APPENDIX D

Quantites & Cost Estimate

Quincy Engineering, Inc.

GENERAL PLAN 25% CONTINGENCY

Date: 5-19-2014

Project Name	Rumsey Bridge Retrofit	Project. No.	Y01-500
Bridge Name	Cache Creek Bridge (Alternative 1)	Bridge Q's By	J. Chou
Bridge. No.	22C-0003	Bridge Check Q's By	G. Young / J. Olson

Item No.		Item Code	Item Description	Unit	Quantity	Unit Price	Total
1		157596	TEMPORARY BRIDGE	LS	LUMP SUM	$2,000,000.00	$ 2,000,000.00
2	(F)	192020	STRUCTURE EXCAVATION (TYPE D)	CY	1600	$ 300.00	$ 480,000.00
3	(F)	193003	STRUCTURE BACKFILL (BRIDGE)	CY	850	$ 150.00	$ 127,500.00
4	(F)	510053	STRUCTURAL CONCRETE, BRIDGE	CY	60	$ 3,000.00	$ 180,000.00
5	(F)	510051	STRUCTURAL CONCRETE, BRIDGE FOOTING	CY	510	$ 1,500.00	$ 765,000.00
6		500001	PRESTRESSING CAST-IN-PLACE CONCRETE	LS	LUMP SUM	$ 100,000.00	$ 100,000.00
7	(F)	520102	BAR REINFORCING STEEL (BRIDGE)	LB	174000	$ 1.30	$ 226,200.00
8		490609	60" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	280	$ 2,000.00	$ 560,000.00
9		490616	84" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	660	$ 2,200.00	$ 1,452,000.00
10		153223	REMOVE UNSOUND CONCRETE	CF	250	$ 50.00	$ 12,500.00
11		150312	REPAIR SPALLED SURFACE AREA	SQFT	950	$ 300.00	$ 285,000.00
12		157587	FIBER-WRAP	SQFT	32800	$ 26.50	$ 869,200.00
13		157590	CLEAN BRIDGE DECK	SF	6260	$ 5.00	$ 31,300.00
14		153227	FURNISH POLYESTER CONCRETE OVERLAY	CF	20	$ 3,000.00	$ 60,000.00
15	(F)	153228	PLACE POLYESTER CONCRETE OVERLAY	SQFT	6260	$ 10.00	$ 62,600.00
16		157593	RECONSTRUCT CONCRETE BARRIER RAIL	LF	780	$ 250.00	$ 195,000.00
17		157594	REHABILITAITON OF EXISTING RSP	LS	LUMP SUM	$ 80,000.00	$ 80,000.00
18		157595	APPROACH ROADWAY REHABILIATION	LS	LUMP SUM	$ 150,000.00	$ 150,000.00
19		999990	MOBILIZATION	LS	LUMP SUM	$ 763,630.00	$ 763,630.00
					SUBTOTAL CONTRACT		$ 8,399,930.00
		SUPPLEMENTAL WORK					
20		066015	FEDERAL TRAINEE PROGRAM	LS	LUMP SUM	$ 800.00	$ 800.00
21		157597	FOUNDATION INSTALLATION (BURIED MANMADE OBJECTS)	LS	LUMP SUM	$ 240,000.00	$ 240,000.00
					SUBTOTAL SUPPLEMENTAL WORK		$ 240,800.00
						SUBTOTAL	$ 8,640,730.00
				CONTINGENCIES		25%	$ 2,159,270.00
				TOTAL			**$10,800,000.00**

Quincy Engineering, Inc.

GENERAL PLAN 25% CONTINGENCY

Date: 5-19-2014

Project Name	Rumsey Bridge - Replacement on New Tangent Algnment	Project. No.	Y01-500
Bridge Name	Cache Creek Bridge (Alternative 2)	Bridge Q's By	J. Chou
Bridge. No.	22C-0003	Bridge Check Q's By	G. Young / J. Olson

Item No.		Item Code	Item Description	Unit	Quantity	Unit Price	Total
1	(F)	192020	STRUCTURE EXCAVATION (TYPE D)	CY	210	$ 300.00	$ 63,000.00
2	(F)	193003	STRUCTURE BACKFILL (BRIDGE)	CY	110	$ 150.00	$ 16,500.00
3		490620	108" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	240	$ 2,500.00	$ 600,000.00
4	(F)	510051	STRUCTURAL CONCRETE, BRIDGE FOOTING	CY	50	$ 450.00	$ 22,500.00
5	(F)	510053	STRUCTURAL CONCRETE, BRIDGE	CY	1130	$ 1,100.00	$ 1,243,000.00
6	(F)	510085	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE EQ)	CY	46.25	$ 800.00	$ 37,000.00
7		500001	PRESTRESSING CAST-IN-PLACE CONCRETE	LS	LUMP SUM	$ 80,000.00	$ 80,000.00
8		519100	JOINT SEAL (MR 2")	LF	62	$ 80.00	$ 4,960.00
9	(F)	520101	BAR REINFORCING STEEL	LB	255000	$ 1.30	$ 331,500.00
10	(F)	839720	CONCRETE BARRIER (TYPE 732)	LF	880	$ 80.00	$ 70,400.00
11		044357	TUBULAR BICYCLE RAILING	LF	880	$ 120.00	$ 105,600.00
12		157594	REHABILITAITON OF EXISTING RSP	LS	LUMP SUM	$ 80,000.00	$ 80,000.00
13		190101	ROADWAY EXCAVATION	CY	300	$ 30.00	$ 9,000.00
14		198010	IMPORTED BORROW (CY)	CY	1500	$ 70.00	$ 105,000.00
15		260203	CLASS 2 AGGREGATE BASE (CY)	CY	190	$ 150.00	$ 28,500.00
16		390132	HOT MIX ASPHALT (TYPE A)	TON	250	$ 300.00	$ 75,000.00
17		999990	MOBILIZATION	LS	LUMP SUM	$ 287,196.00	$ 287,196.00
					SUBTOTAL CONTRACT		$ 3,159,156.00
		SUPPLEMENTAL WORK					
18		066015	FEDERAL TRAINEE PROGRAM	LS	LUMP SUM	$ 800.00	$ 800.00
						SUBTOTAL SUPPLEMENTAL WORK	$ 800.00
						SUBTOTAL	$ 3,159,956.00
				CONTINGENCIES		25%	$ 800,000.00
				TOTAL			**$ 3,900,000.00**

Quincy Engineering, Inc.

GENERAL PLAN 25% CONTINGENCY

Date: 5-19-2014

Project Name	Rumsey Bridge - Replacement on New Tangent Algnment	Project. No.	Y01-500
Bridge Name	Cache Creek Bridge (Alternative 3)	Bridge Q's By	J. Chou
Bridge. No.	22C-0003	Bridge Check Q's By	G. Young / J. Olson

Item No.		Item Code	Item Description	Unit	Quantity	Unit Price	Total
1		157550	BRIDGE REMOVAL	LS	1	$ 400,000.00	$ 400,000.00
2	(F)	192020	STRUCTURE EXCAVATION (TYPE D)	CY	210	$ 300.00	$ 63,000.00
3	(F)	193003	STRUCTURE BACKFILL (BRIDGE)	CY	110	$ 150.00	$ 16,500.00
4		490620	108" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	240	$ 2,500.00	$ 600,000.00
5	(F)	510051	STRUCTURAL CONCRETE, BRIDGE FOOTING	CY	50	$ 450.00	$ 22,500.00
6	(F)	510053	STRUCTURAL CONCRETE, BRIDGE	CY	1130	$ 1,100.00	$ 1,243,000.00
7	(F)	510085	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE EQ)	CY	46.25	$ 800.00	$ 37,000.00
8		500001	PRESTRESSING CAST-IN-PLACE CONCRETE	LS	LUMP SUM	$ 80,000.00	$ 80,000.00
9		519100	JOINT SEAL (MR 2")	LF	62	$ 80.00	$ 4,960.00
10	(F)	520101	BAR REINFORCING STEEL	LB	255000	$ 1.30	$ 331,500.00
11	(F)	839720	CONCRETE BARRIER (TYPE 732)	LF	880	$ 80.00	$ 70,400.00
12		044357	TUBULAR BICYCLE RAILING	LF	880	$ 120.00	$ 105,600.00
13		157594	REHABILITAITON OF EXISTING RSP	LS	LUMP SUM	$ 80,000.00	$ 80,000.00
14		190101	ROADWAY EXCAVATION	CY	300	$ 30.00	$ 9,000.00
15		198010	IMPORTED BORROW (CY)	CY	1500	$ 70.00	$ 105,000.00
16		260203	CLASS 2 AGGREGATE BASE (CY)	CY	190	$ 150.00	$ 28,500.00
17		390132	HOT MIX ASPHALT (TYPE A)	TON	250	$ 300.00	$ 75,000.00
18		999990	MOBILIZATION	LS	LUMP SUM	$ 327,196.00	$ 327,196.00
					SUBTOTAL CONTRACT		$ 3,599,156.00
		SUPPLEMENTAL WORK					
19		066015	FEDERAL TRAINEE PROGRAM	LS	LUMP SUM	$ 800.00	$ 800.00
					SUBTOTAL SUPPLEMENTAL WORK		$ 800.00
						SUBTOTAL	$ 3,599,956.00
				CONTINGENCIES		25%	$ 900,044.00
				TOTAL			**$ 4,500,000.00**

Rumsey Bridge Estimate -- Retrofit Alterative
6-10-2014

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Repair Spalled Surface Area [SF]

Work includes epoxy injection, installing of new concrete screws (one at every square foot patch), placing bond coat between existing concrete and patch, and setting concrete patch. Work also includes protecting the existing reinforcing bars and cleaning the reinforcing bars by abrasive blasting.

