



SANTA CLARA RIVER LEVEE SYSTEM (SCR-3): ALTERNATIVES ANALYSIS

*Summary Memorandum
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Cover Photograph:

Looking downstream along the Santa Clara River at the upstream end of Reach 3, November 2012

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1 INTRODUCTION

The document entitled, “Santa Clara River Levee System (SCR-3) Reaches 1-4 – Evaluation and Design Report – County of Ventura, California,” prepared by Wood Rodgers Inc. (WRI), dated March 2013 was prepared to identify and evaluate alternatives for the improvement of the SCR-3 levee system in the City of Oxnard. The report divided the levee system into four reaches. The first three reaches (1-3) extend from the downstream limits of the project at the Bailard Landfill upstream to the point where Ventura Road begins to parallel the Santa Clara River. Reach 4 extends from this point upstream to the Highway 101 crossing and the downstream limits of the SCR-1 levee system. The WRI report evaluated Reaches 1 through 3 together and Reach 4 separately. The vicinity of the project and location of the reaches are shown on Figures 1 and 2.

Chapter 2 of the report focused on the Reach 1 through 3 alternatives. Numerous alternatives were evaluated and discussed, and the report identified 2 alternatives for the final evaluation. These included 1A and 1B. Alternative 1A was the recommended alternative and included sections of levee improvements that tied into the existing landfill as high ground where possible. This alternative also included additional fill to raise all sections above the design water surface elevations. Alternative 1B was identified as the full levee improvement alternative. It included a continuous levee system for Reaches 1 through 3 and did not tie into the existing landfills.

Section 5 of the report focused on the Reach 4 Alternatives. Again, numerous rounds of alternatives were evaluated and discussed, and the report identified 2 alternatives for the final evaluation. These included 1D and the combination of 4A+5C. Alternative 1D was the recommended alternative and included a floodwall along the riverside of Ventura Road for the entire reach. Alternative 4A+5C included a floodwall partially on the riverside and partially on the landside of Ventura Road south of the Union Pacific Railroad (UPRR) and fill in the Wagon Wheel Development area north of the railroad to Highway 101.

RBF has completed a detailed review of the previous work and prepared numerous additional technical studies in support of the final design. These technical studies include detailed hydraulics, scour calculations, geotechnical investigations, review of FEMA certification requirements, and a type selection report for the floodwall design. In addition, the Wagon Wheel development between the UPRR and Highway 101 is currently processing a tentative tract map with the City of Oxnard. This provides opportunities to consider different options adjacent to that proposed development. The results of these studies and the on-gong tentative tract processing suggest that an additional review of the various alternatives in Reaches 1-3 and 4 should be considered prior to the development of the final design.

1.1 Study Goal and Objectives

The primary goal of this alternatives analysis is to re-evaluate the previous alternatives based on additional data, and develop a refined set of alternatives analyses and sensitivity matrices to facilitate the identification and selection of a recommended project for the SCR-3 levee system.

The objectives of this study are identified below:

- Compile and review previous alternatives from WRI report
- Identify potential modifications and refinements to the previous alternatives
- Develop potential concepts and establish a new set of alternatives for evaluation in conjunction with the District and the City.
- Identify design parameters and evaluation criteria used to develop design alternatives.
- Prepare a conceptual level plan for each alternative to be evaluated including layout of the alternative with facility sizing and typical sections.
- Prepare a summary evaluation for the alternatives including the benefits and constraints, estimated project cost, environmental and right-of-way impacts, and compliance with FEMA requirements.
- Develop a set of sensitivity matrices to be applied to the alternatives including:
 1. Cost matrix
 2. Schedule matrix
 3. Regulatory matrix
 4. Risk matrix
- Prepare a technical memorandum and graphic exhibits to summarize the results of the alternative evaluation.



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2 REACHES 1 THROUGH 3

Three (3) alternatives were identified and evaluated for these combined reaches. The alternatives include the previously recommended alternative and the full levee alternative from the WRI report, and a new modified alternative that eliminates the levee improvements in Reach 2. The alternatives were re-named to avoid any confusion with the previous work.

Subsequent to the preparation of the WRI report, additional geotechnical investigations completed by Kleinfelder have provided new information on the existing bank protection in Reach 2. The previous studies by WRI and Anderson Consulting Engineers, Inc. (ACE) have indicated that the existing riprap in the middle portion of Reach 2 (Sta 170+00 to 190+00) may be inadequate for toe down depth and shear stress. This determination was based on the lack of information available at the time. The subsequent testing has revealed that the toe down depths and riprap thickness is similar to the other sections in Reach 2 and appears to be adequate. Therefore, removal and replacement of the riprap bank protection in Reach 2 has been eliminated from the project alternatives.

The following sections provide a summary of the project alternatives.

2.1 Alternative I.A - Full Levee System

This alternative includes a continuous raised earthen levee on top of the existing levee for the full limits of the project improvements. It does not require tie-ins to the existing closed landfills for high ground. Sheet pile scour protection is proposed along the upper 400 feet of Reach 3 and will tie-in with the Reach 4 improvements. This sheet pile will eliminate the need for additional bendway weirs in the area.

Flood Protection: This alternative will provide full flood protection for Reaches 1 through 3. This system also provides additional flood protection for the existing closed landfills and golf course maintenance facilities in Reach 2.

2.2 Alternative I.B - Levee System with Landfill Tie-ins and Protection to Golf Course Maintenance

This alternative was the recommended project in the Wood Rogers study. It includes an earthen raised levee that ties into the existing closed landfills as high ground. In Reach 2, the levee is extended beyond the closest landfill tie-in to provide flood protection for the Ventura Regional Sanitation District (VRSD) flare and River Ridge Golf Course maintenance yard. In areas that would no longer be considered levees (between landfill tie-in locations, station 165+00 to 178+00), the river bank maintenance roads were raised to be above the design water surface

elevations. Sheet pile scour protection is proposed along the upper 400 feet of Reach 3 and will tie-in with the Reach 4 improvements similar to Alternative I.A.

Flood Protection: This alternative will provide full flood protection for Reaches 1 through 3. This system also provides additional flood protection for the existing closed landfills and golf course maintenance facilities in Reach 2.

2.3 Alternative I.C - Levee System with Landfill Tie-ins and No Protection to Golf Course Maintenance

This alternative is modified from Alternative I.B to eliminate the improvements in Reach 2. Levee systems in Reaches 1 and 3 would be constructed and tie into the existing closed landfills at the closest acceptable locations. No flood protection would be provided to the VRSD flare or the golf course maintenance yard. The existing golf course drainage swale, located at the mid-point of Reach 2 would be filled in to eliminate the levee condition at this isolated location. Sheet pile scour protection is proposed along the upper 400 feet of Reach 3 and will tie-in with the Reach 4 improvements similar to the other alternatives.

Flood Protection: This alternative is anticipated to provide full flood protection for the properties protected by the system, but does not protect the golf course maintenance yard or provide additional river bank protection for the existing closed landfills.

2.4 Summary of Reach 1 - 3 Alternatives

Alternative I.A provides the best flood protection but is also the most expensive. It has the largest environmental impact, and requires the most coordination with the regulatory agencies.

Alternatives I.B is a reduced version of Alternative I.A and results in a minor reduction in the project cost. However, it requires the maximum number of tie-ins (5 total) to the existing closed landfills.

Alternative I.C is designed to eliminate the majority of the levee improvements in Reach 2 and provide significant reductions in the project cost and environmental impacts. By placing fill in the existing golf course drainage swale, if effective, eliminates Reach 2 as a levee system and avoids the construction requirements to improve the system to FEMA criteria. It does not protect the golf course or landfill facilities, and includes additional requirements for long-term maintenance and operations. The critical issue for Alternative I.C is to obtain FEMA concurrence that the drainage swale fill will eliminate the levee conditions. To gain acceptance it is anticipated that a comprehensive operations and maintenance plan will be required to monitor the bank and provide corrective measures if significant bank failures occur.

A summary matrix for the alternatives is attached as Exhibit A with detailed cost estimates for each alternative (Exhibits B1 through B3). The summary matrix highlights the benefits and constraints of each alternative along with the anticipated permitting requirements and project costs. The alternatives are shown graphically on Figures 3 through 6.

