

Draft

Attachment 1 Cost Estimates for Comprehensive Plans

Engineering Summary Appendix

Shasta Lake Water Resources Investigation, California

Prepared by:

**U. S. Department of the Interior
Bureau of Reclamation
Mid-Pacific Region**



**U.S. Department of the Interior
Bureau of Reclamation**

June 2013

Cost Summary for CP1

Item	Estimated Cost (\$million, April 2010) ¹	Index Category ^{2,3}	April 2010 Index ³	April 2012 Index ³	Estimated Cost (\$million, April 2012) ¹
Relocations					
Vehicular Bridges	\$32	Bridges	364	390	\$34
Doney Creek Railroad Bridge	\$51	Bridges	364	390	\$55
Sacramento River Railroad Bridge, Second Crossing	\$105	Bridges	364	390	\$113
Pit River Bridge Modifications	\$15	Bridges	364	390	\$16
Railroad Realignment	\$7.4	Composite	338	368	\$8.1
Roads	\$15	Secondary roads	412	456	\$17
Utilities	\$23	Composite	338	368	\$25
Buildings/Facilities - Recreation	\$120	Composite	338	368	\$131
Dams and Reservoirs					
Main Dam	\$49	Concrete dams	325	347	\$52
Outlet Works	\$25	Concrete dams	325	347	\$27
Spillway	\$95	Concrete dams	325	347	\$101
Temperature Control Device	\$26	Concrete dams	325	347	\$28
Powerhouse & Penstocks	\$1.2	Powerplants; structures and improvements	324	348	\$1.2
Right Wing Dam	\$4.2	Concrete dams	325	347	\$4.5
Left Wing Dam	\$12	Earth dams	301	331	\$13
Visitor Center	\$7.6	Composite	338	368	\$8.3
Dikes	\$13	Earth dams	301	331	\$14
Reservoir Clearing	\$4.1	Composite	338	368	\$4.5
Pit 7 Dam and Powerhouse Modifications	\$0.2	Powerplants	327	346	\$0.2
TOTAL FIELD COST	\$605	N/A	N/A	N/A	\$653
Non-Contract Costs					
Planning, Engineering, Design, and Construction Management ⁴	\$121	N/A	N/A	N/A	\$131
Lands	\$26	California	830	880	\$28
Environmental Mitigation ⁵	\$61	N/A	N/A	N/A	\$65
Cultural Resources Mitigation ⁶	\$12	N/A	N/A	N/A	\$13
Water Use Efficiency Actions	\$2.3	N/A	N/A	N/A	\$1.6
TOTAL CONSTRUCTION COST	\$827	N/A	N/A	N/A	\$891
Interest During Construction ⁷	\$71	N/A	N/A	N/A	\$76
TOTAL CAPITAL COST	\$898	N/A	N/A	N/A	\$967
Interest and Amortization ⁸	\$38	N/A	N/A	N/A	\$39
Annual Operations and Maintenance ⁹	\$4.9	N/A	N/A	N/A	\$4.9
TOTAL ANNUAL COST	\$43	N/A	N/A	N/A	\$44

Notes:

¹ Cost estimate is feasibility-level and subject to change in the future. Escalation from published price level to notice to proceed is excluded. Estimates may include discrepancies due to rounding. For appropriate use and terminology, see Reclamation Manual, Directives and Standards FAC; 09-01, 09-02 and 09-03.

² Cost index category is based on majority of line item costs and assumed to represent the estimate as a whole. Costs are not anticipated to vary significantly from current labor and materials pricing.

³ From Reclamation's Construction Cost Trends (Reclamation 2012).

⁴ 20 percent of the field cost was estimated for Planning, Engineering, Design, and Construction Management non-contract costs.

⁵ 10 percent of the field cost was estimated for Environmental Mitigation non-contract costs.

⁶ 2 percent of the field cost was estimated for Cultural Resources Mitigation non-contract costs.