Arch Rib – Repair Area Estimation:

(Assume 1 of the four Arch faces requires repair) (Assume conservatively 0.33 of that one faces require repair) (112 ft Arch length at CL of arch EA) (27"/12' width of Arch) (2 Arches per span) (2 Spans) = 333 SF

Vertical Hanger – Repair Area Estimation:

(Assume one of the four Vertical Hanger faces requires repair) (Assume conservatively 0.25 of that one faces require repair) (18 ft average Hanger length EA) (20"/12' width of Hanger) (6 Hanger per face) (2 faces per span) (2 Spans) = 180 SF

Average vertical hanger length = (14.3' + 18.7' + 20.8' + 20.8' + 18.7' 14.3') / 6 = 18'

Portal Bracing – Repair Area Estimation:

(Assume one of the four Portal Bracing faces requires repair) (Assume conservatively 1/8 of that one face require repair) (22.5 ft Portal length EA) (24"/12' width of Arch) (4 portals total) = 22 SF

Tie Girder – Repair Area Estimation:

(Assume 1 of the four Tie Girder faces requires repair) (Assume conservatively 0.50 of that one face requires repair) (108 ft Tie Girder length EA) (23"/12' width of Tie Girder) (2 Tie Girder per span) (2 Spans) = 414 SF

Other Bridge Elements – Repair Area Estimation:

Other bridge elements such as the floor beam have minor areas of work. The conservatism built-in to the previous estimated bridge elements will capture the minor area of work not accounted for. The bridge substructure generally is in good shape.

Sum = 333 SF + 180 SF + 22 SF + 414 SF = 949 SF

Say = 950 SF

Estimated price = $300

Based on Caltrans bid history, the average adjusted Repair Spalled Surface Area cost is around $620/SF. However, most of the bid history came from smaller projects. Accounting for economy of scale (Caltrans history has a 400 SF project at $200/SF), use $300/SF for Rumsey Bridge.

☑	150312 - REPAIR SPALLED SURFACE AREA	SQFT	03	80	$400.00
☑	150312 - REPAIR SPALLED SURFACE AREA	SQFT	03	80	$45.00
☑	150312 - REPAIR SPALLED SURFACE AREA	SQFT	03	80	$39.00

uncheck all | check all

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	623.83	**623.83**	Avg No. Units	994
Std Dev. (of Unit Price): ±$	1,638.76	**1,638.76**	Rows Selected	143
Weighted Avg.: $	29.03	**29.03**	Rows Returned	143
Minimum Price/Unit: $	1.00	1.00		
Maximum Price/Unit: $	18,360.00	18,360.00		

Stevenson Bridge –Area of Repair Required is much smaller than Rumsey Bridge:

In 2007, the Stevenson Bridge unit price for Repair Spalled Surface Area is $200/SF, the estimated area of repair is 100SF. As shown in the Stevenson photos below, the concrete is in much better condition than that of the Rumsey Bridge, which totals to $20k for the Stevenson Bridge. (Compared to $285k for the Rumsey Bridge)

Remove Unsound Concrete [SF]

Assume conservatively that the area of Remove Unsound Concrete is approximately 25% of the Repair Spalled Surface Area

(949 SF) (0.25) = 237

Say = 250 SF

Estimated price = $50/SF

Based on Caltrans bid history, the average adjusted Remove Unsound Concrete Area is around $50.

☑	153223 - REMOVE UNSOUND CONCRETE	SQFT	10	425	$60.00
☑	153223 - REMOVE UNSOUND CONCRETE	SQFT	10	425	$40.00
☑	153223 - REMOVE UNSOUND CONCRETE	SQFT	10	425	$50.00
☑	153223 - REMOVE UNSOUND CONCRETE	SQFT	10	425	$80.00

uncheck all | check all

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	50.55	**52.29**	Avg No. Units	376
Std Dev. (of Unit Price): ±$	17.28	**23.09**	Rows Selected	7
Weighted Avg.: $	48.84	**46.86**	Rows Returned	7
Minimum Price/Unit: $	30.00	28.09		
Maximum Price/Unit: $	80.00	94.55		

Stevenson Bridge – Remove Unsound Concrete is much smaller than Rumsey Bridge:

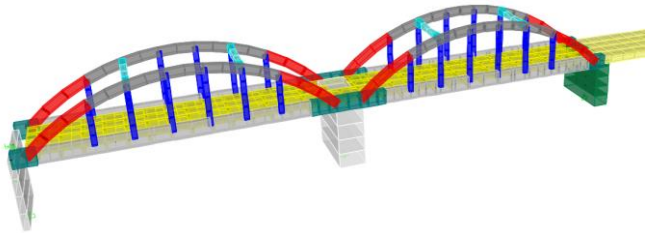
As shown in the Stevenson photos previously, the concrete is in much better condition than that of the Rumsey Bridge. In 2007, the Stevenson Bridge unit price for Repair Spalled Surface was $100/SF. The estimated area of repair was 100SF, which totals to $10k. (Compared to $12.5k for the Rumsey Bridge)

Fiber Wrap [SF]

Arch Rib – FRP Area Estimation:

(25 ft Arch Rib length at CL of arch from Spring line to first column EA) [(27"/12' width of Arch) (2 sides) + (36"/12' depth of Arch)) (2 sides)] (2 Arches per span) (2 Spans) = 1,050 SF

(1,050 SF) [(5 layers + 8 layers)/2 + 2 layers] = 8,925 SF



Based on the preliminary feasibility analysis performed for this study, the following FRP sizes are estimated: On the top and bottom (strong axis fibers) of the arch, approximately 5 Layers of 0.04" of the Fyfe's Fyfo SCH-41 Carbon FRP system (Total 0.08") will be applied to limit FRP strain demand. Though, in the strong axis FRP for strengthening improvement is not required, per the manufacturer's FRP elongation limits, the calculated deformation base on stress strain requires 2 layers of FRP on the strong axis.

On the side faces (inside and outside faces / weak axis fibers) of the arch, approximately 8 Layers of 0.04" FRP (Total 0.32") will be applied to increase the arch's minor axis flexural capacity. The strain and stress limit based on manufacturer's design limit are met. At the spring line outside face (exterior of bridge), the FRP must bonded to the Tie Girder and lapped with the Tie Girder FRP to develop the FRP strength.

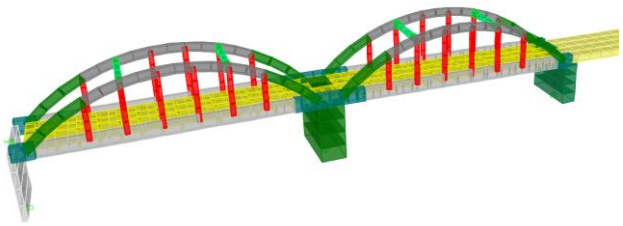
At the spring line inside face (interior of bridge), the FRP must to be fed through a drilled hole on the deck and make bonded to the Tie Girder. Lastly, 2 layers of FRP will be bonded in the perpendicular direction and wrap around the arch section to provide additional confinement and continuity. The red block above indicates the approximate location of where the Arch will be retrofitted.

Vertical Hanger – FRP Area Estimation:

Average vertical hanger length = (14.3’ + 18.7’ + 20.8’ + 20.8’ + 18.7’ 14.3’) / 6 = 18’

(18 ft average Vertical Hanger length EA) [(20”/12’ width of Hanger) (2 sides) + (15”/12’ width of Hanger)) (2 sides) (6 Hanger per face) (2 faces per span) (2 Spans) = 2,520 SF

(2,520 SF) [(6 layers + 3 layers)/2 + 2 layers] = 16,925 SF

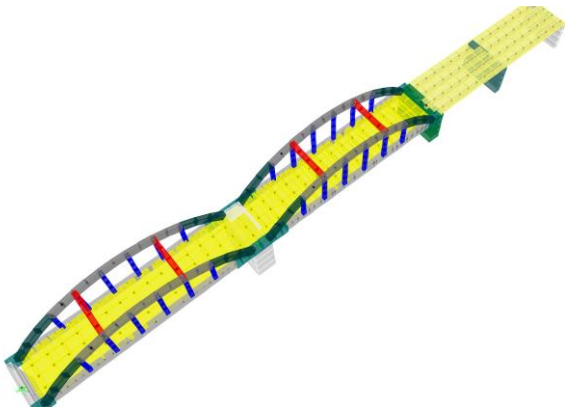


The Vertical Hanger Retrofit entails applying FRP on the exterior of the Hangers for flexural and shear strength. On the top and bottom (strong axis fibers) of the arch, 6 Layers of 0.04” FRP (Total 0.24”) is required to increase the hanger’s major axis flexural capacity. On the side faces (inside and outside / weak axis fibers) of the Hanger, 3 Layers of 0.04” FRP (Total 0.12”) will be applied to increase the hanger’s minor axis flexural capacity. Additionally, 2 layers of FRP will be bonded in the perpendicular direction and wrap around the Arch section.

