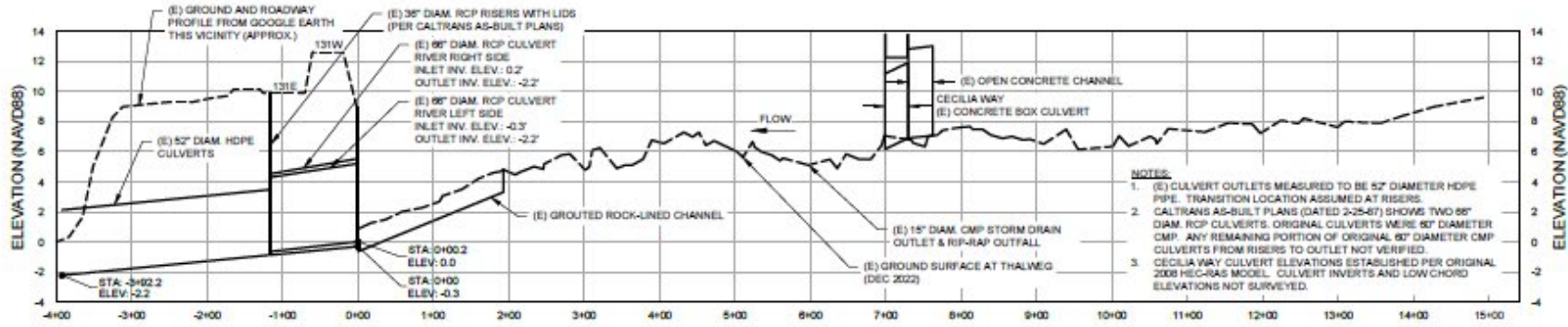
(E) 24" HIGH 2X12 WOOD WALL TOP OF BANK BARRIER
(E) ACCESS ROADWAY

MULTIPLE CULVERT OUTFALLS TO HEAD OF OPEN CREEK CHANNEL
EAST CREEK CHANNEL ALIGNMENT

PERIODIC VEGETATION & SEDIMENT REMOVAL
PERIODIC VEGETATION & SEDIMENT REMOVAL

LEGEND
--- EXISTING PROPERTY BOUNDARY LINE (FROM MARINMAP GIS, APPROX.)
--- EXISTING BUILDING LINE (FROM MARINMAP GIS, APPROX.)
--- EXISTING THALWEG LINE

EAST CREEK MINIMUM PLAN "MINIMUM PLAN" (PLAN 26)
SCALE: 1" = 60'



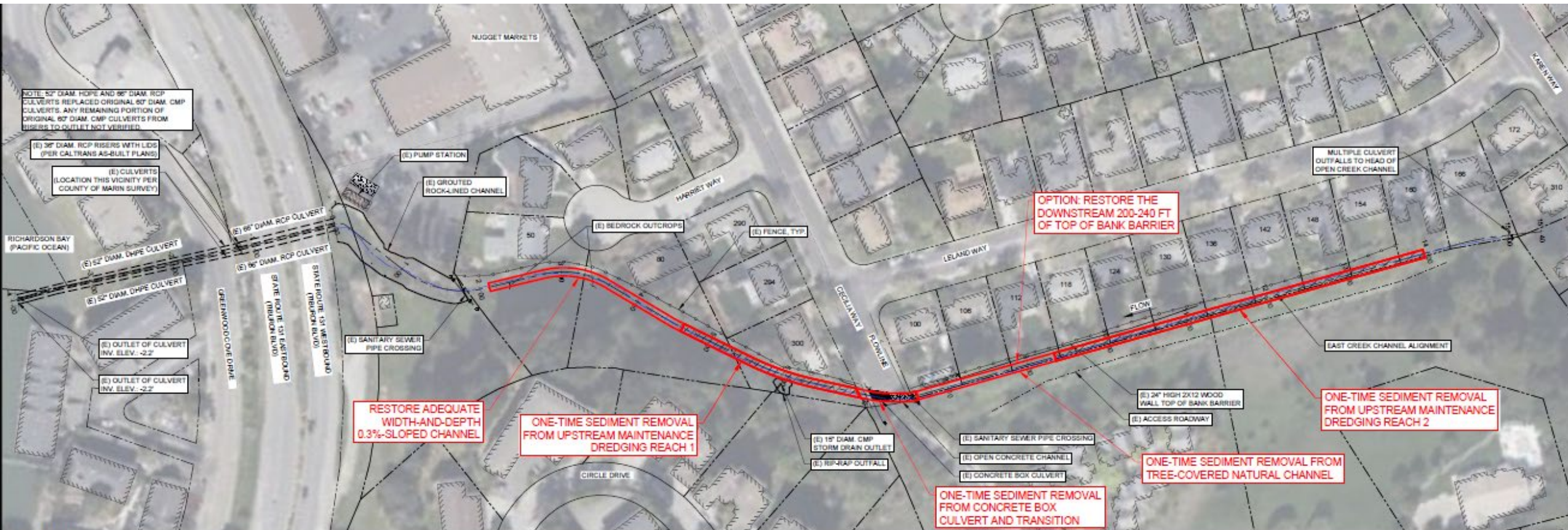
- NOTES:**
- (E) CULVERT OUTFALLS MEASURED TO BE 52" DIAMETER HDPE PIPE. TRANSITION LOCATION ASSUMED AT RISERS.
 - CALTRANS AS-BUILT PLANS (DATED 2-25-87) SHOWS TWO 66" DIAM. RCP CULVERTS. ORIGINAL CULVERTS WERE 80" DIAMETER CMP. ANY REMAINING PORTION OF ORIGINAL 80" DIAMETER CMP CULVERTS FROM RISERS TO OUTLET NOT VERIFIED.
 - CECILIA WAY CULVERT ELEVATIONS ESTABLISHED PER ORIGINAL 2008 HEC-RAS MODEL. CULVERT INVERTS AND LOW CHORD ELEVATIONS NOT SURVEYED.

