Storage & Conveyance Back-up

CALFED Bay Delta Program
Technical Services Branch

Construction Estimate: $ 309,544,698
Revision Date: October-96

SACRAMENTO RIVER TRIBUTARY SURFACE STORAGE

Description: SITES RESERVOIR - 1.2 MAF ALTERNATIVE

FACILITY GROUPING: STORAGE
CODE: BRSI12

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
I.	**RIGHTS-OF-WAY**				
	Reservoir (Includes Buffer Area Factor of 1.32)	AC	$ 1,500	16,240	$ 24,360,000
	Sites - Cottonwood Elverta #2 Loop	LS	$ 13,276	JOB	$ 13,276
	Subtotal				**$ 24,373,276**
II.	**RELOCATION OF EXISTING PROPERTY**				
	Secondary Road Relocation	LS	$ 13,254,000	JOB	$ 13,254,000
	12 kV Electrical Line	LS	$ 438,000	JOB	$ 438,000
	Subtotal				**$ 13,692,000**
III.	**CLEARING RESERVOIR**				
	Reservoir clearing	AC	$ 1,097	700	$ 768,033
	Subtotal				**$ 768,033**
IV.	**ACCESS ROADS**				
	Access Roads	LS	$ 2,539,000	JOB	$ 2,539,000
	Subtotal				**$ 2,539,000**
V.	**GOLDEN GATE DAM, SITES DAM, AND 5 DIKES**				
	Diversion and care of river and unwatering foundation	LS	$ 240,698	JOB	$ 240,698
	Excavation all classes, equalizing channel	CY	$ 3.58	183,000	$ 655,140
	Excavation all classes, for foundations	CY	$ 3.23	419,500	$ 1,354,985
	Excavation, rock for grout cap	CY	$ 7.15	2,000	$ 14,300
	Excavation, stripping, borrow pits	CY	$ 1.15	340,000	$ 391,000
	Excavation, common, in borrow area and transportation to dam embankment	CY	$ 3.22	5,320,000	$ 17,130,400
	Excavation, rock and rockfines in borrow area and transportation to embankments	CY	$ 7.15	1,484,000	$ 10,610,600
	Placing earthfill in embankment	CY	$ 0.95	4,859,900	$ 4,616,905
	Placing rock and rockfines in embankment	CY	$ 0.75	2,024,000	$ 1,518,000
	Furnish and place sand and gravel filter	CY	$ 8.54	27,100	$ 231,434
	Furnish and place riprap	CY	$ 31.64	54,000	$ 1,708,560
	Furnish and place bedding for riprap	CY	$ 11.79	28,000	$ 330,120
	Furnish 8-inch diameter sewer pipe and constructing toe drains	LF	$ 20.00	2,350	$ 47,000
	Gravel surfacing on dam crest	TON	$ 11.99	1,850	$ 22,182
	Seeding	SY	$ 0.13	43,340	$ 5,448
	Water for seeding	MGAL	$ 10.48	1,000	$ 10,476
	Drilling grout holes 0 to 30 feet	LF	$ 18.70	18,180	$ 339,966
	Drilling grout holes 30 to 60 feet	LF	$ 18.70	9,090	$ 169,983
	Drilling grout holes 60 to 110 feet	LF	$ 18.70	5,760	$ 107,712
	Drilling grout holes 110 to 160 feet	LF	$ 18.70	1,720	$ 32,164
	Concrete in grout caps	CY	$ 146.67	2,000	$ 293,333
	Furnish and install grout pipe and fittings	LB	$ 3.98	17,400	$ 69,269
	Hookups to grout holes	EA	$ 41.90	610	$ 25,562