Portal Bracing – FRP Area Estimation:

(22.5 ft Portal Bracing length EA) [(24"/12' width of Portal) (2 sides) + (36"/12' height conservative for variable depth overlap)(2 sides)] (4 Portals total) = 900 SF

(900 SF) [(4 layers + 4 layers)/2 + 2 layers] = 5,400 SF

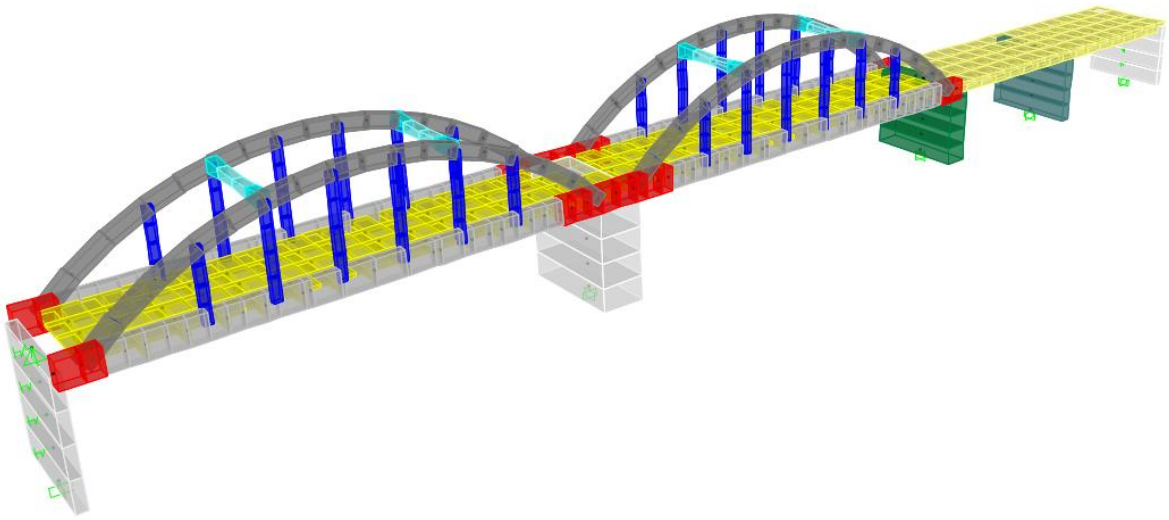


The Portal Retrofit entails applying FRP on the exterior of the Portal Bracing for flexural and shear strength. On the top and bottom (strong axis fibers) of the Portal Bracing, 4 Layers of 0.04" FRP (Total 0.16") applied to increase the Portal's major axis flexural capacity. On the side faces (inside and outside / weak axis fibers) of the Portal, 4 Layers of 0.04" FRP (Total 0.16") will be applied to increase the Portal's minor axis flexural capacity. Additionally, 2 layers of FRP will be bonded in the perpendicular direction and wrap around the arch section.

Tie Girder – FRP Area Estimation:

(24 ft + 48 ft + 24 ft Tie Girder length conservative for development bond length) (63”/12’ height of Tie Girder) (2 Girders) = 1,008 SF

(1,008 SF) (2 layers) = 2,016 SF



The Tie Girder Retrofit entails bolstering the interior of the Tie Girders and applying FRP on the exterior of the Tie Girder for strength. The interior bolster will include drill and bond #5 dowels at 12” spacing (horizontally and vertically) to create a composite section of the existing Tie Girder. A total of 7 #9 bars will be placed on the inside face of the girder. The internal floor beams must be cored for the #9 bars to pass through the floor beam. On the out face of the Tie Girder, 2 Layers of 0.04” FRP (Total 0.08”) will be applied to increase bending strength in the opposite direction.

This strategy allows the retrofit to be applied where is needed. The red sections above indicate the approximate location of where the Tie Girder will be retrofitted.

Sum = 8,925 SF + 16,380 SF + 5,400 SF + 2,016 SF = 5478 SF

= 32,720 Say = 32,800 SF to account for development laps and ties.

Estimated price = $ 26.50/SF Based on Fyfe's presentation workshop info below.

While the cost varies significantly based on the location of the work and how much work is required, Fyfe provided the following common cost of wrap:

$25/SF per carbon Layer

Add $1-2/SF for UV protection

Add $5-15/SF for fire rating protection (for information only. Not required for this project)

Based on Caltrans bid history, there have been few FRP projects. The FRP bid item names also are different. The average adjusted prices are listed below. The FRP unit costs obtained from Caltrans bid history are for information only.

GLASS FIBER REINFORCED POLYMER REPAIR (EPOXY INJECTION)	Price $77/SF	Qty 50 SF
WET LAY-UP GLASS FIBER REINFORCED POLYMER COMPOSITE	Price $60/SF	Qty 1650 SF
FIBER REINFORCED POLYMER STRIP	Price $30/SF	Qty 2950 SF
PREPARE FIBER REINFORCED POLYMER DECK SURFACE	Price $2/SF	Qty 8050 SF
FURNISH FIBER REINFORCED POLYMER DECK PANEL 5" THICK	Price $116/SF	Qty 8600 SF
FIBER REINFORCED PLASTIC (FRP) DECKING	Price $60/SF	Qty 60 SF
610 FIBER REINFORCED PLASTIC (FRP) DECKING	Price $60/SF	Qty 60 SF

Stevenson Bridge - Fiber Wrap:

In 2007, the Stevenson Bridge unit price for Fiber-Wrap was $50/SF, with an estimated area of repair of 6,492 SF. As shown in the Stevenson photos previously, the concrete is in much better condition than that of the Rumsey Bridge. The cost was $325k. (Compared to $869k for the Rumsey Bridge.)

Reconstruct Bridge Railing [LF]

Bridge Length = [(311' of Total Bridge Length from Abut1 to Abut5) (2 EA) + (50' Abut1 WW) (2 side) + (25' Abut5 WW by scale) (2 EA)] = 772 ft

Say 780 LF

Estimated price = $250/LF

Based on Caltrans bid history, the Reconstruct Bridge Railing is $100/LF. However, for the Rumsey project, reconstructing the bridge railing to match the existing appearance requires specialized forms. Therefore, a higher unit price is used. Note: Reconstruction of the bridge railing is required to fully wrap the FRP full height of the Vertical Hanger.

	Item No. / Description	Unit	Dist	Qty	Unit Price	Adj Price
☑	045104 - RECONSTRUCT BRIDGE RAILING	LF	07	56	$75.00	$157.61
☑	033412 - RECONSTRUCT BRIDGE RAILING	LF	04	150	$83.00	$174.43
☑	043637 - RECONSTRUCT BRIDGE RAILING	LF	02	600	$50.00	$57.38
☑	043637 - RECONSTRUCT BRIDGE RAILING	LF	02	600	$27.00	$30.99
☑	043637 - RECONSTRUCT BRIDGE RAILING	LF	02	600	$35.00	$40.17
☑	043637 - RECONSTRUCT BRIDGE RAILING	LF	02	600	$50.99	$58.52
☑	043637 - RECONSTRUCT BRIDGE RAILING	LF	02	600	$125.00	$143.45

Stevenson Bridge - Refinish Bridge Railing:

In 2007, the Stevenson Bridge unit price for Refinish Bridge Railing was $150/SF, with an estimated area of repair of $647/LF. As shown in the Stevenson photos previously, the concrete is in much better condition than that of the Rumsey Bridge, which totals to $97k for the Stevenson Bridge. (Compared to $195k Reconstruct Bridge Railing for the Rumsey Bridge.) Note: Stevenson Bridge does not have a reconstruct concrete barrier rail as an item.

Furnish Polyester Concrete Overlay (1") [CY]

Bridge Area = (313' Total Bridge Length from Abut1 to Abut5) (20' deck width) = 6,260 SF

x 1"/12 / 27CY

= 19.3 CY

Say 20 CY

Estimated price = $3,000/CY

Based on Caltrans bid history, the average adjusted Furnish Polyester Concrete Overlay is around $2,250. Accounting for remote location, use $3,000/CY for Rumsey Bridge.

☑	515041 - FURNISH POLYESTER CONCRETE OVERLAY	CY	11	8	$3631.64	$3076.21
☑	515041 - FURNISH POLYESTER CONCRETE OVERLAY	CY	11	8	$2293.66	$1942.87
☑	515041 - FURNISH POLYESTER CONCRETE OVERLAY	CY	01	31.1	$2675.94	$2266.68
☑	515041 - FURNISH POLYESTER CONCRETE OVERLAY	CY	01	31.1	$4510.87	$3820.98
	MORE THAN 500 RESULTS RETURNED. ONLY 500 ROWS SHOWN.					

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SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	2,281.76	**2,250.13**	Avg No. Units	173
Std Dev. (of Unit Price): ±$	1,661.15	**2,450.92**	Rows Selected	500
Weighted Avg.: $	1,769.13	**1,687.91**	Rows Returned	500
Minimum Price/Unit: $	611.64	435.04		
Maximum Price/Unit: $	27,000.00	46,894.74		

Stevenson Bridge - Furnish Polyester Concrete Overlay (1"):

In 2007, the Stevenson Bridge unit price for Furnish Polyester Concrete Overlay (1") was $3000/CY, the estimated area of repair was 19 CY, which totals to $57k. (Compared to $60k for the Rumsey Bridge.)

Place Polyester Concrete Overlay [SF]

Bridge Area = (313' Total Bridge Length from Abut1 to Abut5) (20' deck width) = 6,220 SF

Say 6,260 SF

Estimated price = $10/SF

Based on Caltrans bid history, the average adjusted Place Polyester Concrete Overlay is around $9/SF. Accounting for remote location, use $10/SF for Rumsey Bridge.

☑	153228 - PLACE POLYESTER CONCRETE OVERLAY	SQFT	08	38000	$3.5
☑	153228 - PLACE POLYESTER CONCRETE OVERLAY	SQFT	10	9339	$5.5
☑	153228 - PLACE POLYESTER CONCRETE OVERLAY	SQFT	10	9339	$15.0
☑	153228 - PLACE POLYESTER CONCRETE OVERLAY	SQFT	10	9339	$5.0
☑	153228 - PLACE POLYESTER CONCRETE OVERLAY	SQFT	10	9339	$8.0

uncheck all | check all

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	8.55	**8.55**	Avg No. Units	37946
Std Dev. (of Unit Price): ±$	46.80	**46.80**	Rows Selected	202
Weighted Avg.: $	2.67	**2.67**	Rows Returned	202
Minimum Price/Unit: $	0.50	0.50		
Maximum Price/Unit: $	500.00	500.00		

Stevenson Bridge - Place Polyester Concrete Overlay:

In 2007, the Stevenson Bridge unit price for Place Polyester Concrete Overlay (1") was $10 /SF, the estimated area of repair was 6,068 SF which totals to $60k. (Compared to $62k for the Rumsey Bridge.)