POTENTIAL EAST CREEK FLOOD RISK REDUCTION MEASURES - PROFILE
SCALE: H:1" = 100', V:1" = 5' (2X EXAGGERATION)

East Creek Medium Plan

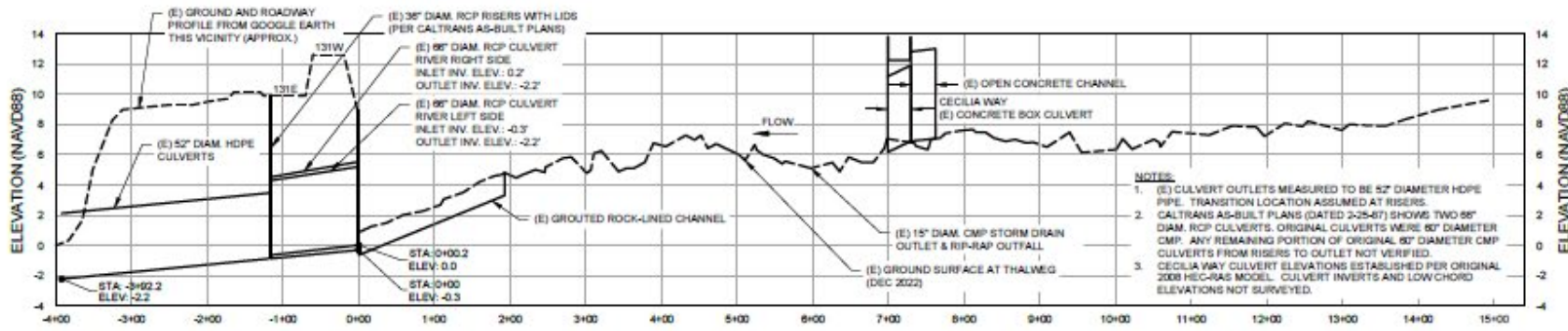
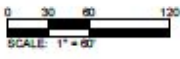
• \$744k*

- Extend sediment removal about 250 feet downstream of current permitted maintenance limit
 - Challenging access
 - Needs additional permits
 - Increase in one-time expense, but may reduce ongoing maintenance cost
 - Benefits are likely more sustainable
 - Option to restore top of bank barrier along Leland Way
- *Preliminary estimate, for planning purposes only



- LEGEND**
- EXISTING PROPERTY BOUNDARY LINE (FROM MARINMAP GIS, APPROX.)
 - EXISTING BUILDING LINE (FROM MARINMAP GIS, APPROX.)
 - - - EXISTING THALWEG LINE

EAST CREEK MEDIUM PLAN "MEDIUM PLAN" (PLAN 52)
SCALE: 1" = 60'



- NOTES**
1. (E) CULVERT OUTLETS MEASURED TO BE 52\"/>

POTENTIAL EAST CREEK FLOOD RISK REDUCTION MEASURES - PROFILE
SCALE: H-1" = 100', V-1" = 5' (20X EXAGGERATION)