3 REACH 4 ALTERNATIVES

Four (4) potential alternatives were identified for the Reach 4 levee improvements. These alternatives were based on modifications to the various project elements from the previous work, and developed from the additional studies and information completed by the RBF team. The alternatives are re-named to avoid any confusion with the previous work. The following section provides a summary of the project alternatives.

3.1 Alternative II.A - Floodwall along Riverside of Ventura Road

This alternative includes a 2,900 foot long floodwall along the riverside of Ventura Road from Reach 3 to Highway 101. The floodwall will vary in height from 6 feet to over 22 feet. The largest heights will be in the vicinity of the UPRR crossing. The visible height at this location will be approximately 22 feet. The floodwall is proposed to be located 17.5 feet from the existing roadway pavement. This distance was established to accommodate the future master planned bikeway (16-foot wide) and a curb and gutter along the roadway. Where curb and gutter already exists, the floodwall offset was 16 feet. A 13 foot high FloodBreak flood gate would be placed across Ventura Road just downstream of Highway 101. The gate is required to provide flood protection until the SCR-1 improvements are completed. Upon completion of the SCR-1 improvements, the gate can be removed or simply de-activated. No pump station is anticipated for any of the alternatives at the El Rio Drain based on the preliminary interior drainage studies completed.

A variation on the alternative was evaluated to eliminate the interim flood gate along Ventura Road downstream of the Highway 101 crossing. The variation includes improving approximately 1,000 feet of the SCR-1 levee upstream of the crossing, and reconstructing 1,200 feet of Ventura Road to raise the grade to above the design water surface elevation. This would require that the road be raised by approximately 8 feet and would eliminate the need for the flood gate. While the improvements may be possible, a full geometric layout of the roadway improvements would be necessary to determine if adequate stopping and decision distances can be obtained prior to the intersection with Town Center Drive. Assuming that they are adequate, the estimated roadway and levee improvement cost is approximately \$3,000,000. In addition, the SCR-1 is a federally constructed facility and is anticipated to require a USACE 408 permit. The permit would add approximately 3 years to the approval and construction process. The alternative could also result in ponding behind the improvements to an elevation of 82 feet MSL if the SCR-1 levee were to be breached. For these reasons this variation of Alternative II.A was dropped from further consideration.

Flood Protection: This alternative will provide full flood protection for the areas downstream of Highway 101, and would not impact the future SCR-1 improvements. However, prior to the

completion of the SCR-1 improvements, any breach in that system upstream of Hwy 101 could result in ponding behind the flood gate. The maximum ponding level would be approximately 78 feet (based on the elevation of the existing SCR-1 levee), and would be an increase in the water surface elevations compared to the existing condition. The extent of the interim ponding is illustrated on Figure 10.

3.2 Alternative II.B - Floodwall along Landside of Ventura Road and along the El Rio Drain, Fill in the Wagon Wheel Area

This alternative includes a floodwall on the riverside of Ventura Road for approximately 900 feet. The wall will have a visible height of approximately 6 feet and will be offset from the roadway similar to Alternative II.A. The floodwall will then cross Ventura Road at the high point in the road. A FloodBreak flood gate is proposed for the roadway crossing (6-foot high gate). The floodwall will then extend along the top of the existing slope on the landside of Ventura Road to the El Rio Drain. The floodwall will vary in height from 6 feet down to 4 feet near the El Rio Drain. The floodwall will then continue along the El Rio Drain to approximately Oxnard Boulevard where it will terminate on higher ground. Between the UPRR and Highway 101, the Wagon Wheel development will be placed on fill (up to 8 feet in depth) to an elevation above the 100-year floodplain. The fill along Ventura Road would be faced with riprap to provide erosion protection. No improvements in the Wagon Wheel development would be constructed with the SCR-3 project. However, the cost of the fill material and lost developable acreage (right-of-way) from the fill slope is included in the alternatives analysis cost estimate.

Flood Protection: This alternative will provide flood protection downstream of the UPRR with the initial construction, and full flood protection once the Wagon Wheel improvements are constructed. This alternative results in a gap in the levee system between SCR-3 and SCR-1 at the downstream side of the Highway 101 crossing. As a result, some flooding would occur upstream of Highway 101 without an additional flood gate in the vicinity of the highway crossing, even with the SCR-1 improvements. The extent of the flooding is shown in Figure 11 and is based on the design water surface elevation at the gap location.

3.3 Alternative II.C - Floodwall along the Landside of Ventura Road to UPRR and along Wagon Wheel Area

This alternative is similar to Alternative II.B except that the floodwall on the landside of Ventura Road would tie directly into the UPRR embankment rather than extending along the El Rio Drain. Between the UPRR crossing and Highway 101, a floodwall would be constructed on the landside of Ventura Road. A second FloodBreak floodgate would be required at the future entrance to the Wagon Wheel development. Due to the relocation of the streets with the Wagon Wheel development, it is not anticipated that the flood wall and gates between the UPRR crossing and Highway 101 could be completed with the initial SCR-3 construction.

Flood Protection: The UPRR embankment is not anticipated to provide flood protection in conformance with the FEMA requirements, therefore no flood protection would be provided with the initial construction. Full flood protection for the SCR-3 project reach would be obtained once the Wagon Wheel improvements are constructed. Some flooding would occur upstream of Highway 101 without an additional flood gate in the vicinity of the highway crossing, even with the SCR-1 improvements (Figure 11) similar to Alternative II.B.

3.4 Alternative II.D - Floodwall along Landside of Ventura Road to UPRR and fill in Wagon Wheel Area

This alternative is similar to Alternative II.B except that the floodwall on the landside of Ventura Road would tie directly into the UPRR embankment rather than extending along the El Rio Drain. This would reduce the project cost, however, it is not anticipated that the railroad embankment would be considered adequate as an earthen levee. Between the UPRR and Highway 101, the Wagon Wheel development will be placed on fill to an elevation above the 100-year floodplain. The fill along Ventura Road would be faced with riprap to provide erosion protection.

Flood Protection: Similar to Alternative II.C, the UPRR embankment is not anticipated to provide flood protection in conformance with the FEMA requirements, therefore no flood protection would be provided with the initial construction. Full flood protection for the SCR-3 project reach would be obtained once the Wagon Wheel improvements are constructed. Similar to Alternatives II.B and II.C, some flooding would occur upstream of Highway 101 without an additional flood gate in the vicinity of the crossing, even with the SCR-1 improvements (Figure 11).

3.5 Summary of Reach 4 Alternatives

Alternative II.A provides the best flood protection but is also the most expensive. It has the largest environmental impact, and requires the most coordination with the UPRR and Caltrans to construct. Once SCR-1 is completed, it will also prevent flooding along Ventura Road and the flood gate can be eliminated. However, prior to the SCR-1 improvements, it could potentially result in adverse impacts to the flooding immediately upstream of Highway 101.

Alternatives II.B, II.C, and II.D are variations of a similar concept, which is to reduce the floodwall height by moving the floodwall to the landside of Ventura Road near the high point in the road (approximately 900 feet southwest of the UPRR crossing). Alternatives II.B and II.D will have floodwalls of about 6-feet. This is less than Alternative II.A which will have floodwalls up to 22-feet high. Alternative II.C will also have high floodwalls in the reach from the UPRR to Highway 101. A critical issue with Alternatives II.B and II.D is that they will not provide flood protection until the Wagon Wheel improvements are completed. All three of these alternatives (II.B, II.C, and II.D) will also leave a gap in the system on the downstream side of Highway 101. Since the

walls and fill will be on the landside of Ventura Road, they will not connect with the SCR-1 improvements. This will allow runoff to backflow under the freeway and flood a portion of the area north of the highway. Installation of a permanent flood gate across Ventura Road (either upstream or downstream of the freeway) would eliminate that problem. The cost for the flood gate is approximately \$2,000,000 and is not included in the cost estimates.

A summary matrix for the alternatives is attached as Exhibit C with detailed cost estimates for each alternative (Exhibits D1 through D4). The summary matrix highlights the benefits and constraints of each alternative along with the anticipated permitting requirements and project costs. The alternatives are shown graphically on Figures 6 through 9. The ponding limits upstream of Highway 101 are shown on Figures 10 and 11.