Clean Bridge Deck [SF]

Bridge Area = (311' Total Bridge Length from Abut1 to Abut5) (20' deck width) = 6,220 SF

Say 6,260 SF

Estimated price = $5/SF

Based on Caltrans bid history, the average adjusted Clean Bridge Deck is $1/SF with a maximum unit price of $15/SF. Accounting for remote location, use $10/SF for Rumsey Bridge.

Stevenson Bridge - Clean Bridge Deck:

In 2007, the Stevenson Bridge unit price for Clean Bridge Deck was $5/SF, the estimated area of repair was 6,068 SF which totals to $30k. (Compared to $31k for the Rumsey Bridge.)

Structure Excavation (Type D) [CY]

Abutment 1 location:

Pier 2 location:

Structure Excavation (Type D) – Continued

Pier 3 & Pier 4 locations:

Abut 1: [(33' tall from deck to bottom of Abut 1 footing) (22' wide at Abut 1 face) (12' length, longitudinally)] / 27

= 330 CY

Pier 2: [(8' high) (48' long + 1' +1') (12' wide + 8' + 3' for PS)] / 27

= 340 CY

Pier 3: [(8' high) (48' long + 1' +1') (12' wide + 8' + 3' for PS)] / 27

= 340 CY

Pier 4: [(8' high) (48' long + 1' +1') (12' wide + 8' + 3' for PS)] / 27

= 340 CY

Abut 5: [(26' tall from deck to bottom of Abut 5 footing) (22' wide at Abut 1 face) (12' length, longitudinally)] / 27

= 250 CY

∑ = 1,600 CY

Say 1,600 CY

Estimated price = $300/CY

Based on Caltrans bid history, the average adjusted Structure Excavation (Type D) is around $125/CY. The average adjusted Structure Excavation (Type A) is around $350/CY. (See next page.) Accounting for the possibility of no seal course required at Pier 4 and Abut 5 locations, use a slightly lower Type A price of $300/CY for Rumsey Bridge.

Stevenson Bridge - Structure Excavation (Bridge):

In 2007, the Stevenson Bridge unit price for Structure Excavation (Bridge) was $150/CY, the estimated area of repair was 1,000 SF which totals to $150k. (Compared to $480k for the Rumsey Bridge.)

☑	192008 - STRUCTURE EXCAVATION (TYPE A)	CY	04	4279	$190.00
☑	192008 - STRUCTURE EXCAVATION (TYPE A)	CY	04	4279	$110.00
☑	192008 - STRUCTURE EXCAVATION (TYPE A)	CY	04	4279	$400.00
☑	192008 - STRUCTURE EXCAVATION (TYPE A)	CY	04	4279	$130.00

uncheck all | check all

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	292.41	**344.18**	Avg No. Units	2242
Std Dev. (of Unit Price): ±$	266.20	**326.02**	Rows Selected	79
Weighted Avg.: $	292.92	**341.14**	Rows Returned	79
Minimum Price/Unit: $	10.00	17.60		
Maximum Price/Unit: $	1,529.11	2,280.71		

☑	192020 - STRUCTURE EXCAVATION (TYPE D)	CY	04	1010	$50.00
☑	192020 - STRUCTURE EXCAVATION (TYPE D)	CY	04	1010	$150.00
☑	192020 - STRUCTURE EXCAVATION (TYPE D)	CY	04	1010	$75.00
☑	192020 - STRUCTURE EXCAVATION (TYPE D)	CY	04	1010	$200.00

uncheck all | check all

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	123.79	**127.60**	Avg No. Units	2375
Std Dev. (of Unit Price): ±$	157.46	**152.33**	Rows Selected	190
Weighted Avg.: $	121.39	**125.73**	Rows Returned	190
Minimum Price/Unit: $	4.59	6.48		
Maximum Price/Unit: $	1,529.11	1,163.35		

Structure Backfill (Bridge) [CY]

Abut 1: [(33' tall from deck to bottom of Abut 1 footing) (22' wide at Abut 1 face) (12' length, longitudinally)] / 27

= 330 CY

Less two 60" CIDH Piles and concrete attachment.

– [(33' tall from deck to bottom of Abut 1 footing) (14' wide) (7' length)] / 27

= – 120 CY

= 210 CY

Pier 2: [(8' high) (48' long + 1' +1') (12' wide + 8' + 3' for PS)] / 27

= 340 CY

Less two concrete footing retrofit

– [(8' tall) (48' wide) (12' length)] / 27

= – 170 CY

= 170 CY

Pier 3: [(8' high) (48' long + 1' +1') (12' wide + 8' + 3' for PS)] / 27

= 340 CY

Less two concrete footing retrofit

– [(8' tall) (48' wide) (12' length)] / 27

= – 170 CY

= 170 CY

Pier 4: [(8' high) (48' long + 1' +1') (12' wide + 8' + 3' for PS)] / 27

= 340 CY

Less two concrete footing retrofit

– [(8' tall) (48' wide) (12' length)] / 27

= – 170 CY

= 170 CY

Abut 5: [(26' tall from deck to bottom of Abut 5 footing) (22' wide at Abut 1 face) (12' length, longitudinally)] / 27

= 250 CY

Less two 60" CIDH Piles and concrete attachment.

– [(33' tall from deck to bottom of Abut 1 footing) (14' wide) (7' length)] / 27

= – 120 CY

= 130 CY

∑ = 850 CY

Say 850 CY

Estimated price = $150/CY

Based on Caltrans bid history, the average adjusted Structure Backfill (Bridge) is around $100/CY. Use price of $150/CY for Rumsey Bridge accounting for remote location.

☑	193003 - STRUCTURE BACKFILL (BRIDGE)	CY	08	697	$45.87
☑	193003 - STRUCTURE BACKFILL (BRIDGE)	CY	08	697	$56.58
☑	193003 - STRUCTURE BACKFILL (BRIDGE)	CY	08	697	$87.92
☑	193003 - STRUCTURE BACKFILL (BRIDGE)	CY	08	697	$38.23
☑	193003 - STRUCTURE BACKFILL (BRIDGE)	CY	08	697	$95.57
	MORE THAN 500 RESULTS RETURNED. ONLY				

uncheck all | check all

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	71.66	**89.85**	Avg No. Units	560
Std Dev. (of Unit Price): ±$	51.18	**65.62**	Rows Selected	500
Weighted Avg.: $	69.18	**85.06**	Rows Returned	500
Minimum Price/Unit: $	5.00	8.68		
Maximum Price/Unit: $	500.00	868.42		

Stevenson Bridge - Structure Backfill (Bridge) :

In 2007, the Stevenson Bridge unit price for Structure Backfill (Bridge) was $120/CY, the estimated area of repair is 500 SF which totals to $60k. (Compared to $127k for the Rumsey Bridge.)

60" Cast-in-Drilled-Hole Concrete Piling [LF]

At this Preliminary Stage, it is not known if CISS pile or CIDH piling is required. For simplicity the cost estimate is based on CIDH piles.

Abut 1 and Abut 5: (70' long per pile) (2 piles per support) (2 supports) = 280'

Say 280 LF

Based on Caltrans Contract Cost Data,

60" CIDH piles has an adjusted average price of about $1,000 for quantities between 100 to 300 LF. Adjusting for retrofit and more difficult access, say:

Estimated price = $2,000/LF

☑	490609 - 60" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	07	133	$350.00
☑	490609 - 60" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	07	133	$450.00
☑	490609 - 60" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	07	133	$469.00

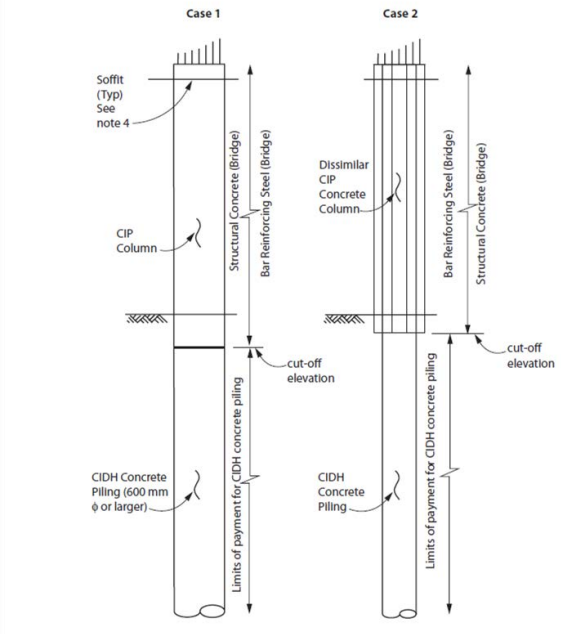
uncheck all | check all

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	862.72	**953.18**	Avg No. Units	158
Std Dev. (of Unit Price): ±$	1,406.18	**1,280.84**	Rows Selected	61
Weighted Avg.: $	682.46	**811.39**	Rows Returned	61
Minimum Price/Unit: $	0.01	0.01		
Maximum Price/Unit: $	10,000.00	9,339.62		

Stevenson Bridge - 60" Cast-in-Drilled-Hole Concrete Piling :

In 2007, the Stevenson Bridge unit price for 60" Cast-in-Drilled-Hole Concrete Piling was $900/LF, the estimated quantities was 200LF which totals to $180k. (Compared to $560k for the Rumsey Bridge.)

Pile Extensions and Columns for CIDH Concrete Piles



84" Cast-in-Drilled-Hole Concrete Piling [EA]

At this Preliminary Stage, it is not known if CISS pile or CIDH piling is required. For simplicity the cost estimate is based on CIDH piles.