East Creek Maximum Plan

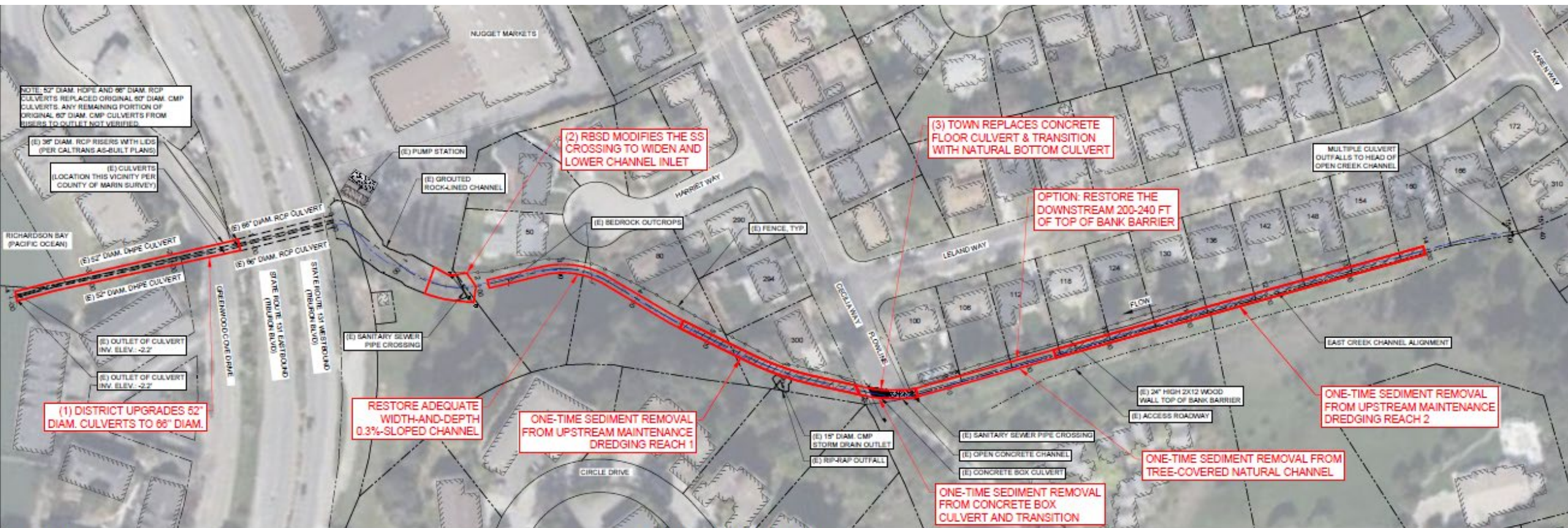


Medium plan plus potential crossing modifications at:

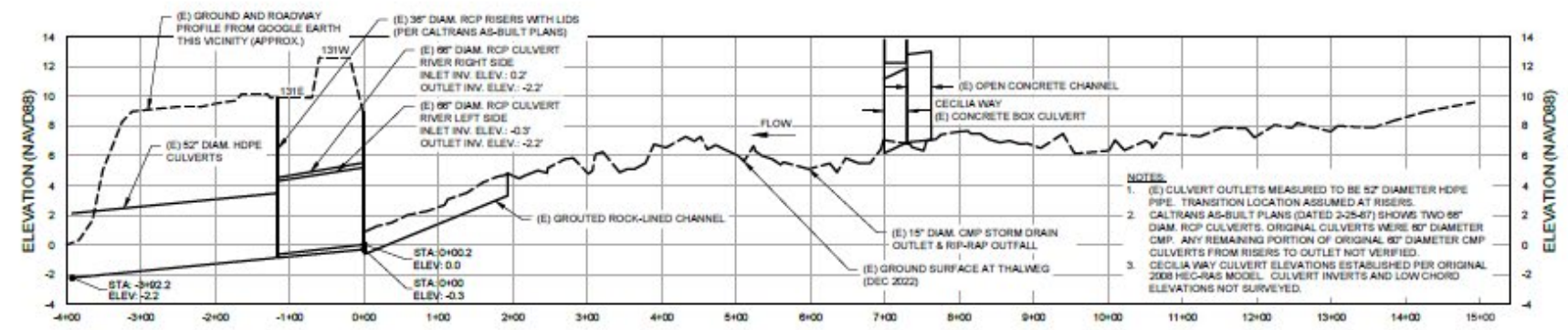
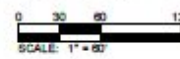
- Culverts under Tiburon Blvd and Greenwood Cove Dr
- Sanitary Sewer Crossing
- Cecilia Way Culvert