Description: **SITES RESERVOIR - 1.2 MAF ALTERNATIVE**

FACILITY GROUPING: STORAGE
CODE: BRSI12

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Pressure grouting	SKS	$ 10.48	52,130	$ 546,124
	Cement	BBL	$ 20.95	16,090	$ 337,124
	Subtotal				**$ 40,808,484**
VI.	**SPILLWAY**				
	Excavation, open cut, all classes	CY	$ 4.03	8,557	$ 34,485
	Backfill	CY	$ 8.17	1,200	$ 9,804
	Special compacted backfill	CY	$ 13.51	300	$ 4,053
	Structural Concrete in floors and crest	CY	$ 365.24	485	$ 177,141
	Structural Concrete in walls	CY	$ 365.24	479	$ 174,950
	Drilling and grouting anchors	LF	$ 16.86	2,260	$ 38,104
	F&I 4" dia. S.P. drains	LF	$ 16.86	180	$ 3,035
	Riprap	CY	$ 31.64	200	$ 6,328
	Bedding for riprap	CY	$ 11.79	100	$ 1,179
	F&I 6" dia. S.P. drains	LF	$ 16.86	700	$ 11,802
	10% Minor items	LS		JOB	$ 46,088
	Subtotal				**$ 506,969**
	Factor cost by ratio of max. water depths (244.3/295.8)=.826				
	Adjusted Subtotal				**$ 418,756**
VII.	**OUTLET WORKS**				
	Excavation all classes tailrace	CY	$ 7.40	36,000	$ 266,400
	Excavation, open cut	CY	$ 3.38	6,000	$ 20,280
	Excavation, tunnel	CY	$ 128.27	9,700	$ 1,244,219
	Excavation, gate chamber and shaft	CY	$ 146.59	6,300	$ 923,517
	Drilling grout holes	LF	$ 18.70	13,400	$ 250,580
	F&I grout pipe and fittings	LB	$ 4.59	6,700	$ 30,753
	Hookups to grout holes	EA	$ 91.73	446	$ 40,912
	Pressure grouting	SKS	$ 91.73	13,400	$ 1,229,182
	Concrete in tunnel lining	CY	$ 320.68	7,240	$ 2,321,723
	Structural Concrete in intake	CY	$ 339.50	3,950	$ 1,341,025
	Structural Concrete in gate chamber and shaft	CY	$ 339.50	3,110	$ 1,055,845
	Structural Concrete in stilling basin	CY	$ 339.50	3,850	$ 1,307,075
	Structural Concrete in anchor blocks	CY	$ 256.15	3,000	$ 768,450
	Metal control house	LS	$ 9,173.00	JOB	$ 9,173
	Specially compacted backfill	CY	$ 15.61	800	$ 12,488
	F&I 11x11 fixed wheel gates	LB	$ 5.55	116,000	$ 643,800
	2-42" H.J. valves and controls	LB	$ 6.28	32,222	$ 202,354
	2 guard gates for 42" H.J. valves	LB	$ 6.92	32,000	$ 221,440
	4-6.5'x8.0' H.P. gates	LB	$ 4.59	564,000	$ 2,588,760
	144" dia. penstock & manifold for H.P. gates	LB	$ 1.65	2,000,000	$ 3,300,000
	F&I tunnel supports	LB	$ 3.66	288,000	$ 1,054,080
	Trashrack metalwork	LB	$ 3.63	74,000	$ 268,620
	F&I tower bulkhead	LB	$ 3.02	100,000	$ 302,000
	Tunnel vent system	LS	$ 129,555	JOB	$ 129,555
	Other misc. metalwork	LB	$ 3.63	3,000	$ 10,890
	Rockbolts	LF	$ 64.14	27,900	$ 1,789,506
	Chain link fabric	SF	$ 12.88	23,000	$ 296,240
	10% Minor items	LS		JOB	$ 2,162,887
	Subtotal				**$ 23,791,754**
	Upsize Outlet Works for Emergency Evacuation				
	Increase Outlet Works Capacity from 2,100cfs to 15,200cfs				

Description: **SITES RESERVOIR - 1.2 MAF ALTERNATIVE**

FACILITY GROUPING: STORAGE
CODE: BRSI12

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Cost Factor = $(15,200/2,100)^{3/8}$ = 2.10				
	Adjusted Subtotal				**$ 49,962,683**
VIII.	**SITES PUMPING - GENERATING PLANT (Located at Golden Gate Dam)**				
	(Q=5,000cfs, TDH=290, eff=75%, 219,350 HP)				
	Structure, Equipment and Electrical, Complete	LS	$ 169,864,000	JOB	$ 169,864,000
	Subtotal				**$ 169,864,000**
IX.	**SITES PUMPING/GENERATING PLANT SWITCHYARD**				
	Station Equipment, Electrical				
	Transformer, 3 Phase, 65 MVA, 230/6.9 kv	EA	$ 1,028,350	1	$ 1,028,350
	230-kv Line Bay, 10,000 MVA	EA	$ 650,325	3	$ 1,950,975
	230-kv Bus-Tie Bay, 10,000 MVA	EA	$ 573,089	1	$ 573,089
	Coupling Capacitor, (w/potential device)	EA	$ 12,049	5	$ 60,245
	Carrier equipment	EA	$ 30,894	2	$ 61,788
	Telemetring and supervisory control	LS	$ 183,722	JOB	$ 183,722
	Subtotal				**$ 3,858,169**
	Increase capacity from 2,100cfs to 5,000cfs				
	Cost Factor = (5,000/2100)6/10 = 1.683				
	Adjusted Subtotal				**$ 6,493,298**
X.	**SITES-COTTONWOOD ELVERTA #2 LOOP**				
	Clearing Land	LS	$ 3,841	JOB	$ 3,841
	Towers and Fixtures	LS	$ 405,911	JOB	$ 405,911
	Conductors and Devices	LS	$ 215,416	JOB	$ 215,416
	Subtotal				**$ 625,168**
	CONSTRUCTION ESTIMATE				**$ 309,544,698**

EFERENCES: 1. Bookman-Edmonston Engineering, *CALFED Storage and Conveyance Components - Facility Description and* Cost Estimate Reports, October 1997.