Pier 2, 3 and 4: (110' long per pile) (2 piles per support) (3 supports) = 660'

Say 660 LF

Based on Caltrans Contract Cost Data,

84" CIDH piles has an adjusted average price of about $1,000 for quantities between 100 to 300 LF. However, this doesn't seem reasonable compared to the 60" CIDH price of $1000. A larger pile requires a larger crane. In water work required temporary access for the cranes. Use a higher estimated price, say:

Estimated price = $ 2,200/LF

☑	490616 - 84" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	04	626	$800.00
☑	490616 - 84" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	04	626	$750.00
☑	490616 - 84" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	04	626	$1200.00

uncheck all | check all

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	822.82	**1,045.60**	Avg No. Units	410
Std Dev. (of Unit Price): ±$	208.53	**203.83**	Rows Selected	17
Weighted Avg.: $	902.24	**990.02**	Rows Returned	17
Minimum Price/Unit: $	500.00	702.13		
Maximum Price/Unit: $	1,200.00	1,496.00		

Stevenson Bridge - 84" Cast-in-Drilled-Hole Concrete Piling :

In 2007, the Stevenson Bridge unit price for 84" Cast-in-Drilled-Hole Concrete Piling was $2,800/LF, the estimated quantities was 570LF which totals to $1,596k. (Compared to $1,452k for the Rumsey Bridge.)

Structure Concrete, Bridge Footing [CY]

Abut 1: [(33' tall from deck to bottom of Abut 1 footing) (20' wide at Abut 1 face) (4' length, longitudinally)] / 27

= 100 CY

Pier 2: [(8' high) (48' long) (12' wide) – (5' high) (28' long) (12' wide)] / 27

= 108 CY

Pier 3: [(8' high) (48' long) (12' wide) – (5' high) (28' long) (12' wide)] / 27

= 108 CY

Pier 4: [(8' high) (48' long) (12' wide) – (5' high) (28' long) (12' wide)] / 27

= 108 CY

Abut 5: [(26' tall from deck to bottom of Abut 5 footing) (20' wide at Abut 1 face) (4' length, longitudinally)] / 27

= 80 CY

∑ = 505 CY

Say 510 CY

Based on Caltrans Contract Cost Data,

Structure Concrete, Bridge has an average adjusted unit price of $500/CY, however since this is a retrofit

Say $1,500/CY

Stevenson Bridge - Structure Concrete, Bridge:

In 2007, the Stevenson Bridge unit price for 540 CY of Structure Concrete, Bridge was $1,300/CY. The estimated cost was $702k. (Compared to $765k for the Rumsey Bridge.)

☑	510051 - STRUCTURAL CONCRETE, BRIDGE FOOTING	CY	04	753	$229.37	$342.11
☑	510051 - STRUCTURAL CONCRETE, BRIDGE FOOTING	CY	04	753	$229.37	$342.11
☑	510051 - STRUCTURAL CONCRETE, BRIDGE FOOTING	CY	04	753	$382.28	$570.18
☑	510051 - STRUCTURAL CONCRETE, BRIDGE FOOTING	CY	07	51	$191.14	$285.09
	MORE THAN 500 RESULTS RETURNED. ONLY 500 ROWS SHOWN.					

uncheck all | check all

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	308.59	**498.71**	Avg No. Units	255
Std Dev. (of Unit Price): ±$	172.71	**260.68**	Rows Selected	500
Weighted Avg.: $	281.81	**459.76**	Rows Returned	500
Minimum Price/Unit: $	27.00	44.92		
Maximum Price/Unit: $	1,911.39	2,850.88		

Structure Concrete, Bridge [CY]

Abut 1 Wingwall:

[(33' tall from deck to bottom of Abut 1 footing) (1' wide WW) (50' length, longitudinally)] / 27

= 60 CY

Say 60 CY

Based on Caltrans Contract Cost Data,

Structure Concrete, Bridge has an average adjusted unit price of $1,000/CY. However, for retrofit and difficulty foundation access.

Say $3,000 /CY

Stevenson Bridge - Structure Concrete, Bridge:

In 2007, the Stevenson Bridge unit price for 540 CY of Structure Concrete, Bridge was $1,300/CY. The estimated cost was $702k (Compared to $180k for the Rumsey Bridge). Note: Stevenson bridge quantities did not have footing and bridge separated.

☑	510053 - STRUCTURAL CONCRETE, BRIDGE	CY	03	100	$955.69	$1425.44
☑	510053 - STRUCTURAL CONCRETE, BRIDGE	CY	07	311	$420.51	$627.19
☑	510053 - STRUCTURAL CONCRETE, BRIDGE	CY	07	311	$458.73	$684.21
☑	510053 - STRUCTURAL CONCRETE, BRIDGE	CY	07	311	$405.21	$604.39
☑	510053 - STRUCTURAL CONCRETE, BRIDGE	CY	07	311	$496.96	$741.23
	MORE THAN 500 RESULTS RETURNED. ONLY 500 ROWS SHOWN.					

uncheck all | check all

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	588.29	**970.99**	Avg No. Units	309
Std Dev. (of Unit Price): ±$	298.88	**476.83**	Rows Selected	500
Weighted Avg.: $	535.81	**879.83**	Rows Returned	500
Minimum Price/Unit: $	115.00	202.40		
Maximum Price/Unit: $	2,100.00	3,647.37		

Bar Reinforcing Steel (Bridge) [LB]

Density of Steel, 490 lb/CY, is obtained from Bridge Design Aids Ch.11

Abut 1 Wingwall:

(60 CY) (100 lb / CY) = 6,000 lb

Abut 1 CIDH to Abut Stem attachment:

(33' tall from deck to bottom of Abut 1 footing) (20' wide at Abut 1 face) (4' length, longitudinally) (100 lb / CY) = 10,000 lb

Pier 2 Footing:

(108 CY) (180 lb / CY) = 20,000 lb

Pier 3 Footing:

(108 CY) (180 lb / CY) = 20,000 lb

Pier 4 Footing:

(108 CY) (180 lb / CY) = 20,000 lb

Abut 5 CIDH to Abut Stem attachment:

(26' tall from deck to bottom of Abut 1 footing) (20' wide at Abut 1 face) (4' length, longitudinally) (100 lb / CY) = 8,000 lb

Abut 1 CIDH:

(70 LF) (20 EA #11)(1.56 sq-in) (490 lb/CF) / (12 in)^(2) = 7,500 lb

2 pier = [(60" – 3"x2) /12 ft] [pi] [0.31 sq-in / (12 in)^(2)] [490 lb/CF]
x [70'] / [9'/12] = 1,400 lb

Pier 2 CIDH:

(110 LF) (36 EA #11)(1.56 sq-in) (490 lb/CF) / (12 in)^(2) = 21,000 lb

2 pier = [(84" – 3"x2) /12 ft] [pi] [0.31 sq-in / (12 in)^(2)] [490 lb/CF]
x [110'] / [9'/12] = 3,000 lb

Pier 3 CIDH:

(110 LF) (36 EA #11)(1.56 sq-in) (490 lb/CF) / (12 in)^(2) = 21,000 lb

2 pier = [(84" – 3"x2) /12 ft] [pi] [0.31 sq-in / (12 in)^(2)] [490 lb/CF]
x [110'] / [9'/12] = 3,000 lb

Pier 4 CIDH:

(110 LF) (36 EA #11)(1.56 sq-in) (490 lb/CF) / (12 in)^(2) = 21,000 lb

2 pier = [(84" – 3"x2) /12 ft] [pi] [0.31 sq-in / (12 in)^(2)] [490 lb/CF]
x [110'] / [9'/12] = 3,000 lb

Abut 5 CIDH:

(70 LF) (20 EA #11)(1.56 sq-in) (490 lb/CF) / (12 in)^(2) = 7,500 lb

2 pier = [(70" – 3"x2) /12 ft] [pi] [0.31 sq-in / (12 in)^(2)] [490 lb/CF]

x [70'] / [9'/12] = 1,400 lb

∑ = 174,000 LB

Say 174,000 LB

Based on Caltrans Contract Cost Data,
Bar Reinforcing Steel (Bridge) has an average adjusted unit price of $1.3/LB.
Say $ 1.3 /LB

Joint Seal (Type B) [LF]

Assumed that the existing Joint Seal is okay and No Retrofit is required at this point.

Rehabilitation of Existing RSP [LS]

Work includes removal of existing RSP (to construct the Abutment 1 WW) and then placing the RSP back in place, via Method A placement. Work includes removal of K-Rail.

Approximate RSP volume: [(33' high) (33' long) (20' wide) (1/3 for cone volume)] / 27

= 270 CY

There is no rehabilitation cost data for RSP.

Based on Caltrans Contract Cost Data, ROCK SLOPE PROTECTION (1T, METHOD A) has an average adjusted unit price of $130/CY.

For rehab assumed Say $100 /CY which yields $30,000. Plus regarding all RSP's at all other bridge supports say: $80,000 LS.

Stevenson Bridge - does not have a Rehab RSP item.

☑	720119 - ROCK SLOPE PROTECTION (1T, METHOD A)	CY	01	200	$250.00
☑	720119 - ROCK SLOPE PROTECTION (1T, METHOD A)	CY	01	200	$150.00
☑	720119 - ROCK SLOPE PROTECTION (1T, METHOD A)	CY	01	200	$40.00
☑	720119 - ROCK SLOPE PROTECTION (1T, METHOD A)	CY	01	200	$230.00
☑	720119 - ROCK SLOPE PROTECTION (1T, METHOD A)	CY	01	200	$136.00
☑	720119 - ROCK SLOPE PROTECTION (1T, METHOD A)	CY	01	200	$90.00

uncheck all | check all

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	123.10	**128.37**	Avg No. Units	1780
Std Dev. (of Unit Price): ±$	135.48	**135.01**	Rows Selected	118
Weighted Avg.: $	60.35	**69.71**	Rows Returned	118
Minimum Price/Unit: $	26.76	26.50		
Maximum Price/Unit: $	879.24	934.71		

Prestressing Cast-In-Place Concrete [LS]

Prestressing the footing is required for flexural strength.

For all 3 in-water pier footings, using strands for ease of construction, Say $100,000 LS. Work also includes coring of existing footing to place the PS strands.