4 SENSITIVITY MATRICES

A series of matrices have been developed and applied to each of the alternatives in both Reach 1-3 and Reach 4 to facilitate the evaluation of the reach alternatives and combination of alternatives to assist in the selection of a recommended project. The following matrices have been developed:

Cost – This matrix was developed to compare various combinations of the Reach 1-3 and Reach 4 alternatives on the total cost of the project.

Schedule – The schedule matrix includes a combination of timeframes to complete the design and construction of the various alternatives. It includes the overall schedule for the alternatives to the completion of construction, and is divided into three (3) components; design, permitting, and construction. The permitting includes the environmental and regulatory permits including stakeholder permits/agreements from the UPRR, Caltrans, and VRSD.

Regulatory – The regulatory matrix was developed to assist in evaluating the potential impacts associated with processing the alternatives with the various agencies that will be required to issue permits and/or enter into agreements for the construction. The matrix includes the different permits anticipated to be required for each of the project alternatives.

Risk – The risk matrix is a summary matrix to quantify the risk associated with each alternative. It identifies a number to signify the potential risks associated with the alternative, and is divided between the Reach 1-3 and Reach 4 alternatives. Each alternative in the reaches is assigned a level of risk for the identified category. A weighting factor was identified for each category, and point value is established for the level of risk (high, medium, low). A total score can then be determined for each alternative. A low number represents a lower risk, while a larger number represents a higher risk. The different matrices are included as Exhibits E through H. A summary of the risk matrix is included below.

Total Risk Summary Matrix

Alternative		Reach 4			
		II.A	II.B	II.C	II.D
Reach 1-3	I.A	102	84	96	72
	I.B	118	100	112	88
	I.C	118	100	112	88

Exhibit A
Santa Clara River (SCR-3) Levee Improvement Project
Reaches 1-3 Alternatives Analysis Matrix

Alternative Name	Alternative I.A	Alternative I.B	Alternative I.C
Project Description	Full Levee System	Levee System with Landfill Tie-ins and Protection to Golf Course Maintenance	Levee System with Landfill Tie-ins and No Protection to Golf Course Maintenance
Flood Protection and Other Benefits	Continuous earthen levee system Eliminate landfill tie-ins (except Bailard) Protects all golf course and landfill facilities Ability to modify for 200-year event Highest level of flood protection Limited environmental impacts	Earthen levee in Reaches 1 and 3 Partial levee in Reach 2 Protects golf course maintenance and landfill flare Ability to modify for 200-year event Access road above 100-year water surface profile Limited environmental impacts	Earthen levee in Reaches 1 and 3 No levee in Reach 2 Golf course fill at drainage swale Limited environmental impacts
Constraints and Other Challenges	Flood/Retaining walls at golf maintenance Use State DWR standards for levee vegetation	Landfill tie-ins (5 required) Flood/Retaining walls at golf maintenance Use State DWR standards for levee vegetation	Landfill tie-ins (3 required) Does not protect golf maintenance facility Higher risk during storm event Difficult to modify for 200-year event Use State DWR standards for levee vegetation Impacts golf course operations Access road not above 100-year water surface
Permit Requirements	Regulatory Permits (USACE, CDFW, RWQCB, NMFS, USFWS) Landfill permits	Regulatory Permits (USACE, CDFW, RWQCB, NMFS, USFWS) Landfill permits	Regulatory Permits (USACE, CDFW, RWQCB, NMFS, USFWS) Landfill permits
Meets FEMA Requirements?	Yes	Yes, some risk at landfill tie-ins	Likely to be accredited, higher risk associated with golf course drainage swale fill
Capital Cost Estimate ⁽¹⁾	\$4,248,650	\$3,871,150	\$2,805,250
Environmental Mitigation ⁽¹⁾	\$420,000	\$420,000	\$165,000
Contingency (15%)	\$700,298	\$643,673	\$445,538
Construction Management/ Inspection/Bio Monitoring (8%)	\$373,492	\$343,292	\$237,620
Total Project Cost	\$5,742,440	\$5,278,115	\$3,653,408
YR 2016 - Total Project Cost ⁽²⁾	\$6,029,561	\$5,542,020	\$3,836,078

Notes:

- 1 Based on State DWR policy for Levee Vegetation (20-foot vegetative thinning along top of levee)
- 2 Based on Construction Cost Index of +2.5% per year (2014 Base year for unit prices)

Exhibit B.1

Santa Clara River (SCR-3) Levee Improvement Project Reaches 1-3 - Alternative I.A (Full Levee)						
Line Item	Description	Unit	Quantity	Unit Cost	Cost	Category Cost
General						\$632,500
1	Mobilization and Bonding	LS	1	\$175,000	\$175,000	
2	Clearing and Grubbing	AC	7.0	\$6,000	\$42,000	
3	Demolition and Removals	LS	1	\$85,500	\$85,500	
4	SWPPP	LS	1	\$30,000	\$30,000	
5	Diversion and Control of Water	LS	1	\$150,000	\$150,000	
6	Traffic Control	LS	1	\$150,000	\$150,000	
Levee						\$3,067,500
7	Foundation Excavation	CY	28,500	\$5	\$142,500	
8	Golf Course Fill	CY	0	\$10	\$0	
9	Levee Embankment Fill	CY	91,000	\$15	\$1,365,000	
10	Landfill Tie-in	EA	1	\$10,000	\$10,000	
11	Riprap (1/4 ton)	CY	3,000	\$75	\$225,000	
12	Sheet pile (Sta 214+00 to 217+50)	LS	1	\$1,325,000	\$1,325,000	
Concrete Structures						\$336,150
13	Concrete Retaining Wall	LF	375	\$250	\$93,750	
14	Structure Excavation & Backfill	CY	500	\$10	\$5,000	
15	Concrete Slide Gate Structures	CY	125	\$500	\$62,500	
16	66" RCP	LF	0	\$250	\$0	
17	Flap Gate - 24"	EA	1	\$3,100	\$3,100	
18	Flap Gate - 66"	EA	2	\$19,000	\$38,000	
19	Slide Gate - 24"	EA	2	\$4,500	\$9,000	
20	Slide Gate - 48"	EA	2	\$7,400	\$14,800	
21	Slide Gate - 66"	EA	2	\$13,000	\$26,000	
22	Slide Gate - 72"	EA	2	\$17,000	\$34,000	
23	Utility relocations	LS	1	\$50,000	\$50,000	
Miscellaneous						\$212,500
24	AB Access Road (12' wide, 6" thick)	LF	8,700	\$15	\$130,500	
25	6' Chain Link Fence	LF	1,800	\$20	\$36,000	
26	Swing Gate	EA	3	\$3,000	\$9,000	
27	Hydroseed Slopes	AC	3	\$3,000	\$9,000	
28	Vegetation Thinning (20' wide)	AC	2.8	\$10,000	\$28,000	
29	Vegetation Removal	AC	0.0	\$25,000	\$0	
Construction Cost Subtotal						\$4,248,650
Environ. Impact Mitigation-Temporary (2.5:1)		AC		\$375,000		\$0.00
Environ. Impact Mitigation-Permanent (1:1 - Veg Thinning)		AC	2.8	\$150,000		\$420,000.00
Environ. Impact Mitigation-Permanent (5:1)		AC	0.0	\$750,000		\$0.00
Project Contingencies (15%)						\$700,298
Construction Management/Inspection/Biological Monitoring (8%)						\$373,492
Total Project Cost						\$5,742,440
YR 2016 - Total Project Cost ⁽²⁾						\$6,029,561

Notes:

1. Cost and mitigation requirements based on using State DWR Levee Vegetation Policy
2. Based on Construction Cost Index of +2.5% per year (2014 Base year for unit prices)