➤ Zone 4 only has right-of-way for the culverts under Greenwood Cove Dr

*Preliminary estimate, for planning purposes only



EAST CREEK MAXIMUM PLAN *MEDIUM PLAN +1 +2 +3* (PLAN 40)
SCALE: 1" = 60'



POTENTIAL EAST CREEK FLOOD RISK REDUCTION MEASURES - PROFILE
SCALE: H:1" = 100', V:1" = 5' (2X EXAGGERATION)

East Creek

Model-Computed 50-Year Water Surface Elevations at Floodprone Locations (Red numbers indicate potential inundation.)

Plan	Scenario	#1 Replace 52" Culverts	#2 Modify SS Xing & Channel Inlet	#3 Replace Cecilia Way Culvert	50-yr WSE at Station 8+16' (CS 17) (ft) "Levee" 12.28	50-yr WSE at Station 8+81' (CS 18) (ft) "Levee" 12.01	50-yr WSE at Station 9+40' (CS 19) (ft) "Levee" 12.07	50-yr WSE at Station 11+86' (CS 23) (ft) "Levee" 13.02
29	Orig. Exist Cond				13.37	13.39	13.40	13.51
28	New Exist Cond ¹				12.49	12.54	12.55	12.89
35	"Pre-Maintenance"				12.83	12.89	12.94	13.38
28	Minimum Plan ¹				12.49	12.54	12.55	12.89
32	Medium Plan				11.89	11.96	12.00	12.51
37	Medium+1				11.84	11.91	11.95	12.48
33	Medium+3				11.68	11.76	11.82	12.41
34	Medium+1+3				11.64	11.72	11.78	12.41
38	Medium+2				11.72	11.80	11.85	12.42
39	Medium+1+2				11.63	11.72	11.77	12.38
41	Medium+2+3				11.34	11.40	11.48	12.25
40	Medium+1+2+3				11.20	11.28	11.37	12.21



West Creek Crossing Infrastructure

Crossing	Stakeholder	Description
SR 131 (Tiburon Blvd)	Caltrans	Two approx. 180-ft-long 60" CMP culverts extending from the vertical concrete headwall at north edge of Tiburon Blvd to constructed natural open channel downstream from Tiburon Blvd
Cecilia Way	Town of Tiburon	Approx. 50-ft-long 5.3'x11.4' concrete box culvert (5.4' culvert invert) with narrow natural channel transitioning into culvert inlet



Lower West Creek



Looking from left bank to outlet of two 60" CMP culverts (in foreground) outfalling to open natural channel downstream from Tiburon Boulevard

August 3, 2022

Lower West Creek



Looking upstream at the broken concrete rubble covered channel bed

August 17, 2022

Lower West Creek



Looking upstream to outlet of the Cecilia Way 5.3'x11.4' concrete box culvert. Note there is about 2-3 ft of fine sediment deposited within the downstream part of the culvert but much less sediment deposited in the upstream part of the culvert

August 17, 2022

Upper West Creek



Looking downstream to the grade-controlling channel-spanning concrete stormwater outfall forming a headcut-step

January 19, 2023

Upper West Creek



Looking downstream to the lightweight foreign rubble deposited upstream from the rubble covered channel bed downstream, and evidence of recent natural tendency channel bed downcutting limited by coarse foreign material on the bed

August 17, 2022

Upper West Creek



Looking upstream to 46"-diameter eucalyptus. Tree was topped approximately 10 years ago. Model simulations show that removal of this tree reduces the computed 50-year flood water surface elevation by 0.4'