⁷ Interest During Construction is based on 4.125 percent federal discount rate over a 4 year construction period for April 2010 price level cost estimates or based on 4 percent federal discount rate over a 4 year construction period for April 2012 price level cost estimates.

⁸ Interest and Amortization is based on 4.125 percent federal discount rate over a 100-year period of analysis for April 2010 price level cost estimates or based on 4 percent federal discount rate over a 100-year period of analysis for April 2012 price level cost estimates.

⁹ Annual Operations and Maintenance costs were estimated at 0.2 percent of the field cost plus estimated CVP/SWP additional pumping costs. CVP/SWP additional pumping costs estimation was updated from the April 2010 to April 2012 price level cost estimates.

Key:

\$ million = million dollars

N/A = not applicable

Cost Summary for CP2

Item	Estimated Cost (\$million, April 2010) ¹	Index Category ^{2,3}	April 2010 Index ³	April 2012 Index ³	Estimated Cost (\$million, April 2012) ¹
Relocations					
Vehicular Bridges	\$32	Bridges	364	390	\$34
Doney Creek Railroad Bridge	\$51	Bridges	364	390	\$55
Sacramento River Railroad Bridge, Second Crossing	\$105	Bridges	364	390	\$113
Pit River Bridge Modifications	\$21	Bridges	364	390	\$23
Railroad Realignment	\$7.4	Composite	338	368	\$8.1
Roads	\$23	Secondary roads	412	456	\$25
Utilities	\$24	Composite	338	368	\$26
Buildings/Facilities - Recreation	\$135	Composite	338	368	\$147
Dams and Reservoirs					
Main Dam	\$58	Concrete dams	325	347	\$62
Outlet Works	\$25	Concrete dams	325	347	\$27
Spillway	\$98	Concrete dams	325	347	\$105
Temperature Control Device	\$27	Concrete dams	325	347	\$29
Powerhouse & Penstocks	\$1.2	Powerplants; structures and improvements	324	348	\$1.2
Right Wing Dam	\$5.2	Concrete dams	325	347	\$5.6
Left Wing Dam	\$17	Earth dams	301	331	\$18
Visitor Center	\$7.9	Composite	338	368	\$8.6
Dikes	\$15	Earth dams	301	331	\$16
Reservoir Clearing	\$6.5	Composite	338	368	\$7.1
Pit 7 Dam and Powerhouse Modifications	\$0.2	Powerplants	327	346	\$0.2
TOTAL FIELD COST	\$658	N/A	N/A	N/A	\$711
Non-Contract Costs					
Planning, Engineering, Design, and Construction Management ⁴	\$132	N/A	N/A	N/A	\$142
Lands	\$41	California	830	880	\$43
Environmental Mitigation ⁵	\$66	N/A	N/A	N/A	\$71
Cultural Resources Mitigation ⁶	\$13	N/A	N/A	N/A	\$14
Water Use Efficiency Actions	\$3.1	N/A	N/A	N/A	\$2.6
TOTAL CONSTRUCTION COST	\$913	N/A	N/A	N/A	\$984
Interest During Construction ⁷	\$78	N/A	N/A	N/A	\$84
TOTAL CAPITAL COST	\$991	N/A	N/A	N/A	\$1,068
Interest and Amortization ⁸	\$42	N/A	N/A	N/A	\$44
Annual Operations and Maintenance ⁹	\$4.8	N/A	N/A	N/A	\$7.1
TOTAL ANNUAL COST	\$46	N/A	N/A	N/A	\$51

Notes:

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³ From Reclamation's Construction Cost Trends (Reclamation 2012).

⁴ 20 percent of the field cost was estimated for Planning, Engineering, Design, and Construction Management non-contract costs.

⁵ 10 percent of the field cost was estimated for Environmental Mitigation non-contract costs.

⁶ 2 percent of the field cost was estimated for Cultural Resources Mitigation non-contract costs.

⁷ Interest During Construction is based on 4.125 percent federal discount rate over a 4 year construction period for April 2010 price level cost estimates or based on 4 percent federal discount rate over a 4 year construction period for April 2012 price level cost estimates.