Exhibit B.2

Santa Clara River (SCR-3) Levee Improvement Project						
Reaches 1-3 - Alternative I.B (Levee System w/golf maintenance protection)						
Line Item	Description	Unit	Quantity	Unit Cost	Cost	Category Cost
General						\$632,500
1	Mobilization and Bonding	LS	1	\$175,000	\$175,000	
2	Clearing and Grubbing	AC	7.0	\$6,000	\$42,000	
3	Demolition and Removals	LS	1	\$85,500	\$85,500	
4	SWPPP	LS	1	\$30,000	\$30,000	
5	Diversion and Control of Water	LS	1	\$150,000	\$150,000	
6	Traffic Control	LS	1	\$150,000	\$150,000	
Levee						\$2,690,000
7	Foundation Excavation	CY	14,000	\$5	\$70,000	
8	Golf Course Fill	CY	0	\$10	\$0	
9	Levee Embankment Fill	CY	68,000	\$15	\$1,020,000	
10	Landfill Tie-in	EA	5	\$10,000	\$50,000	
11	Riprap (1/4 ton)	CY	3,000	\$75	\$225,000	
12	Sheet pile (Sta 214+00 to 217+50)	LS	1	\$1,325,000	\$1,325,000	
Concrete Structures						\$336,150
13	Concrete Retaining Wall	LF	375	\$250	\$93,750	
14	Structure Excavation & Backfill	CY	500	\$10	\$5,000	
15	Concrete Slide Gate Structures	CY	125	\$500	\$62,500	
16	66" RCP	LF	0	\$250	\$0	
17	Flap Gate - 24"	EA	1	\$3,100	\$3,100	
18	Flap Gate - 66"	EA	2	\$19,000	\$38,000	
19	Slide Gate - 24"	EA	2	\$4,500	\$9,000	
20	Slide Gate - 48"	EA	2	\$7,400	\$14,800	
21	Slide Gate - 66"	EA	2	\$13,000	\$26,000	
22	Slide Gate - 72"	EA	2	\$17,000	\$34,000	
23	Utility relocations	LS	1	\$50,000	\$50,000	
Miscellaneous						\$212,500
24	AB Access Road (12' wide, 6" thick)	LF	8,700	\$15	\$130,500	
25	6' Chain Link Fence	LF	1,800	\$20	\$36,000	
26	Swing Gate	EA	3	\$3,000	\$9,000	
27	Hydroseed Slopes	AC	3	\$3,000	\$9,000	
28	Vegetation Thinning (20' wide)	AC	2.8	\$10,000	\$28,000	
29	Vegetation Removal	AC	0.0	\$25,000	\$0	
Construction Cost Subtotal						\$3,871,150
Environ. Impact Mitigation-Temporary (2.5:1)		AC	0.0	\$375,000	\$0.00	
Environ. Impact Mitigation-Permanent (1:1 - Veg Thinning)		AC	2.8	\$150,000	\$420,000.00	
Environ. Impact Mitigation-Permanent (5:1)		AC	0.0	\$750,000	\$0.00	
Project Contingencies (15%)						\$643,673
Construction Management/Inspection/Biological Monitoring (8%)						\$343,292
Total Project Cost						\$5,278,115
YR 2016 - Total Project Cost ⁽²⁾						\$5,542,020

Notes:

1. Cost and mitigation requirements based on using State DWR Levee Vegetation Policy
2. Based on Construction Cost Index of +2.5% per year (2014 Base year for unit prices)

Exhibit B.3

Santa Clara River (SCR-3) Levee Improvement Project						
Reaches 1-3 - Alternative I.C (Levee System w/no golf maintenance protection)						
Line Item	Description	Unit	Quantity	Unit Cost	Cost	Category Cost
General						\$492,800
1	Mobilization and Bonding	LS	1	\$150,000	\$150,000	
2	Clearing and Grubbing	AC	6.3	\$6,000	\$37,800	
3	Demolition and Removals	LS	1	\$25,000	\$25,000	
4	SWPPP	LS	1	\$30,000	\$30,000	
5	Diversion and Control of Water	LS	1	\$100,000	\$100,000	
6	Traffic Control	LS	1	\$150,000	\$150,000	
Levee						\$1,901,050
7	Foundation Excavation	CY	6,090	\$5	\$30,450	
8	Golf Course Fill	CY	15,500	\$10	\$155,000	
9	Levee Embankment Fill	CY	13,840	\$15	\$207,600	
10	Landfill Tie-in	EA	3	\$10,000	\$30,000	
11	Riprap (1/4 ton)	CY	2,040	\$75	\$153,000	
12	Sheet pile (Sta 214+00 to 217+50)	LS	1	\$1,325,000	\$1,325,000	
Concrete Structures						\$299,900
13	Concrete Retaining Wall	LF	0	\$250	\$0	
14	Structure Excavation & Backfill	CY	0	\$10	\$0	
15	Concrete Slide Gate Structures	CY	125	\$500	\$62,500	
16	66" RCP	LF	350	\$250	\$87,500	
17	Flap Gate - 24"	EA	1	\$3,100	\$3,100	
18	Flap Gate - 66"	EA	2	\$19,000	\$38,000	
19	Slide Gate - 24"	EA	2	\$4,500	\$9,000	
20	Slide Gate - 48"	EA	2	\$7,400	\$14,800	
21	Slide Gate - 66"	EA	2	\$13,000	\$26,000	
22	Slide Gate - 72"	EA	2	\$17,000	\$34,000	
23	Utility relocations	LS	1	\$25,000	\$25,000	
Miscellaneous						\$111,500
24	AB Access Road (12' wide, 6" thick)	LF	3,500	\$15	\$52,500	
25	6' Chain Link Fence	LF	1,800	\$20	\$36,000	
26	Swing Gate	EA	3	\$3,000	\$9,000	
27	Hydroseed Slopes	AC	1	\$3,000	\$3,000	
28	Vegetation Thinning (20' wide)	AC	1.1	\$10,000	\$11,000	
29	Vegetation Removal	AC	0.0	\$25,000	\$0	
Construction Cost Subtotal						\$2,805,250
Environ. Impact Mitigation-Temporary (2.5:1)		AC	0.0	\$375,000	\$0.00	
Environ. Impact Mitigation-Permanent (1:1 - Veg Thinning)		AC	1.1	\$150,000	\$165,000.00	
Environ. Impact Mitigation-Permanent (5:1)		AC	0.0	\$750,000	\$0.00	
Project Contingencies (15%)						\$445,538
Construction Management/Inspection/Biological Monitoring (8%)						\$237,620
Total Project Cost						\$3,653,408
YR 2016 - Total Project Cost ⁽²⁾						\$3,836,078

Notes:

1. Cost and mitigation requirements based on using State DWR Levee Vegetation Policy
2. Based on Construction Cost Index of +2.5% per year (2014 Base year for unit prices)

Exhibit C
Santa Clara River (SCR-3) Levee Improvement Project
Reach 4 - Alternatives Analysis Matrix