August 17, 2022

West Creek Minimum Plan

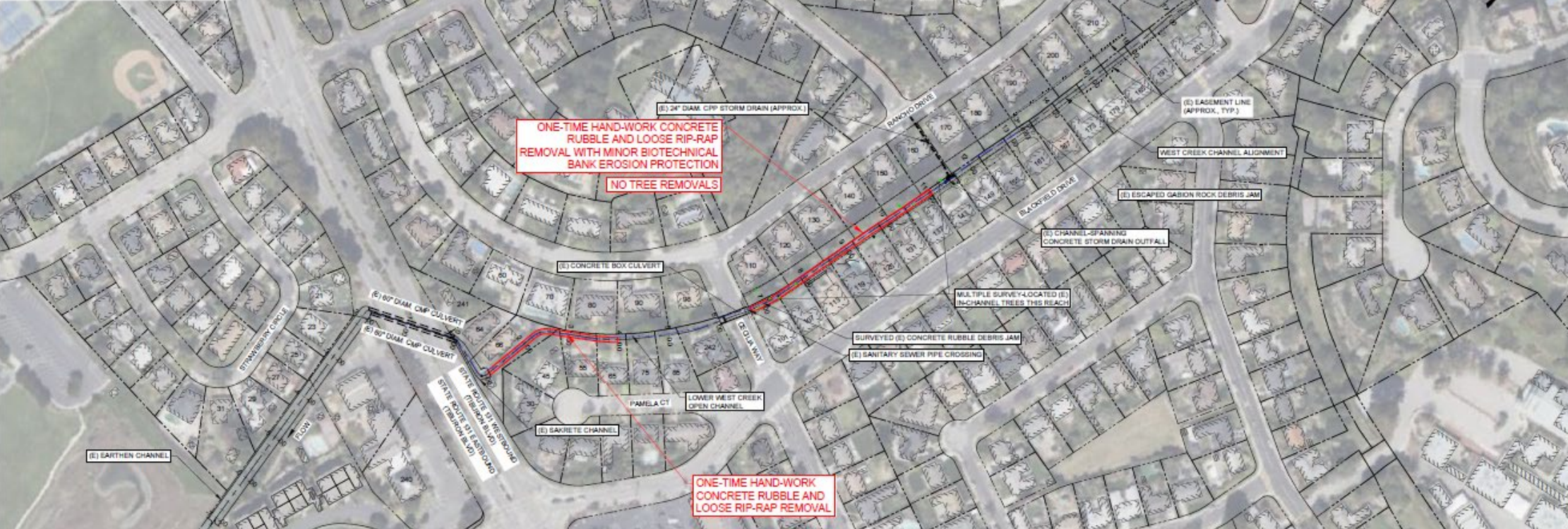
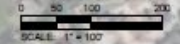
• \$365k

- Remove rock and broken concrete rubble from channel
 - No tree removal
 - Naturalize the creek
 - Need additional permits

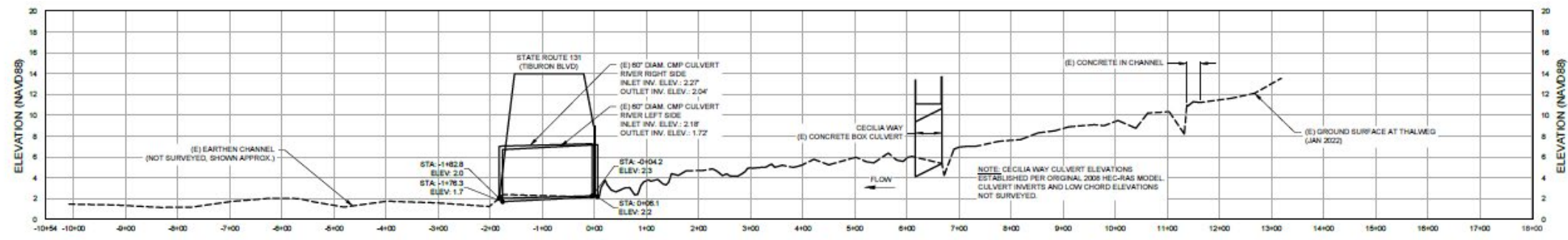
*Preliminary estimate, for planning purposes only

LEGEND

- EXISTING PROPERTY BOUNDARY LINE (FROM MARINMAP GIS, APPROX.)
- EXISTING BUILDING LINE (FROM MARINMAP GIS, APPROX.)
- EXISTING THALWEG LINE
- EXISTING LIVE IN-CHANNEL TREE



WEST CREEK MINIMUM PLAN "MINIMUM PLAN 2" (PLAN 47)
SCALE: 1" = 100'



POTENTIAL WEST CREEK FLOOD RISK REDUCTION MEASURES - PROFILE
SCALE: H1" = 100', V1" = 5' (20X EXAGGERATION)