⁸ Interest and Amortization is based on 4.125 percent federal discount rate over a 100-year period of analysis for April 2010 price level cost estimates or based on 4 percent federal discount rate over a 100-year period of analysis for April 2012 price level cost estimates.

⁹ Annual Operations and Maintenance costs were estimated at 0.2 percent of the field cost plus estimated CVP/SWP additional pumping costs. CVP/SWP additional pumping costs estimation was updated from the April 2010 to April 2012 price level cost estimates.

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N/A = not applicable

Cost Summary for CP3

Item	Estimated Cost (\$ million, April 2010) ¹	Index Category ^{2,3}	April 2010 Index ³	April 2012 Index ³	Estimated Cost (\$ million, April 2012) ¹
Relocations					
Vehicular Bridges	\$48	Bridges	364	390	\$52
Doney Creek Railroad Bridge	\$51	Bridges	364	390	\$55
Sacramento River Railroad Bridge, Second Crossing	\$105	Bridges	364	390	\$113
Pit River Bridge Modifications	\$28	Bridges	364	390	\$30
Railroad Realignment	\$7.4	Composite	338	368	\$8.1
Roads	\$34	Secondary roads	412	456	\$37
Utilities	\$29	Composite	338	368	\$31
Buildings/Facilities - Recreation	\$153	Composite	338	368	\$166
Dams and Reservoirs					
Main Dam	\$69	Concrete dams	325	347	\$74
Outlet Works	\$25	Concrete dams	325	347	\$27
Spillway	\$100	Concrete dams	325	347	\$107
Temperature Control Device	\$28	Concrete dams	325	347	\$30
Powerhouse & Penstocks	\$1.2	Powerplants; structures and improvements	324	348	\$1.2
Right Wing Dam	\$6.3	Concrete dams	325	347	\$6.7
Left Wing Dam	\$23	Earth dams	301	331	\$25.0
Visitor Center	\$8.2	Composite	338	368	\$8.9
Dikes	\$23	Earth dams	301	331	\$26
Reservoir Clearing	\$18	Composite	338	368	\$20
Pit 7 Dam and Powerhouse Modifications	\$0.2	Powerplants	327	346	\$0.2
TOTAL FIELD COST	\$757	N/A	N/A	N/A	\$818
Non-Contract Costs					
Planning, Engineering, Design, and Construction Management ⁴	\$151	N/A	N/A	N/A	\$164
Lands	\$60	California	830	880	\$64
Environmental Mitigation ⁵	\$76	N/A	N/A	N/A	\$82
Cultural Resources Mitigation ⁶	\$15	N/A	N/A	N/A	\$16
Water Use Efficiency Actions	\$3.8	N/A	N/A	N/A	\$3.1
TOTAL CONSTRUCTION COST	\$1,063	N/A	N/A	N/A	\$1,147
Interest During Construction ⁷	\$91	N/A	N/A	N/A	\$95
TOTAL CAPITAL COST	\$1,154	N/A	N/A	N/A	\$1,242
Interest and Amortization ⁸	\$48	N/A	N/A	N/A	\$51
Annual Operations and Maintenance ⁹	\$5.4	N/A	N/A	N/A	\$2.8
TOTAL ANNUAL COST	\$54	N/A	N/A	N/A	\$54

Notes:

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² Cost index category is based on majority of line item costs and assumed to represent the estimate as a whole. Costs are not anticipated to vary significantly from current labor and materials pricing.

³ From Reclamation's Construction Cost Trends (Reclamation 2012).

⁴ 20 percent of the field cost was estimated for Planning, Engineering, Design, and Construction Management non-contract costs.

⁵ 10 percent of the field cost was estimated for Environmental Mitigation non-contract costs.

⁶ 2 percent of the field cost was estimated for Cultural Resources Mitigation non-contract costs.

⁷ Interest During Construction is based on 4.125 percent federal discount rate over a 4 year construction period for April 2010 price level cost estimates or based on 4 percent federal discount rate over a 4 year construction period for April 2012 price level cost estimates.