Alternative Name	Alternative II.A	Alternative II.B	Alternative II.C	Alternative II.D
Project Description	Floodwall along Riverside of Ventura Road	Floodwall along Landside of Ventura Road and along El Rio Drain. Fill in Wagon Wheel area.	Floodwall along Landside of Ventura Road to UPRR and along Wagon Wheel area.	Floodwall along Landside of Ventura Road to UPRR and fill in Wagon Wheel area.
Flood Protection and Other Benefits	Continuous flood wall Protects Ventura Road from flooding Ability to modify for 200-year event Temporary flood gate at Hwy 101	Reduced height flood wall (max. 6' tall) Permanent flood gate on Ventura Road (6' high) Caltrans and UPRR permits by others Reduced environmental impacts	High and low flood walls Permanent flood gate on Ventura Road (6' high) Permanent flood gate at Wagon Wheel (13' high) Caltrans permit by others Reduced environmental impacts	Reduced height flood wall (max. 6' tall) Permanent flood gate on Ventura Road (6' high) Caltrans permit by others Reduced environmental impacts
Constraints and Other Challenges	High flood wall (up to 22' tall) Caltrans encroachment permit Significant Union Pacific RR coordination Environmental impacts Temporary flood gate <i>Active Operations:</i> temporary flood gate only Potential ponding upstream of Hwy 101	Does not protect Ventura Road from flooding Difficult to modify for 200-year event Defer Wagon Wheel fill until development <i>Active Operations:</i> permanent flood gate Some flooding upstream of Hwy 101	Does not protect Ventura Road from flooding Defer Wagon Wheel Imp. until development Union Pacific RR coordination No levee certification until Wagon Wheel occurs <i>Active Operations:</i> 2 permanent flood gates Some flooding upstream of Hwy 101	Does not protect Ventura Road from flooding Difficult to modify for 200-year event Defer Wagon Wheel fill until development No levee certification until Wagon Wheel occurs Union Pacific RR coordination <i>Active Operations:</i> permanent flood gate Some flooding upstream of Hwy 101
Permit Requirements	Regulatory Permits (USACE, CDFW, RWQCB, NMFS, USFWS) UPRR Encroachment Permit Caltrans Encroachment Permit	Regulatory Permits (USACE, CDFW, RWQCB, NMFS, USFWS)	Regulatory Permits (USACE, CDFW, RWQCB, NMFS, USFWS) UPRR Encroachment Permit Caltrans Encroachment Permit	Regulatory Permits (USACE, CDFW, RWQCB, NMFS, USFWS) UPRR Encroachment Permit
Meets FEMA Requirements?	Yes for entire reach	Yes, downstream of UPRR can be certified separately. Upstream of UPRR with Wagon Wheel Dev.	Yes, all improvements including Wagon Wheel Dev. need to be completed to certify	Yes, all improvements including Wagon Wheel Dev. need to be completed to certify
Capital Cost Estimate	\$10,889,639	\$10,834,600	\$6,727,700	\$6,727,700
Temp Flood Gate (Ventura Rd)	\$2,050,000	\$0	\$0	\$0
Environmental Mitigation	\$1,800,000	\$562,500	\$562,500	\$562,500
Contingency (15%)	\$2,210,946	\$1,709,565	\$1,093,530	\$1,093,530
Construction Management/ Inspection/Bio Monitoring (8%)	\$1,179,171	\$911,768	\$583,216	\$583,216
Total Project Cost - Public Contract	\$18,129,756	\$14,018,433	\$8,966,946	\$8,966,946
YR 2017- Public Project Cost ⁽¹⁾	\$19,489,488	\$15,069,815	\$9,639,467	\$9,639,467
Wagon Wheel Improvements:				
<i>Fill and riprap</i>	\$0	\$3,165,000	\$9,000	\$3,165,000
<i>Flood wall and gate</i>	\$0	\$0	\$3,676,950	\$0
<i>Right-of-way</i>	\$0	\$250,000	\$250,000	\$250,000
Contingency (15%)	\$0	\$512,250	\$590,393	\$512,250
Construction Management/ Inspection/Bio Monitoring (8%)	\$0	\$273,200	\$314,876	\$273,200
Total Project Cost-Developer Contract	\$0	\$4,200,450	\$4,841,219	\$4,200,450
YR 2017-Developer Project Cost ⁽¹⁾	\$0	\$4,515,484	\$5,204,310	\$4,515,484
YR 2017 - Total Project Cost ⁽¹⁾	\$19,489,488	\$19,585,299	\$14,843,777	\$14,154,951

Notes:

1 Based on Construction Cost Index of +2.5% per year (2014 Base year for unit prices)

Exhibit D.1

Santa Clara River (SCR-3) Levee Improvement Project						
Reach 4 - Alternative II.A						
Line Item	Description	Unit	Quantity	Unit Cost	Cost	Category Cost
General						\$727,500
1	Mobilization and Bonding (3%)	LS	1	\$385,000	\$385,000	
2	Clearing and Grubbing	AC	2.5	\$25,000	\$62,500	
3	SWPPP	LS	1	\$30,000	\$30,000	
4	Diversion and Control of Water	LS	1	\$100,000	\$100,000	
5	Traffic Control	LS	1	\$150,000	\$150,000	
Levee and Flood Wall						\$10,117,139
6	RC Flood Wall - Type A2	LF	600	\$5,242	\$3,145,200	
7	RC Flood Wall - Type C2	LF	1,167	\$2,252	\$2,627,617	
8	RC Flood Wall - Type D	LF	830	\$5,053	\$4,194,322	
9	Riprap Removal and Replacment	CY	1,000	\$150	\$150,000	
Miscellaneous						\$45,000
10	6' Chain Link Fence	LF	200	\$20	\$4,000	
11	Swing Gate	EA	1	\$3,000	\$3,000	
12	RC Drain Channel and Flap Gate	EA	1	\$30,000	\$30,000	
13	HP Gas Valve relocations	EA	4	\$2,000	\$8,000	
14	Landscaping	SF	0	\$2.5	\$0	
15	Concrete Trail	SF	0	\$4.0	\$0	
Flood Gate System						\$2,050,000
16	FloodBreak Gate System (13-foot)	LS	1	\$1,600,000	\$1,600,000	
17	Concrete Abutments	LS	1	\$250,000	\$250,000	
18	Street modifications	LS	1	\$150,000	\$150,000	
19	Utility relocations	LS	1	\$50,000	\$50,000	
Public Contract - Construction Cost Subtotal						\$12,939,639
Environmental Impact Mitigation-Temporary (2.5:1)		AC	0.8	\$375,000		\$300,000.00
Environmental Impact Mitigation-Permanent (5:1)		AC	2.0	\$750,000		\$1,500,000.00
Project Contingencies (15%)						\$2,210,946
Construction Management/Inspection/Biological Monitoring (8%)						\$1,179,171
Public Contract - Total Project Cost						\$18,129,756
YR 2017 - Public Contract - Total Project Cost ⁽¹⁾						\$19,489,488
Wagon Wheel Improvements						\$0
20	Import Fill	CY	0	\$15	\$0	
21	Floodwall - Type D (No sheet pile)	LF	0	\$2,503	\$0	
22	FloodBreak Flood gate	EA	0	\$1,500,000	\$0	
23	Riprap Bank Protection	CY	0	\$75	\$0	
24	Right-of-Way	Acre	0	\$500,000	\$0	
Developer Contract - Construction Cost Subtotal						\$0
Project Contingencies (15%)						\$0
Construction Management/Inspection/Biological Monitoring (8%)						\$0
Developer Contract - Total Project Cost						\$0
YR 2017 - Developer Contract - Total Project Cost ⁽¹⁾						\$0
YR 2017 - Total Project Cost ⁽¹⁾						\$19,489,488

Notes:

1. Based on Construction Cost Index of +2.5% per year (2014 Base year for unit prices)

Exhibit D.2

Santa Clara River (SCR-3) Levee Improvement Project						
Reach 4 - Alternative II.B						
Line Item	Description	Unit	Quantity	Unit Cost	Cost	Category Cost
General						\$592,500
1	Mobilization and Bonding (3%)	LS	1	\$325,000	\$325,000	
2	Clearing and Grubbing	AC	2.5	\$25,000	\$62,500	
3	SWPPP	LS	1	\$30,000	\$30,000	
4	Diversion and Control of Water	LS	1	\$75,000	\$75,000	
5	Traffic Control	LS	1	\$100,000	\$100,000	
Levee and Flood Wall						\$8,978,500
6	RC Flood Wall - Type A2	LF	600	\$5,242	\$3,145,200	
7	RC Flood Wall - Type C2	LF	350	\$1,418	\$496,300	
8	RC Flood Wall - Landside and El Rio Drain	LF	4,200	\$1,210	\$5,082,000	
9	Riprap Removal and Replacment	CY	1,700	\$150	\$255,000	
Miscellaneous						\$113,600
10	6' Chain Link Fence	LF	200	\$20	\$4,000	
11	Swing Gate	EA	1	\$3,000	\$3,000	
12	RC Drain Channel and Flap Gate	EA	1	\$30,000	\$30,000	
13	HP Gas Valve relocations	EA	4	\$2,000	\$8,000	
14	Landscaping	SF	14,000	\$2.5	\$35,000	
15	Concrete Trail	SF	8,400	\$4.0	\$33,600	
Flood Gate System						\$1,150,000
16	FloodBreak Gate System (6-foot)	LS	1	\$850,000	\$850,000	
17	Concrete Abutments	LS	1	\$150,000	\$150,000	
18	Street modifications	LS	1	\$100,000	\$100,000	
19	Utility relocations	LS	1	\$50,000	\$50,000	
Public Contract - Construction Cost Subtotal						\$10,834,600
Environmental Impact Mitigation-Temporary (2.5:1)		AC	0.3	\$375,000		\$112,500.00
Environmental Impact Mitigation-Permanent (5:1)		AC	0.6	\$750,000		\$450,000.00
Project Contingencies (15%)						\$1,709,565
Construction Management/Inspection/Biological Monitoring (8%)						\$911,768
Public Contract - Total Project Cost						\$14,018,433
YR 2017 - Public Contract - Total Project Cost ⁽¹⁾						\$15,069,815
Wagon Wheel Improvements						\$3,415,000
20	Import Fill	CY	207,000	\$15	\$3,105,000	
21	Floodwall - Type D (No sheet pile)	LF	0	\$2,503	\$0	
22	FloodBreak Flood gate	EA	0	\$1,500,000	\$0	
23	Riprap Bank Protection	CY	800	\$75	\$60,000	
24	Right-of-Way	Acre	0.5	\$500,000	\$250,000	
Developer Contract - Construction Cost Subtotal						\$3,415,000
Project Contingencies (15%)						\$512,250
Construction Management/Inspection/Biological Monitoring (8%)						\$273,200
Developer Contract - Total Project Cost						\$4,200,450
YR 2017 - Developer Contract - Total Project Cost ⁽¹⁾						\$4,515,484
YR 2017 - Total Project Cost ⁽¹⁾						\$19,585,299