Stevenson Bridge - does not have a Prestressing Cast-In-Place Concrete item.

Approach Roadway Rehabilitation [LF]

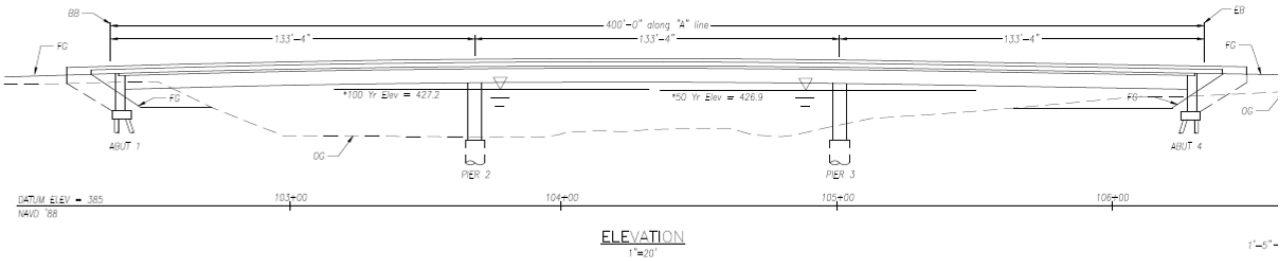
For approach roadway rehabilitation, Say $150,000 LS.

Stevenson Bridge - does not have an Approach Roadway Rehabilitation item.

Temporary Bridge [LS]

A two year temporary bridge is necessary to provide temporary crossing during the retrofit of the existing Rumsey Bridge. To account for the long term temporary crossing duration, design the temporary bridge per current code, design to clear high water elevations, and design for seismic, a cost of $2,000,000 is estimated for the temporary bridge. The estimated price is similar to the bids of a recent nearby Winters Road Bridge over Putah Creek (Br 23C-0243) dated in 2013. The temporary bridge bid item price for the Winters Road Bridge ranged from $1,070,000 to $2,874,000.

Rumsey Bridge Estimate – New Replaced Alterative
5-19-2014



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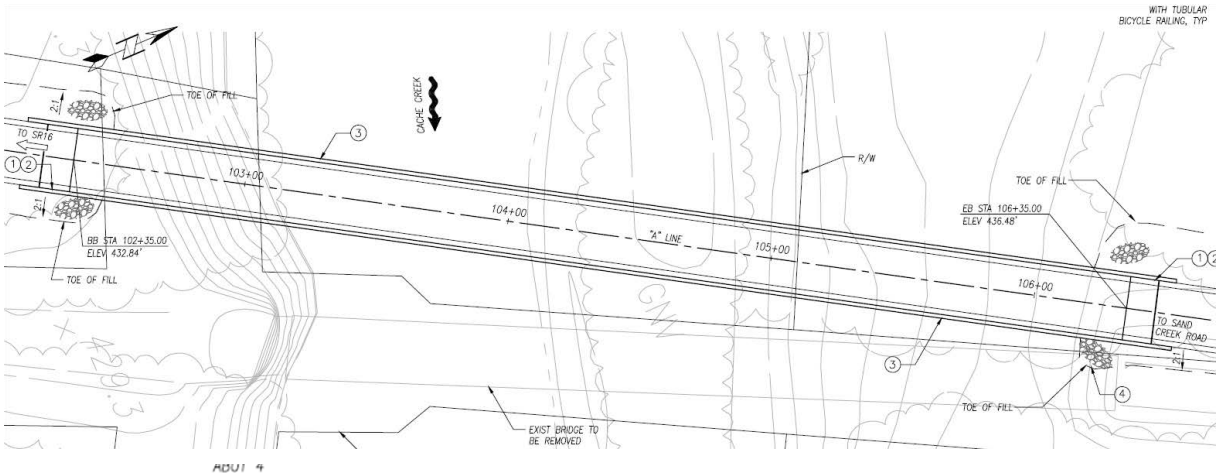


ABUT 4

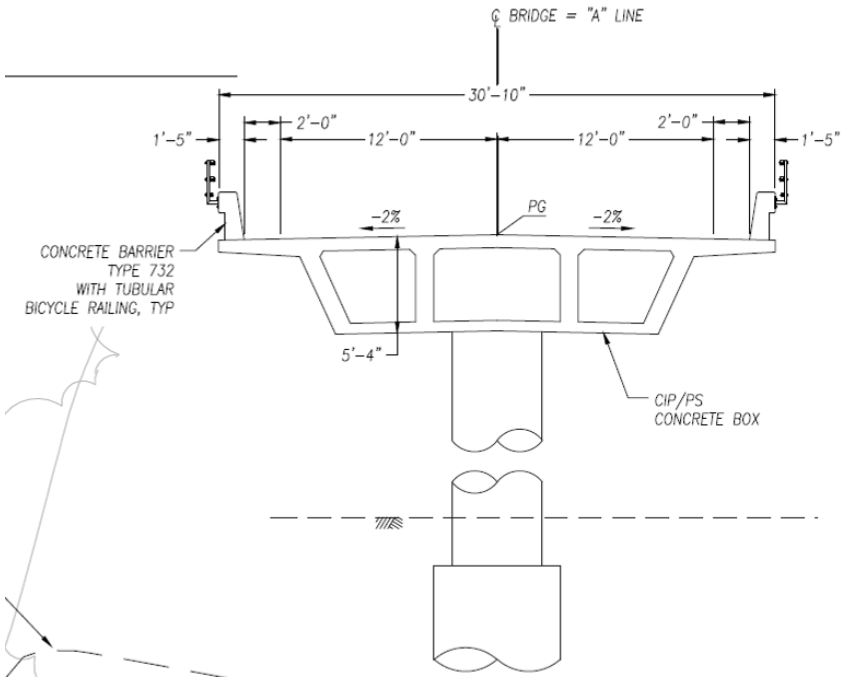


Table of Contents

Structure Excavation (Type D) [CY]

Abut 1: [(9' high) (32'10" + 2' long) (7' + 2' wide)] / 27

= 105 CY

Abut 3: [(9' high) (32'10" + 2' long) (7' + 2' wide)] / 27

= 105 CY

∑ = 210 CY

Say 210 CY

Estimated price = $300/CY

Based on Caltrans bid history, the average adjusted Structure Excavation (Type D) is around $125/CY. The average adjusted Structure Excavation (Type A) is around $350/CY.

☑	192008 - STRUCTURE EXCAVATION (TYPE A)	CY	04	4279	$190.00
☑	192008 - STRUCTURE EXCAVATION (TYPE A)	CY	04	4279	$110.00
☑	192008 - STRUCTURE EXCAVATION (TYPE A)	CY	04	4279	$400.00
☑	192008 - STRUCTURE EXCAVATION (TYPE A)	CY	04	4279	$130.00

uncheck all | check all

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	292.41	**344.18**	Avg No. Units	2242
Std Dev. (of Unit Price): ±$	266.20	**326.02**	Rows Selected	79
Weighted Avg.: $	292.92	**341.14**	Rows Returned	79
Minimum Price/Unit: $	10.00	17.60		
Maximum Price/Unit: $	1,529.11	2,280.71		

☑	192020 - STRUCTURE EXCAVATION (TYPE D)	CY	04	1010	$50.00
☑	192020 - STRUCTURE EXCAVATION (TYPE D)	CY	04	1010	$150.00
☑	192020 - STRUCTURE EXCAVATION (TYPE D)	CY	04	1010	$75.00
☑	192020 - STRUCTURE EXCAVATION (TYPE D)	CY	04	1010	$200.00

uncheck all | check all

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	123.79	**127.60**	Avg No. Units	2375
Std Dev. (of Unit Price): ±$	157.46	**152.33**	Rows Selected	190
Weighted Avg.: $	121.39	**125.73**	Rows Returned	190
Minimum Price/Unit: $	4.59	6.48		
Maximum Price/Unit: $	1,529.11	1,163.35		

Structure Backfill (Bridge) [CY]

Structure Excavation (Type D) [CY]

210 CY / (2)

Say 110 CY

Estimated price = $150/CY

Based on Caltrans bid history, the average adjusted Structure Backfill (Bridge) is around $100/CY. Use price of $150 per CY for Rumsey Bridge accounting for remote location.

☑	193003 - STRUCTURE BACKFILL (BRIDGE)	CY	08	697	$45.87
☑	193003 - STRUCTURE BACKFILL (BRIDGE)	CY	08	697	$56.58
☑	193003 - STRUCTURE BACKFILL (BRIDGE)	CY	08	697	$87.92
☑	193003 - STRUCTURE BACKFILL (BRIDGE)	CY	08	697	$38.23
☑	193003 - STRUCTURE BACKFILL (BRIDGE)	CY	08	697	$95.57
					MORE THAN 500 RESULTS RETURNED. ONLY

uncheck all | check all

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	71.66	**89.85**	Avg No. Units	560
Std Dev. (of Unit Price): ±$	51.18	**65.62**	Rows Selected	500
Weighted Avg.: $	69.18	**85.06**	Rows Returned	500
Minimum Price/Unit: $	5.00	8.68		
Maximum Price/Unit: $	500.00	868.42		

108" Cast-in-Drilled-Hole Concrete Piling [LF]

At this Preliminary Stage, it is not known if CISS pile or CIDH piling is required. For simplicity the cost estimate is based on CIDH piles.

Pier 2: (120' long per pile) (1 piles per support) (2 support) = 240'

Say 240 LF

Based on Caltrans Contract Cost Data,

108" CIDH piles has an adjusted average price of about $1,800.