⁸ Interest and Amortization is based on 4.125 percent federal discount rate over a 100-year period of analysis for April 2010 price level cost estimates or based on 4 percent federal discount rate over a 100-year period of analysis for April 2012 price level cost estimates.

⁹ Annual Operations and Maintenance costs were estimated at 0.2 percent of the field cost plus estimated CVP/SWP additional pumping costs. CVP/SWP additional pumping costs estimation was updated from the April 2010 to April 2012 price level cost estimates.

Key:

\$ million = million dollars

N/A = not applicable

Cost Summary for CP4

Item	Estimated Cost (\$million, April 2010) ¹	Index Category ^{2,3}	April 2010 Index ³	April 2012 Index ³	Estimated Cost (\$million, April 2012) ¹
Relocations					
Vehicular Bridges	\$48	Bridges	364	390	\$52
Doney Creek Railroad Bridge	\$51	Bridges	364	390	\$55
Sacramento River Railroad Bridge, Second Crossing	\$105	Bridges	364	390	\$113
Pit River Bridge Modifications	\$28	Bridges	364	390	\$30
Railroad Realignment	\$7.4	Composite	338	368	\$8.1
Roads	\$34	Secondary roads	412	456	\$37
Utilities	\$29	Composite	338	368	\$31
Buildings/Facilities - Recreation	\$153	Composite	338	368	\$166
Dams and Reservoirs					
Main Dam	\$69	Concrete dams	325	347	\$74
Outlet Works	\$25	Concrete dams	325	347	\$27
Spillway	\$100	Concrete dams	325	347	\$107
Temperature Control Device	\$28	Concrete dams	325	347	\$30
Powerhouse & Penstocks	\$1.2	Powerplants; structures and improvements	324	348	\$1.2
Right Wing Dam	\$6.3	Concrete dams	325	347	\$6.7
Left Wing Dam	\$23	Earth dams	301	331	\$25
Visitor Center	\$8.2	Composite	338	368	\$8.9
Dikes	\$23	Earth dams	301	331	\$26
Reservoir Clearing	\$18	Composite	338	368	\$20
Pit 7 Dam and Powerhouse Modifications	\$0.2	Powerplants	327	346	\$0.2
Environmental Restoration					
Gravel Augmentation	\$3.9	Composite	338	368	\$4.2
Restore Riparian and Floodplain Habitat	\$1.7	Composite	338	368	\$1.9
TOTAL FIELD COST	\$763	N/A	N/A	N/A	\$824
Non-Contract Costs					
Planning, Engineering, Design, and Construction Management ⁴	\$153	N/A	N/A	N/A	\$165
Lands	\$61	California	830	880	\$65
Environmental Mitigation ⁵	\$76	N/A	N/A	N/A	\$82
Cultural Resources Mitigation ⁶	\$15	N/A	N/A	N/A	\$16
Water Use Efficiency Actions	\$2.3	N/A	N/A	N/A	\$1.6
TOTAL CONSTRUCTION COST	\$1,070	N/A	N/A	N/A	\$1,154
Interest During Construction ⁷	\$92	N/A	N/A	N/A	\$96
TOTAL CAPITAL COST	\$1,161	N/A	N/A	N/A	\$1,250
Interest and Amortization ⁸	\$49	N/A	N/A	N/A	\$51
Annual Operations and Maintenance ⁹	\$5.2	N/A	N/A	N/A	\$5.3
TOTAL ANNUAL COST	\$54	N/A	N/A	N/A	\$56

Notes:

¹ Cost estimate is feasibility-level and subject to change in the future. Escalation from published price level to notice to proceed is excluded. Estimates may include discrepancies due to rounding. For appropriate use and terminology, see Reclamation Manual, Directives and Standards FAC; 09-01, 09-02 and 09-03.

² Cost index category is based on majority of line item costs and assumed to represent the estimate as a whole. Costs are not anticipated to vary significantly from current labor and materials pricing.