Notes:

1. Based on Construction Cost Index of +2.5% per year (2014 Base year for unit prices)

Exhibit D.3

Santa Clara River (SCR-3) Levee Improvement Project						
Reach 4 - Alternative II.C						
Line Item	Description	Unit	Quantity	Unit Cost	Cost	Category Cost
General						\$472,500
1	Mobilization and Bonding (3%)	LS	1	\$205,000	\$205,000	
2	Clearing and Grubbing	AC	2.5	\$25,000	\$62,500	
3	SWPPP	LS	1	\$30,000	\$30,000	
4	Diversion and Control of Water	LS	1	\$75,000	\$75,000	
5	Traffic Control	LS	1	\$100,000	\$100,000	
Levee and Flood Wall						\$4,991,600
6	RC Flood Wall - Type A2	LF	600	\$5,242	\$3,145,200	
7	RC Flood Wall - Type C2	LF	350	\$1,418	\$496,300	
8	RC Flood Wall - Landside to UPRR	LF	860	\$1,210	\$1,040,600	
9	UPRR Enbankment Fill	CY	300	\$15	\$4,500	
10	El Rio Drain Channel Modifications	LS	1	\$50,000	\$50,000	
11	Riprap Removal and Replacment	CY	1,700	\$150	\$255,000	
Miscellaneous						\$113,600
12	6' Chain Link Fence	LF	200	\$20	\$4,000	
13	Swing Gate	EA	1	\$3,000	\$3,000	
14	RC Drain Channel and Flap Gate	EA	1	\$30,000	\$30,000	
15	HP Gas Valve relocations	EA	4	\$2,000	\$8,000	
16	Landscaping	SF	14,000	\$2.5	\$35,000	
17	Concrete Trail	SF	8,400	\$4.0	\$33,600	
Flood Gate System						\$1,150,000
18	FloodBreak Gate System (6-foot)	LS	1	\$850,000	\$850,000	
19	Concrete Abutments	LS	1	\$150,000	\$150,000	
20	Street modifications	LS	1	\$100,000	\$100,000	
21	Utility relocations	LS	1	\$50,000	\$50,000	
Public Contract - Construction Cost Subtotal						\$6,727,700
Environmental Impact Mitigation-Temporary (2.5:1)		AC	0.3	\$375,000		\$112,500.00
Environmental Impact Mitigation-Permanent (5:1)		AC	0.6	\$750,000		\$450,000.00
Project Contingencies (15%)						\$1,093,530
Construction Management/Inspection/Biological Monitoring (8%)						\$583,216
Public Contract - Total Project Cost						\$8,966,946
YR 2017 - Public Contract - Total Project Cost ⁽¹⁾						\$9,639,467
Wagon Wheel Improvements						\$3,935,950
22	Import Fill	CY	600	\$15	\$9,000	
23	Floodwall - Type D (No sheet pile)	LF	650	\$2,503	\$1,626,950	
24	FloodBreak Flood gate (13-foot)	EA	1	\$2,050,000	\$2,050,000	
25	Riprap Bank Protection	CY	0	\$75	\$0	
26	Right-of-Way	Acre	0.5	\$500,000	\$250,000	
Developer Contract - Construction Cost Subtotal						\$3,935,950
Project Contingencies (15%)						\$590,393
Construction Management/Inspection/Biological Monitoring (8%)						\$314,876
Developer Contract - Total Project Cost						\$4,841,219
YR 2017 - Developer Contract - Total Project Cost ⁽¹⁾						\$5,204,310
YR 2017 - Total Project Cost ⁽¹⁾						\$14,843,777

Notes:

1. Based on Construction Cost Index of +2.5% per year (2014 Base year for unit prices)

Exhibit D.4

Santa Clara River (SCR-3) Levee Improvement Project						
Reach 4 - Alternative II.D						
Line Item	Description	Unit	Quantity	Unit Cost	Cost	Category Cost
General						\$472,500
1	Mobilization and Bonding (3%)	LS	1	\$205,000	\$205,000	
2	Clearing and Grubbing	AC	2.5	\$25,000	\$62,500	
3	SWPPP	LS	1	\$30,000	\$30,000	
4	Diversion and Control of Water	LS	1	\$75,000	\$75,000	
5	Traffic Control	LS	1	\$100,000	\$100,000	
Levee and Flood Wall						\$4,991,600
6	RC Flood Wall - Type A2	LF	600	\$5,242	\$3,145,200	
7	RC Flood Wall - Type C2	LF	350	\$1,418	\$496,300	
8	RC Flood Wall - Landside to UPRR	LF	860	\$1,210	\$1,040,600	
9	UPRR Enbankment Fill	CY	300	\$15	\$4,500	
10	El Rio Drain Channel Modifications	LS	1	\$50,000	\$50,000	
11	Riprap Removal and Replacment	CY	1,700	\$150	\$255,000	
Miscellaneous						\$113,600
12	6' Chain Link Fence	LF	200	\$20	\$4,000	
13	Swing Gate	EA	1	\$3,000	\$3,000	
14	RC Drain Channel and Flap Gate	EA	1	\$30,000	\$30,000	
15	HP Gas Valve relocations	EA	4	\$2,000	\$8,000	
16	Landscaping	SF	14,000	\$2.5	\$35,000	
17	Concrete Trail	SF	8,400	\$4.0	\$33,600	
Flood Gate System						\$1,150,000
18	FloodBreak Gate System (6-foot)	LS	1	\$850,000	\$850,000	
19	Concrete Abutments	LS	1	\$150,000	\$150,000	
20	Street modifications	LS	1	\$100,000	\$100,000	
21	Utility relocations	LS	1	\$50,000	\$50,000	
Public Contract - Construction Cost Subtotal						\$6,727,700
Environmental Impact Mitigation-Temporary (2.5:1)		AC	0.3	\$375,000		\$112,500.00
Environmental Impact Mitigation-Permanent (5:1)		AC	0.6	\$750,000		\$450,000.00
Project Contingencies (15%)						\$1,093,530
Construction Management/Inspection/Biological Monitoring (8%)						\$583,216
Public Contract - Total Project Cost						\$8,966,946
YR 2017 - Public Contract - Total Project Cost ⁽¹⁾						\$9,639,467
Wagon Wheel Improvements						\$3,415,000
22	Import Fill	CY	207,000	\$15	\$3,105,000	
23	Floodwall - Type D (No sheet pile)	LF	0	\$2,503	\$0	
24	FloodBreak Flood gate (13-foot)	EA	0	\$2,050,000	\$0	
25	Riprap Bank Protection	CY	800	\$75	\$60,000	
26	Right-of-Way	Acre	0.5	\$500,000	\$250,000	
Developer Contract - Construction Cost Subtotal						\$3,415,000
Project Contingencies (15%)						\$512,250
Construction Management/Inspection/Biological Monitoring (8%)						\$273,200
Developer Contract - Total Project Cost						\$4,200,450
YR 2017 - Developer Contract - Total Project Cost ⁽¹⁾						\$4,515,484
YR 2017 - Total Project Cost ⁽¹⁾						\$14,154,951

Notes:

1. Based on Construction Cost Index of +2.5% per year (2014 Base year for unit prices)

Exhibit E
SCR-3 Evaluation Matrices
Total Cost Matrix
(\$ million)