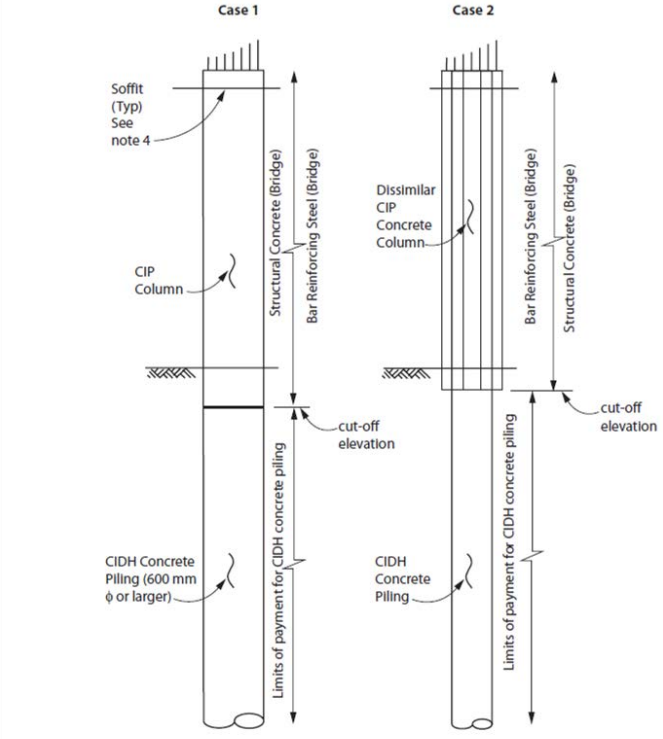
Estimated price = $ 2,500/LF for remote location and small quantities.

☑	490620 - 108" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	04	43	$2200.00
☑	490620 - 108" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	08	601	$800.00
☑	490620 - 108" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	08	601	$1300.00
☑	490620 - 108" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	08	601	$700.00
☑	490620 - 108" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	08	601	$1200.00
☑	490620 - 108" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	08	601	$1200.00

uncheck all | check all

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	1,399.09	**1,773.82**	Avg No. Units	323
Std Dev. (of Unit Price): ±$	585.25	**690.33**	Rows Selected	21
Weighted Avg.: $	1,208.20	**1,694.85**	Rows Returned	21
Minimum Price/Unit: $	700.00	722.82		
Maximum Price/Unit: $	2,920.00	3,112.57		

Pile Extensions and Columns for CIDH Concrete Piles



Structure Concrete, Bridge Footing [CY]

Abut 1: [(3' high) (32'10" long) (7' wide)] / 27

= 25 CY

Abut 4: [(3' high) (32'10" long) (7' wide)] / 27

= 25 CY

∑ = 50 CY

Say 50 CY

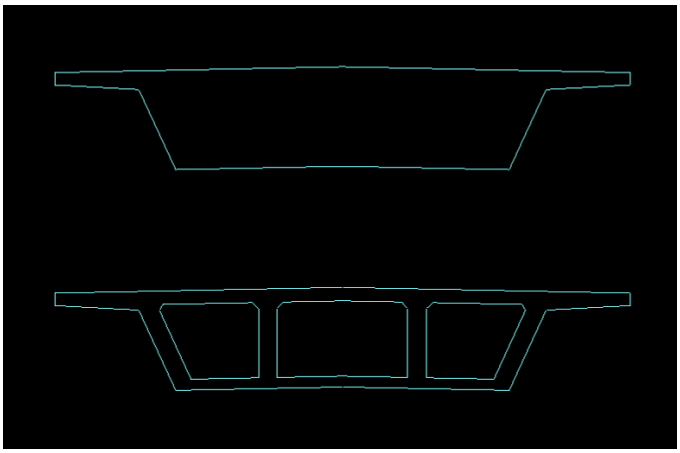
Based on Caltrans Contract Cost Data,
Structure Concrete, Bridge has an average adjusted unit price of $500/CY,
Say $450 / CY for easy on land construction (even though project site is remote).

☑	510051 - STRUCTURAL CONCRETE, BRIDGE FOOTING	CY	04	753	$229.37	$342.11
☑	510051 - STRUCTURAL CONCRETE, BRIDGE FOOTING	CY	04	753	$229.37	$342.11
☑	510051 - STRUCTURAL CONCRETE, BRIDGE FOOTING	CY	04	753	$382.28	$570.18
☑	510051 - STRUCTURAL CONCRETE, BRIDGE FOOTING	CY	07	51	$191.14	$285.09
	MORE THAN 500 RESULTS RETURNED. ONLY 500 ROWS SHOWN.					

uncheck all | check all

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	308.59	**498.71**	Avg No. Units	255
Std Dev. (of Unit Price): ±$	172.71	**260.68**	Rows Selected	500
Weighted Avg.: $	281.81	**459.76**	Rows Returned	500
Minimum Price/Unit: $	27.00	44.92		
Maximum Price/Unit: $	1,911.39	2,850.88		

Structure Concrete, Bridge [CY]



Superstructure :

[(115 SF) – (17+17+21.5 SF hollow cells)] (400 LF) / 27

= 881 CY

Superstructure Diaps:

[(17+17+21.5 SF cells)] (10 + 10 + 2.5 +2.5 LF) / 27

= 51 CY

Abut 1 seat: [(14' tall) (3.5' wide) (30'10" long) / 27

= 56 CY

Pier 2 & 3 column: [(20' tall) (7' diameter) ^(2) (pi) / (4) / 27 (2 columns)

= 60 CY

Abut 4 seat: [(14' tall) (3.5' wide) (30'10" long) / 27

= 56 CY

Wingwall's: (161 SF wingwall back area)(1' thick backfill) (4 WW's) / 27

= 24 CY

∑ = 1128 CY

Say 1130 CY

Based on Caltrans Contract Cost Data,
Structure Concrete, Bridge has an average adjusted unit price of $1,000/CY,
Say $1,100 / CY for remote location.

☑	510053 - STRUCTURAL CONCRETE, BRIDGE	CY	03	100	$955.69	$1425.44	
☑	510053 - STRUCTURAL CONCRETE, BRIDGE	CY	07	311	$420.51	$627.19	
☑	510053 - STRUCTURAL CONCRETE, BRIDGE	CY	07	311	$458.73	$684.21	
☑	510053 - STRUCTURAL CONCRETE, BRIDGE	CY	07	311	$405.21	$604.39	
☑	510053 - STRUCTURAL CONCRETE, BRIDGE	CY	07	311	$496.96	$741.23	
	MORE THAN 500 RESULTS RETURNED. ONLY 500 ROWS SHOWN.						

uncheck all | check all

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	588.29	**970.99**	Avg No. Units	309
Std Dev. (of Unit Price): ±$	298.88	**476.83**	Rows Selected	500
Weighted Avg.: $	535.81	**879.83**	Rows Returned	500
Minimum Price/Unit: $	115.00	202.40		
Maximum Price/Unit: $	2,100.00	3,647.37		

Bar Reinforcing Steel (Bridge) [LB]

Density of Steel, lb/CY, is obtained from Bridge Design Aids Ch.11

Box Super:	(133.33' span length) => 185 lb/CY x 1.25 LDF to LRDF	
	(880 CF) (230 lb/CY)	= 178,000 lb
Superstructure Diaps:	(51 CY) (150 lb/CY)	= 7,700 lb
Abut 1 seat:	(56 CY) (100 lbs/CY)	= 5,600 lb
Pier 2 & 3 column:	(60 CY) (450 lbs/CY)	= 27,000 lb
Abut 4 seat:	(56 CY) (100 lbs/CY)	= 5,600 lb
Abut 1 & 3 footings:	(50 CY) (170 lbs/CY)	= 8,500 lb
Wingwall's:	(24 CY) (100 lbs/CY)	= 2,400 lb

108" CIDH pile: (9 ft)^(2) (pi) / (4) (120 LF) /27 (450 lbs/CY)(2col) = 255,000 lb

$\sum$ = 922,000 LB

Say 920,000 LB

Based on Caltrans Contract Cost Data,
Say $ 1.30 /LB

Joint Seal (Type B) [LF]

L =(30+10/12)*2 = 62 Ft

Say 62 LF

☑	519100 - JOINT SEAL (MR 2")	LF	11	96	$102.58	$102.58
☑	519100 - JOINT SEAL (MR 2")	LF	11	96	$90.00	$90.00
☑	519100 - JOINT SEAL (MR 2")	LF	11	96	$72.00	$72.00
☑	519100 - JOINT SEAL (MR 2")	LF	07	56	$85.00	$85.00
☑	519100 - JOINT SEAL (MR 2")	LF	07	56	$150.31	$150.31

ncheck all | check all

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	83.77	**78.13**	Avg No. Units	75
Std Dev. (of Unit Price): ±$	35.51	**34.67**	Rows Selected	305
Weighted Avg.: $	84.15	**78.21**	Rows Returned	305
Minimum Price/Unit: $	3.00	3.30		
Maximum Price/Unit: $	250.00	223.98		

Concrete Barrier (Type 732) [LF]

L = (400’ + 20’ + 20’) * (2 sides) = 880 Ft

Say 880 LF

Rehabilitation of Existing RSP [LS]

Work includes removal of existing RSP's and then placing the RSP back at new bridge supports. Use new RSP is required.

Relative work is magnitude is similar to retrofit work. Say $80,000 LS.

☑	720119 - ROCK SLOPE PROTECTION (1T, METHOD A)	CY	01	200	$250.00
☑	720119 - ROCK SLOPE PROTECTION (1T, METHOD A)	CY	01	200	$150.00
☑	720119 - ROCK SLOPE PROTECTION (1T, METHOD A)	CY	01	200	$40.00
☑	720119 - ROCK SLOPE PROTECTION (1T, METHOD A)	CY	01	200	$230.00
☑	720119 - ROCK SLOPE PROTECTION (1T, METHOD A)	CY	01	200	$136.00
☑	720119 - ROCK SLOPE PROTECTION (1T, METHOD A)	CY	01	200	$90.00

uncheck all | check all

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	123.10	**128.37**	Avg No. Units	1780
Std Dev. (of Unit Price): ±$	135.48	**135.01**	Rows Selected	118
Weighted Avg.: $	60.35	**69.71**	Rows Returned	118
Minimum Price/Unit: $	26.76	26.50		
Maximum Price/Unit: $	879.24	934.71		

Prestressing Cast-In-Place Concrete [LS]

Typically the following equation is used to estimate for weight of steel used for PS: (Pjack)(Length)(3.4) / 202.5

However, this is an APS estimate, without know the Pjack by design, a proportion method to estimate PS cost is used.