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⁸ Interest and Amortization is based on 4.125 percent federal discount rate over a 100-year period of analysis for April 2010 price level cost estimates or based on 4 percent federal discount rate over a 100-year period of analysis for April 2012 price level cost estimates.

⁹ Annual Operations and Maintenance costs were estimated at 0.2 percent of the field cost plus estimated CVP/SWP additional pumping costs. CVP/SWP additional pumping costs estimation was updated from the April 2010 to April 2012 price level cost estimates.

Key:

\$ million = million dollars

N/A = not applicable

Cost Summary for CP5

Item	Estimated Cost (\$million, April 2010) ¹	Index Category ^{2,3}	April 2010 Index ³	April 2012 Index ³	Estimated Cost (\$million, April 2012) ¹
Relocations					
Vehicular Bridges	\$48	Bridges	364	390	\$52
Doney Creek Railroad Bridge	\$51	Bridges	364	390	\$55
Sacramento River Railroad Bridge, Second Crossing	\$105	Bridges	364	390	\$113
Pit River Bridge Modifications	\$28	Bridges	364	390	\$30
Railroad Realignment	\$7.4	Composite	338	368	\$8.1
Roads	\$34	Secondary roads	412	456	\$37
Utilities	\$29	Composite	338	368	\$31
Buildings/Facilities - Recreation	\$153	Composite	338	368	\$166
Dams and Reservoirs					
Main Dam	\$69	Concrete dams	325	347	\$74
Outlet Works	\$25	Concrete dams	325	347	\$27
Spillway	\$100	Concrete dams	325	347	\$107
Temperature Control Device	\$28	Concrete dams	325	347	\$30
Powerhouse & Penstocks	\$1.2	Powerplants; Structures and improvements	324	348	\$1.2
Right Wing Dam	\$6.3	Concrete dams	325	347	\$6.7
Left Wing Dam	\$23	Earth dams	301	331	\$25
Visitor Center	\$8.2	Composite	338	368	\$8.9
Dikes	\$23	Earth dams	301	331	\$26
Reservoir Clearing	\$18	Composite	338	368	\$20
Pit 7 Dam and Powerhouse Modifications	\$0.2	Powerplants	327	346	\$0.2
Environmental Restoration					
Gravel Augmentation	\$3.9	Composite	338	368	\$4.2
Restore Riparian and Floodplain Habitat	\$1.7	Composite	338	368	\$1.9
Shoreline Enhancement & Tributary Aquatic Habitat Enhancement	\$11	Composite	338	368	\$12
Recreation Enhancement Facilities					
Recreation Facilities	\$1.2	Composite	338	368	\$1.3
TOTAL FIELD COST	\$775	N/A	N/A	N/A	\$838
Non-Contract Costs					
Planning, Engineering, Design, and Construction Management ⁴	\$155	N/A	N/A	N/A	\$168
Lands	\$61	California	830	880	\$65
Environmental Mitigation ⁵	\$76	N/A	N/A	N/A	\$84
Cultural Resources Mitigation ⁶	\$16	N/A	N/A	N/A	\$17
Water Use Efficiency Actions	\$3.8	N/A	N/A	N/A	\$3.8
TOTAL CONSTRUCTION COST	\$1,086	N/A	N/A	N/A	\$1,174
Interest During Construction ⁷	\$93	N/A	N/A	N/A	\$97
TOTAL CAPITAL COST	\$1,179	N/A	N/A	N/A	\$1,272
Interest and Amortization ⁸	\$50	N/A	N/A	N/A	\$52
Annual Operations and Maintenance ⁹	\$5.4	N/A	N/A	N/A	\$8.8
TOTAL ANNUAL COST	\$55	N/A	N/A	N/A	\$61

Notes:

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⁹ Annual Operations and Maintenance costs were estimated at 0.2 percent of the field cost plus estimated CVP/SWP additional pumping costs. CVP/SWP additional pumping costs estimation was updated from the April 2010 to April 2012 price level cost estimates.

Key:

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N/A = not applicable