West Creek Medium Plan

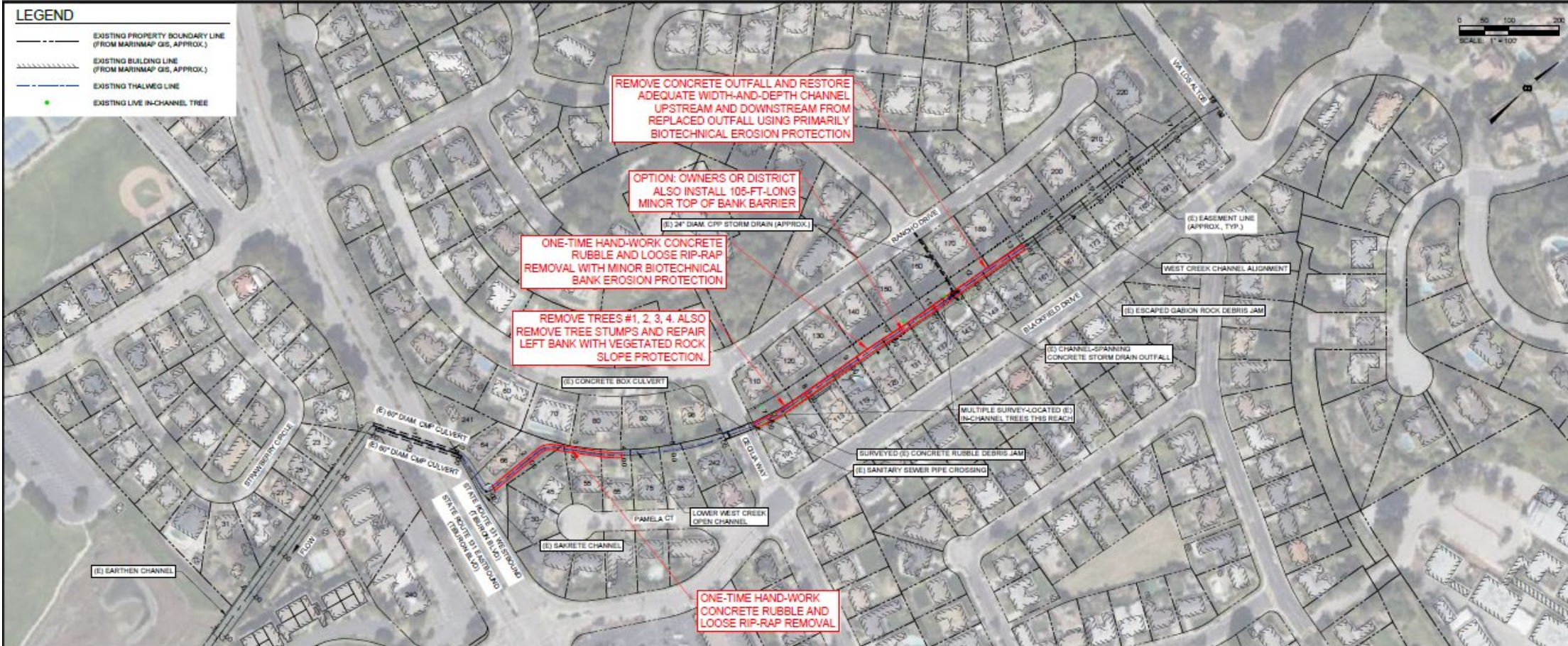
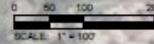
• \$1M+*

- Remove rock and broken concrete rubble from channel
- Remove concrete stormwater outfall
- Remove certain non-native in-channel trees and stumps
- Stabilize banks to enlarge channel where trees were removed
 - Requires heavy equipment
 - Requires environmental mitigation

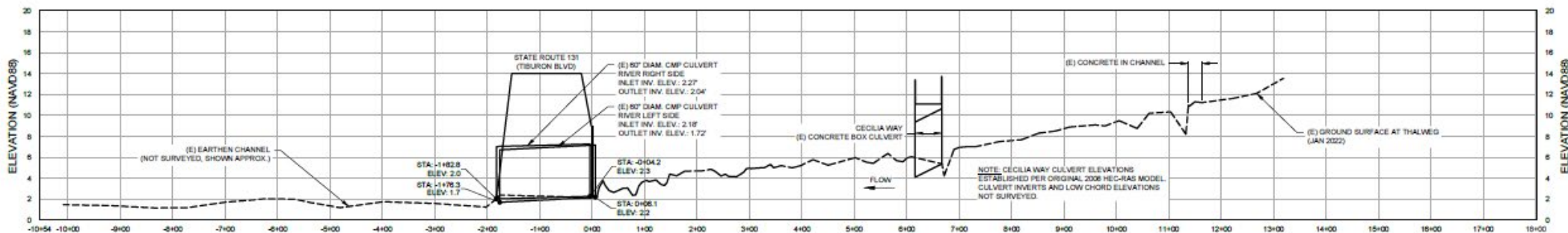
*Preliminary estimate, for planning purposes only