Example, Bowman Road Bridge is 460' long by 42' wide = 19,320SF, with PS-CIP LS at $112,000

Proposed Rumsey Bridge is 400' long by 31' wide = 12,400SF

Solve for PS cost using proportion ratio12,400SF/ Cost = 91,320SF/$112,000 ➔ LS = 72,000

Prestressing the superstructure concrete box girder (for Alternatives 2 and 3), Say $80,000 LS.

Bridge Removal

Use a unit cost of $400,000 for removing the existing bridge.

Roadway Items

For approach roadway construction see roadway quantities.

Life Cycle Costs

Net Future Value adjusted to the proposed 2017 construction year (in 2017 dollars)

Alternative 1 - Bridge Retrofit/Rehabilitation of existing structure

Design Life of Retrofitted Bridge (50-75yrs) = 50 years

Cost to Retrofit Bridge if retrofitted today = $10,800,000 (see quantities & estimates)

$FV = PV * (1 + r)^n$

$Future\ Cost = Initial\ Cost * (1 + Annual\ \%\ Increase)^{years}$

Annual % increase in Construction Cost = 3 %

Future Cost in 2017 to retrofit existing bridge = $11,801,000

Cost of a future bridge if constructed today = $4,500,000 (assumed cost for CIP Conc Box Girder in Alt 3)

$FV = PV * (1 + r)^n$

$Future\ Cost = Initial\ Cost * (1 + Annual\ \%\ Increase)^{years}$

Annual % increase in Construction Cost = 3 %

Future Cost in 2067 to construct a new bridge = $21,557,000

Prorated fraction cost to a common 75 year baseline timeframe analysis. (Prorate cost of new bridge to first 25 years of its life.)

Proration multiplier = (75-50)/75 = 25/75 = 0.333

$7,185,667

Initial Deposit Required

$PV = FV / (1 + r)^n$

where,

P = Future Value = Cost of prorated 2067 bridge = $7,185,667

r = discount/interest rate = 1 %

n = # years discounted 50

Solving for initial Deposit Required = $4,369,000 (amount needed in 2017 to fund a future prorated New Bridge in year 2067)

Initial Deposit Required

$PV = FV / (1 + r)^n$

where,

P = Future Value = Cost of paint and/or FRP repair from vehicle impact/damage in 2027

$100,000

r = discount/interest rate = 1 %

n = # years discounted 10

Solving for initial Deposit Required = $91,000

Initial Deposit Required

$PV = FV / (1 + r)^n$

where,

P = Future Value = Cost of paint and/or FRP repair from vehicle impact/damage in 2037

$125,000

r = discount/interest rate = 1 %

n = # years discounted 20

Solving for initial Deposit Required = $102,000

Initial Deposit Required

$PV = FV / (1 + r)^n$

where,

P = Future Value = Cost of paint and/or FRP repair from vehicle impact/damage in 2047

$150,000

r = discount/interest rate = 1 %

n = # years discounted 30

Solving for initial Deposit Required = $111,000

Initial Deposit Required

$PV = FV / (1 + r)^n$

where,

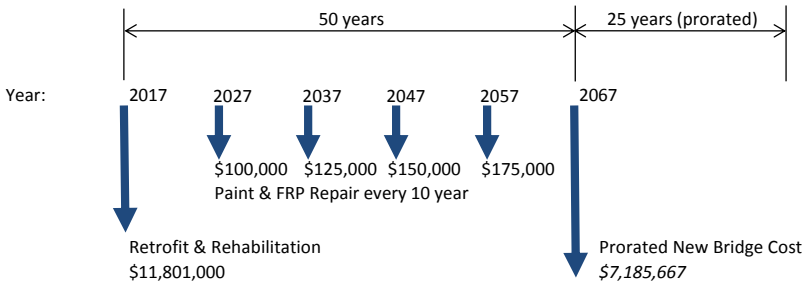
P = Future Value = Cost of paint and/or FRP repair from vehicle impact/damage in 2057

$175,000

r = discount/interest rate = 1 %

n = # years discounted 40

Solving for initial Deposit Required = $118,000



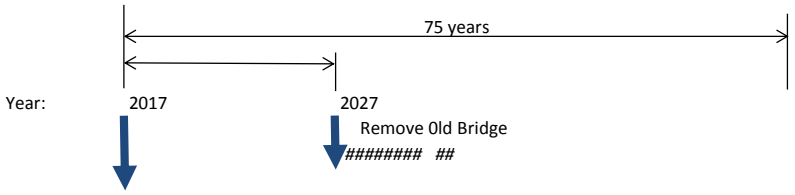
Net Future Value Cost =	$	11,801,000	
+	$	4,369,000	Amount needed in 2017 to fund a future prorated New Bridge in year 2067
+	$	91,000	Paint & Repair in 2027
+	$	102,000	Paint & Repair in 2037
+	$	111,000	Paint & Repair in 2047
+	$	118,000	Paint & Repair in 2057
Net Future Value Cost =	**$**	**16,600,000**	**for Alternative 1** (rounded to nearst $100,000)

Alternative 2 - Add New CIP Concrete Box Girder Bridge on an upstream alignment and keep existing Rumsey Bridge (no retrofit)

Design Life of New Bridge (75-100yrs) = 75 years
Cost of New Bridge if constructed today = $3,900,000 (Bridge Replacement without existing bridge removal cost)
*FV = PV * (1 + r)* ^{n}
*Future Cost = Initial Cost * (1 + Annual % Increase)* ^{years}
Annual % increase in Construction Cost = 3 %
Future Cost in 2017 to construct new bridge = $4,262,000

Assumed when Bridge Removal is Required = 10 years
Cost to Remove Bridge if removed today = $625,000 (Slightly higher cost than Alt 1's, since Contractor needs to remobilize)
*FV = PV * (1 + r)* ^{n}
*Future Cost = Initial Cost * (1 + Annual % Increase)* ^{years}
Annual % increase in Construction Cost = 3 %
Future Cost in 2027 to remove old bridge= $918,000

Initial Deposit Required
PV = FV / (1 + r) ^{n}
where,
P = Future Value = Desired future value = $918,000
r = discount/interest rate = 1 %
n = # years discounted 10
Solving for initial Deposit Required = $831,000 (amount County needs to have in year 2017 to remove existing old bridge in year 2027)



Net Future Value Cost = $4,262,000 + $831,000
Net Future Value Cost = $5,100,000 for Alternative 2 (rounded to nearst $100,000)

Alternative 3 - CIP Concrete Box Girder Bridge Replacement on an upstream alignment with removal of the existing bridge

Design Life of New Bridge (75-100yrs) = 75 years

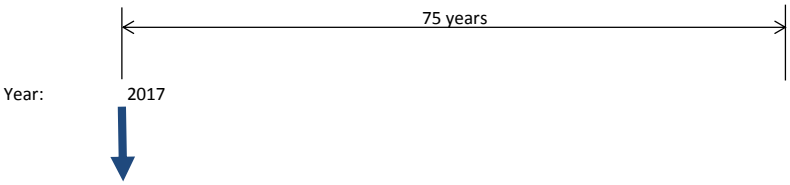
Cost of New Bridge if constructed today = $4,500,000 (Bridge Replacement with existing bridge removal cost)

$FV = PV * (1 + r)^n$

$Future\ Cost = Initial\ Cost * (1 + Annual\ \%\ Increase)^{years}$

Annual % increase in Construction Cost = 3 %

Future Cost in 2017 to construct new bridge = $4,917,000



Net Future Value Cost = $4,900,000 for Alternative 3 (rounded to nearst $100,000)

2012/13-2017/18 Highway Bridge Program

See the appropriate FTIP/FSTIP for current funding commitments. This listing provides the backup project information to support the lump sum amounts programmed in the FTIP.

District: 04 County: Solano

Responsible Agency	HBP-ID	Project Description
Solano County	1498	BRIDGE NO. 23C0092, STEVENSON BR RD, OVER PUTAH CREEK, SOL/YOL CO LINE. Bridge rehabilitation. No adding lane capacity.

Project #: 5923(059)

Phase Summary:	Prior	12/13	13/14	14/15	15/16	16/17	17/18	Beyond	Total
PE	900,000	400,000							1,300,000
R/W			500,000						500,000
CON							6,372,000		6,372,000
Total	900,000	400,000	500,000				6,372,000		8,172,000

Fund Source Summary:	Prior	12/13	13/14	14/15	15/16	16/17	17/18	Beyond	Total
Fed $	720,000	320,000	442,650				5,641,132		7,123,782
Local Match	180,000	80,000	57,350				730,868		1,048,218
LSSRP Bond									
Local AC									
Total	900,000	400,000	500,000				6,372,000		8,172,000

PE Summary:	Prior	12/13	13/14	14/15	15/16	16/17	17/18	Beyond	Total
Fed $	720,000	320,000							1,040,000
Local Match	180,000	80,000							260,000
LSSRP Bond									
Local AC									
Total	900,000	400,000							1,300,000

R/W Summary:	Prior	12/13	13/14	14/15	15/16	16/17	17/18	Beyond	Total
Fed $			442,650						442,650
Local Match			57,350						57,350
LSSRP Bond									
Local AC									
Total			500,000						500,000

CON Summary:	Prior	12/13	13/14	14/15	15/16	16/17	17/18	Beyond	Total
Fed $							5,641,132		5,641,132
Local Match							730,868		730,868
LSSRP Bond									
Local AC									
Total							6,372,000		6,372,000