Alternative		Reach 4			
		II.A	II.B	II.C	II.D
Reach 1-3	I.A	\$25.5	\$25.6	\$20.8	\$20.1
	I.B	\$25.0	\$25.1	\$20.3	\$19.6
	I.C	\$23.4	\$23.5	\$18.7	\$18.0

Alternative Cost: (millions)

I.A	\$6.0
I.B	\$5.5
I.C	\$3.9
II.A	\$19.5
II.B	\$19.6
II.C	\$14.8
II.D	\$14.1

Exhibit F
SCR-3 Evaluation Matrices
Schedule Matrix

Alternative	2014				2015				2016				2017				2018 ⁽¹⁾			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Reaches 1-3																				
I.A	Design & Construction																			
	Environmental/Permitting																			
I.B	Design & Construction																			
	Environmental/Permitting																			
I.C	Design & Construction																			
	Environmental/Permitting																			
Reach 4																				
II.A	Design & Construction																			
	Environmental/Permitting																			
II.B	Design & Construction																			
	Environmental/Permitting																			
II.C	Design & Construction																			
	Environmental/Permitting																			
II.D	Design & Construction ⁽²⁾																			
	Environmental/Permitting																			

Notes:

- 1 Anticipated early effective date for new Digital Flood Insurance Rate Maps (DFIRMs) - January 2018
- 2 Reach 4 - Alternative D would not provide for an accredited levee system without the Wagon Wheel Improvements

Exhibit G
SCR-3 Evaluation Matrices
Regulatory Matrix

Alternative	Environmental						Stakeholder Agencies				Total Permits Required
	CEQA / NEPA	USACE 404 Permit	CDFW 1600	RWQCB 401 Certification	NMFS - Consultation	USFWS	UPRR Agreement	Caltrans Encroachment Permit	VRSD Permit	City of Oxnard - Golf Course Permit	
Reaches 1-3											
I.A	X	X	X	X	X	X			X	X	8
I.B	X	X	X	X	X	X			X	X	8
I.C	X	X	X	X	X	X			X		7
Reach 4											
II.A	X	X	X	X	X	X	X	X			8
II.B	X	X	X	X	X	X					6
II.C	X	X	X	X	X	X	X	X			8
II.D	X	X	X	X	X	X	X				7

**Exhibit H
SCR-3 Evaluation Matrices
Risk Matrix**

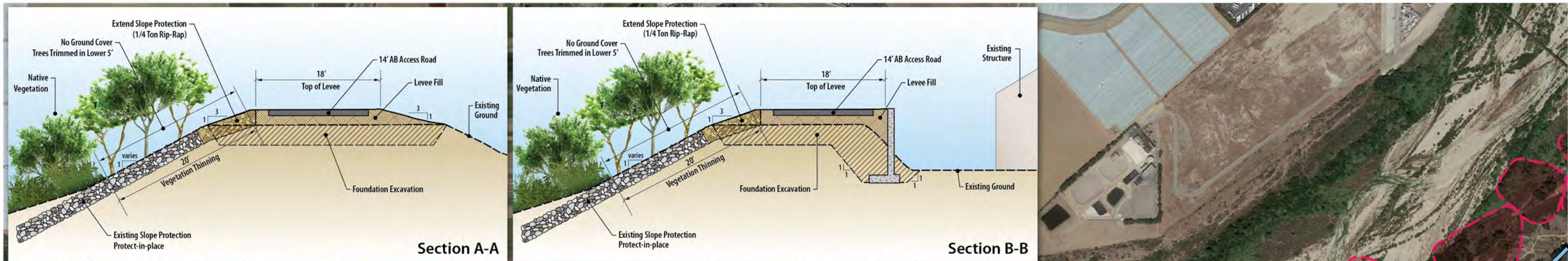
Alternative	FEMA Criteria						Street Flooding/Closures	Adherence to Schedule	Permit Requirements	Total Project Cost	Construction Complexity	Robustness & Resiliency	Score
	Freeboard	Closures	Embankment Protection	Stability/Settlement	Interior Drainage	Operations and Maintenance							
Weighting	1	1	1	1	1	1	2	2	3	3	2	3	
Reaches 1-3													
I.A	Low	Low	Medium	Low	Low	Low	Low	Low	Low	High	Low	Low	35
I.B	Medium	High	Medium	Low	Low	Medium	Low	Medium	Low	Medium	Medium	Medium	51
I.C	Medium	Medium	Medium	Low	Low	High	Low	Medium	Low	Low	Medium	High	51
Reach 4													
II.A	Low	Low	Low	Low	Low	Low	Low	High	High	High	High	Medium	67
II.B	Low	Medium	Low	Low	Low	Low	High	Low	Medium	High	Low	Low	49
II.C	Low	High	Low	Low	Low	Medium	High	Medium	Medium	Medium	Medium	Medium	61
II.D	Low	Medium	Low	Low	Low	Low	High	Low	Medium	Low	Low	Low	37

Scoring: (Higher number = high risk, lower number = low risk)

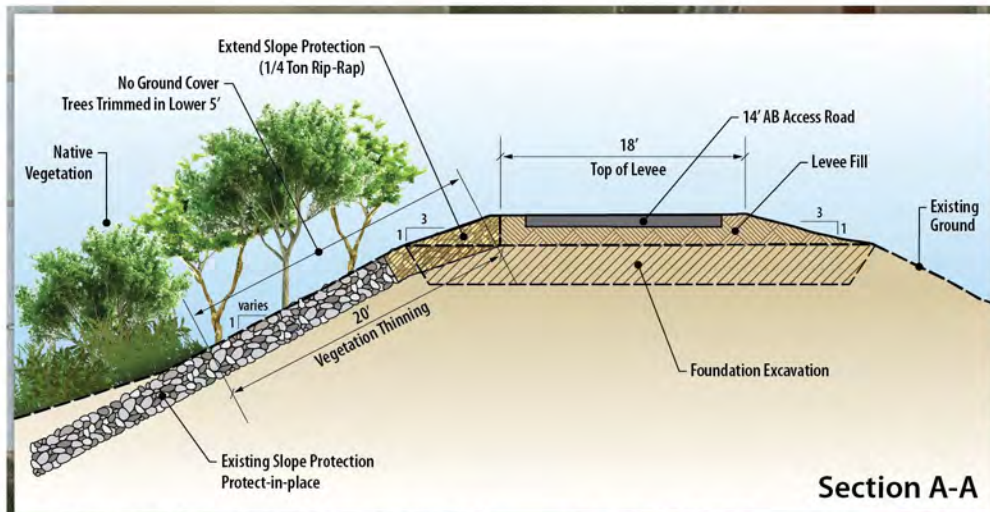
- Low 1
- Medium 3
- High 5
- NA 0

Total Risk Summary Matrix

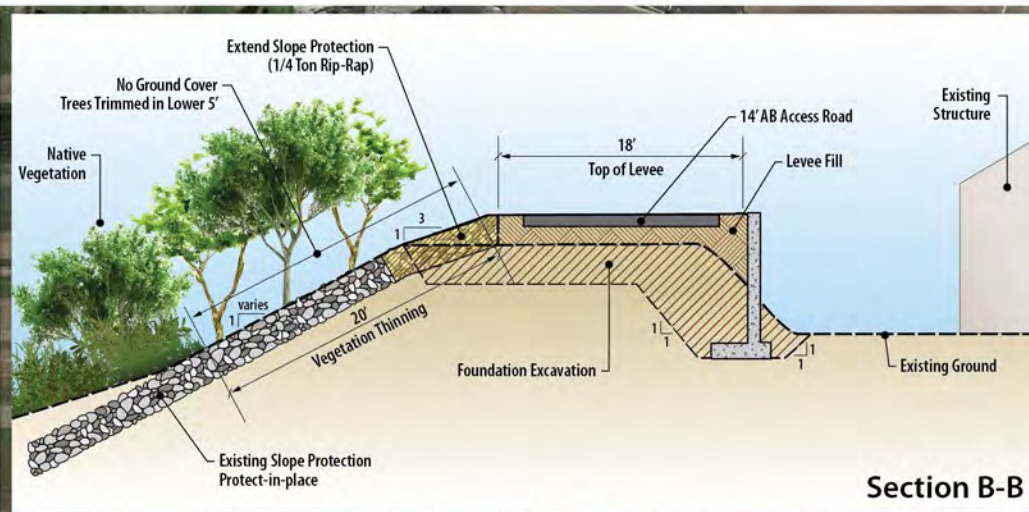
Alternative	Reach 4				
	II.A	II.B	II.C	II.D	
Reach 1-3	I.A	102	84	96	72
	I.B	118	100	112	88
	I.C	118	100	112	88



Source: Google Earth Pro Aerial, 2010.