LEGEND

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- EXISTING BUILDING LINE (FROM MARINMAP GIS, APPROX.)
- EXISTING THALWEG LINE
- EXISTING LIVE IN-CHANNEL TREE



WEST CREEK MEDIUM PLAN "MEDIUM PLAN 2" (PLAN 63)
SCALE: 1" = 100'



POTENTIAL WEST CREEK FLOOD RISK REDUCTION MEASURES - PROFILE
SCALE: H:1" = 100', V:1" = 5' (20X EXAGGERATION)

West Creek Maximum Plan



Medium plan plus potential crossing modifications at:

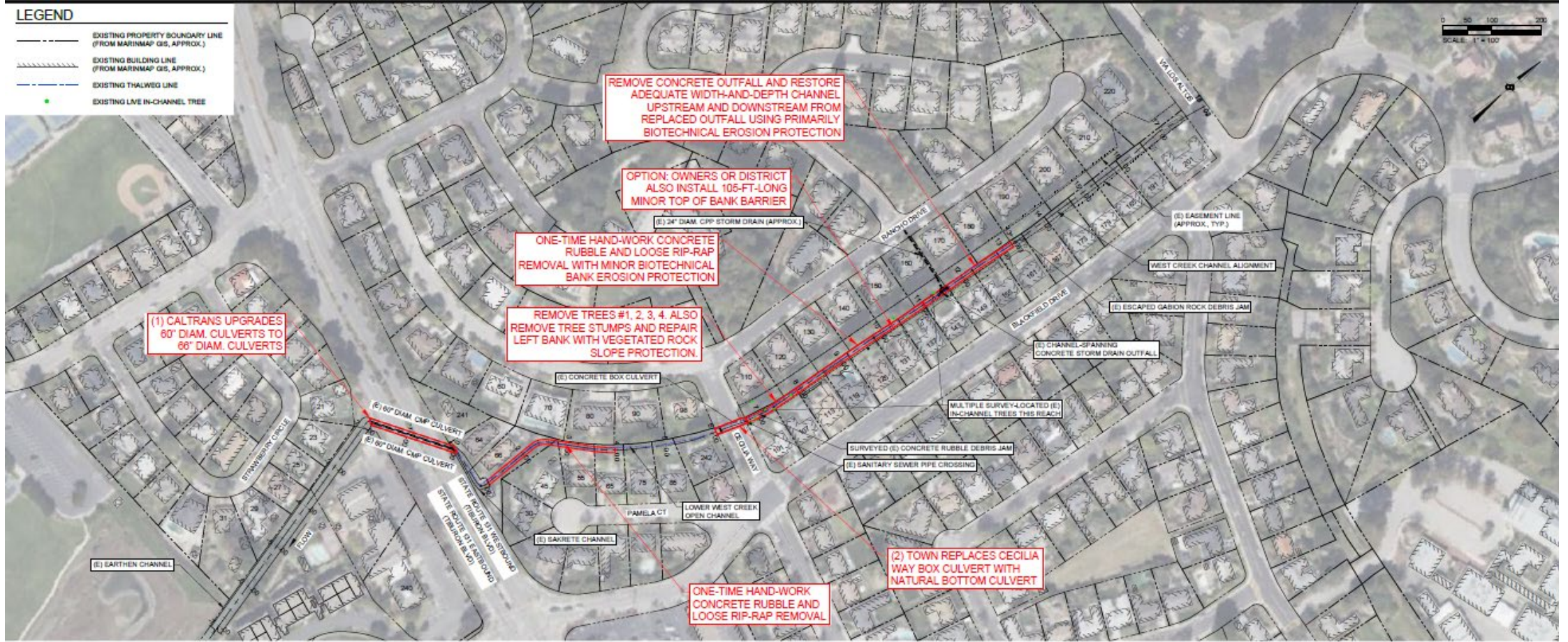
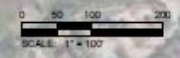
- Tiburon Blvd
- Cecilia Way

➤ Zone 4 does not have the right-of-way to implement these infrastructure modification projects