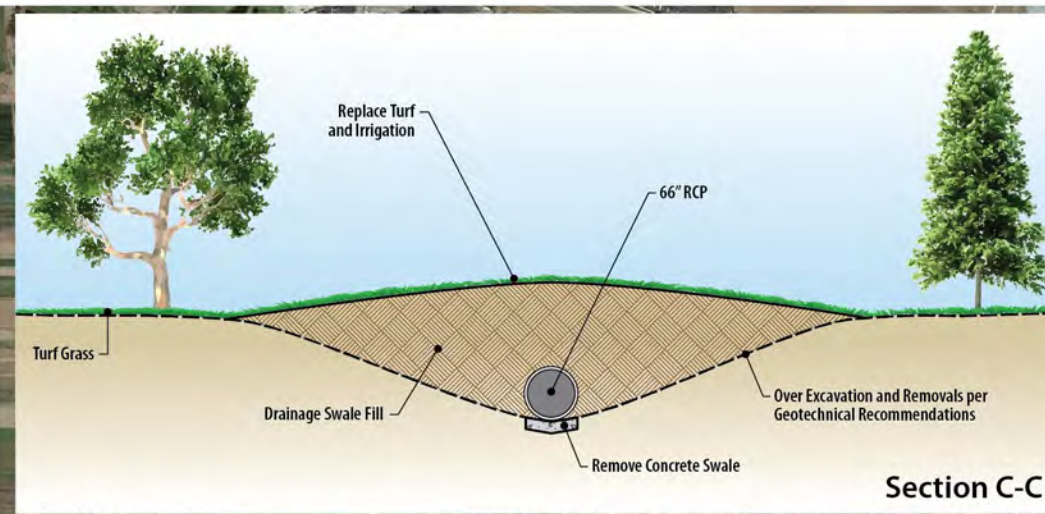
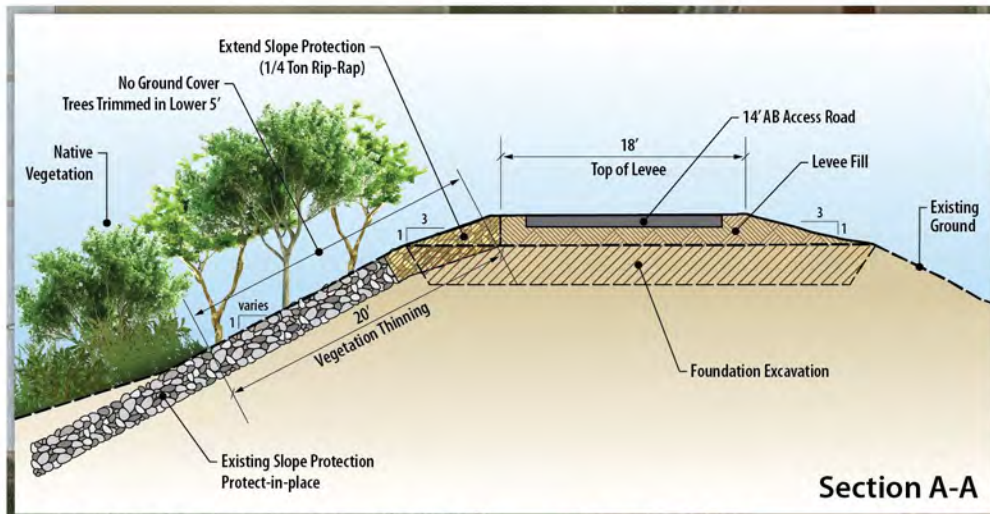
Section A-A



Section B-B



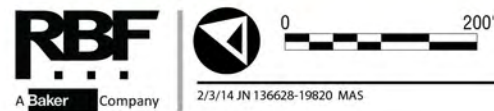
Source: Google Earth Pro Aerial, 2010.



Source: Google Earth Pro Aerial, 2010.



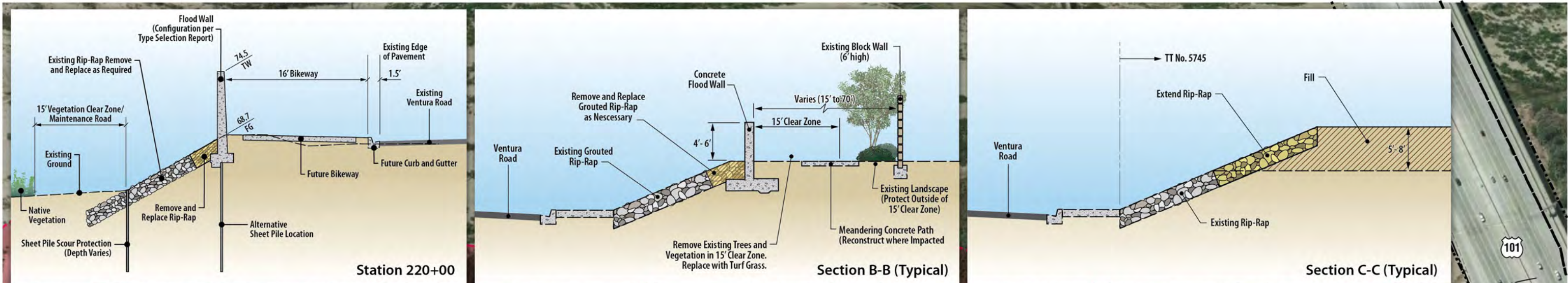
Source: Eagle Aerial 2010



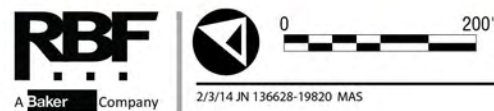
2/3/14 JN 136628-19820 MAS

SANTA CLARA RIVER (SCR-3) LEVEES
Reach 4 • Alternative II.A

Figure 6



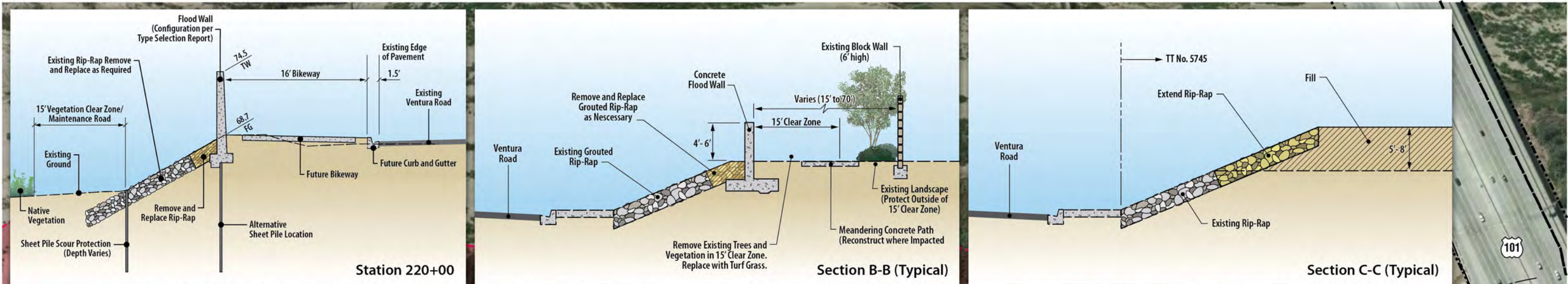
Source: Eagle Aerial 2010



SANTA CLARA RIVER (SCR-3) LEVEES

Reach 4 • Alternative II.B

Figure 7

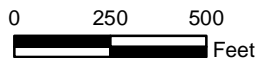


Source: Eagle Aerial 2010





2/4/2014 JN M:\data\136628\GIS\MXD\Ex2_WaterSurfaceElevation.mxd



Source: County of Ventura, Eagle Aerial Imaging -- 2010

SANTA CLARA RIVER
76.14-foot Water Surface Elevation

Figure 11