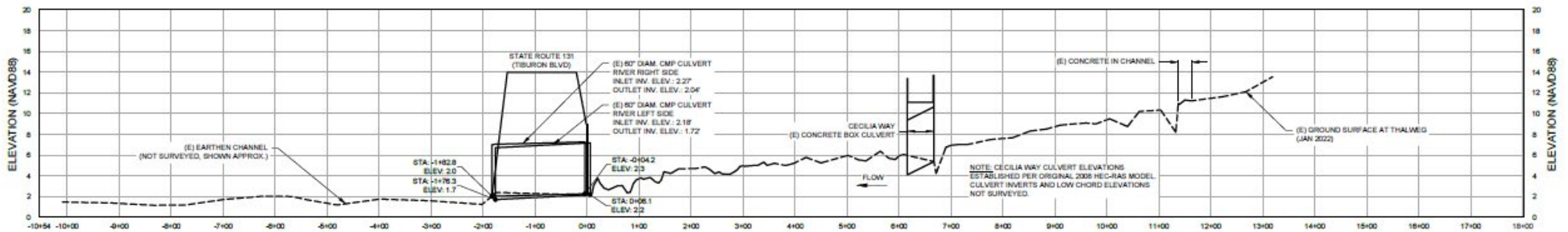
*Preliminary estimate, for planning purposes only

LEGEND

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- //// EXISTING BUILDING LINE (FROM MARINMAP GIS, APPROX.)
- - - EXISTING THALWEG LINE
- EXISTING LIVE IN-CHANNEL TREE



WEST CREEK MAXIMUM PLAN "MAXIMUM PLAN MED-3" (PLAN 66)
SCALE: 1" = 100'



POTENTIAL WEST CREEK FLOOD RISK REDUCTION MEASURES - PROFILE
SCALE: H: 1" = 100', V: 1" = 5' (20X EXAGGERATION)

West Creek

Model-Computed 50-Year Water Surface Elevations at Floodprone Locations (Red numbers indicate potential inundation.)

Scenario	50-yr WSE at Station 5+54' (XS-23) (ft) Left Levee 9.98 ft	50-yr WSE at Station 8+19' (CS 59) (ft) Left Levee 12.28 ft	50-yr WSE at Station 10+40' (CS 66) (ft) Left Levee 13.08 ft	50-yr WSE at Station 11+03' (CS 68) (ft) Left Levee 13.85 ft	50-yr WSE at Station 12+23' (CS 72) (ft) Left Levee 14.90 ft	50-yr WSE at Station 13+28' (XS-6) (ft) Left Levee 15.86 ft
Orig. Exist Cond	9.99	11.85	13.16	13.43	14.52	15.84
New Exist Cond	9.92	12.77	13.49	14.20	15.26	16.54
Minimum Plan 0	9.92	"	"	"	"	"
Minimum Plan 1	9.74	"	"	"	"	"
Minimum Plan 2	9.74	12.56	13.32	13.80	"	"
Maximum Plan Min-1	9.72	"	"	"	"	"
Maximum Plan Min-2	9.73	"	"	"	"	"
Maximum Plan Min-3	"	"	"	"	"	"
Medium Plan 1	9.74	"	"	13.55	14.07	15.78
Medium Plan 2-1	"	"	"	"	"	"
Medium Plan 2-2	"	12.47	13.29	13.54	14.06	"
Medium Plan 2-3	"	12.41	13.27	13.52	"	"
Medium Plan 2-4	"	12.16	13.21	13.49	14.04	"
Medium Plan 2-5	"	"	13.17	13.47	14.03	"
Medium Plan 2-6	"	"	"	"	"	"
Medium Plan 3-1	"	11.81	13.11	13.44	14.02	"
Medium Plan 3-2	"	11.70	13.10	"	"	"
Maximum Plan Med-1	9.71	"	"	"	"	"
Maximum Plan Med-2	9.74	11.67	13.10	"	"	"
Maximum Plan Med-3	9.71	"	13.09	"	"	"



Item 3. Greenwood Bay Condominiums Seawall Project

The Greenwood Bay HOA will have an opportunity to share information about this project with the Advisory Board.



Item 4. Open Time

- Comments will be heard for items not on the agenda.
- Limited to three minutes per speaker.
- When written testimony is presented, it is not necessary to read the entire text; it will automatically become part of the minutes.
- All are expected to be polite and courteous, and refrain from questioning the character or motives of others. Please help create an atmosphere of respect.

Item 5. Next Meeting

October 24, 2023

Additional special meetings may be called if needed.