***NOTES:** The Unit Cost value was generated by Bookman-Edomonston and based on the USBR index according to the following formula:
Unit Cost New = (USBR New / USBR Previous) * Unit Cost Previous

[a]AC=acre; LS=lump sum; MI=mile; CY=cubic yard; LF=linear Foot; SY=square yard; MGAL=million gallons; LB=pound; EA=each; BBL=barrel

CALFED Bay Delta Program
Technical Services Branch

Construction Estimate: $ 445,345,133
Revision Date: October-96

SACRAMENTO RIVER TRIBUTARY SURFACE STORAGE

Description: SITES RESERVOIR - 1.9 MAF ALTERNATIVE

FACILITY GROUPING: STORAGE
CODE: BRSI19

ITEM No.	ITEM	UNIT	UNIT COST*	UANTITY	ITEM COST
I.	**RIGHTS-OF-WAY**				
	Sites-Cottonwood Elverta #2 Loop	LS	$ 13,276	JOB	$ 13,276
	Reservoir (Includes Buffer Area Factor of 1.32)	AC	$ 1,500	19,400	$ 29,100,000
	Subtotal				**$ 29,113,276**
II.	**RELOCATION OF EXISTING PROPERTY**				
	Secondary Road Relocation	MI	$ 1,131,113	14	$ 15,835,579
	12 kV Electrical Line	LS	$ 523,253	JOB	$ 523,253
	Subtotal				**$ 16,358,832**
III.	**CLEARING RESERVOIR**				
	Reservoir clearing	AC	$ 1,097	700	$ 768,033
	Subtotal				**$ 768,033**
IV.	**ACCESS ROADS**				
	Access roads	MI	$ 532,281	5.7	$ 3,034,003
	Subtotal				**$ 3,034,003**
V.	**GOLDEN GATE DAM - Earth and Rockfill Structure; Crest Elevation 541.3**				
	Excavation, all classes for foundation	CY	$ 3.23	468,000	$ 1,511,640
	Stripping borrow pits	CY	$ 1.15	319,000	$ 366,850
	Excavation, impervious and hauling to dam (borrow)	CY	$ 3.22	3,185,000	$ 10,255,700
	Excavation, rockfines and hauling to dam (borrow)	CY	$ 7.15	1,227,500	$ 8,782,114
	Excavation, rock and hauling to dam (borrow)	CY	$ 7.15	2,799,000	$ 20,025,366
	Placing impervious	CY	$ 0.95	2,722,000	$ 2,585,900
	Placing rockfines	CY	$ 0.75	1,534,400	$ 1,150,800
	Placing rock	CY	$ 0.75	3,998,800	$ 2,999,100
	F&P sand filter and gravel drain	CY	$ 8.54	145,300	$ 1,240,862
	Grouting foundation	LS	$ 598,114	JOB	$ 598,114
	Drains	LF	$ 11.09	2,790	$ 30,940
	Gravel on crest	CY	$ 11.09	2,066	$ 22,911
	10% minor items	LS	$ 4,957,030	JOB	$ 4,957,030
	Subtotal				**$ 54,527,325**
VI.	**SITES DAM - Earthfill and Rockfill Structure; Crest Elevation 541.5**				
	Diversion and care of river	LS	$ 238,464	JOB	$ 238,464
	Excavation for equalizing channel and fill in coffer dams	CY	$ 3.58	183,000	$ 654,634
	Excavation, all classes for foundation	CY	$ 3.23	209,300	$ 676,039
	Stripping borrow pits	CY	$ 1.15	167,000	$ 192,050
	Excavation, impervious and hauling to dam (borrow)	CY	$ 3.22	1,666,000	$ 5,364,520
	Excavation, rockfines and hauling to dam (borrow)	CY	$ 7.15	470,100	$ 3,363,317
	Excavation, rock and hauling to dam (borrow)	CY	$ 7.15	1,133,600	$ 8,110,309
	Placing impervious	CY	$ 0.95	1,424,000	$ 1,352,800
	Placing rockfines	CY	$ 0.75	587,600	$ 440,700
	Placing rock	CY	$ 0.75	1,619,400	$ 1,214,550

Description: SITES RESERVOIR - 1.9 MAF ALTERNATIVE

FACILITY GROUPING: STORAGE
CODE: BRSI19

ITEM No.	ITEM	UNIT	UNIT COST*	UANTITY	ITEM COST
	F&P sand filters and gravel drains	CY	$ 8.54	128,600	$ 1,098,244
	Grouting foundation	LS	$ 237,528	JOB	$ 237,528
	Drains	LF	$ 18.24	2,350	$ 42,873
	Gravel on crest	CY	$ 12.88	730	$ 9,401
	10% Minor items	LS		JOB	$ 2,299,543
	Subtotal				**$ 25,294,973**
VII.	**DIKES**				
	Excavation, all classes for foundation	CY	$ 3.23	539,000	$ 1,740,970
	Excavation, impervious and hauling to dam (borrow)	CY	$ 3.22	4,115,500	$ 13,251,910
	Excavation, sand, gravel and hauling to dam (borrow)	CY	$ 9.52	970,000	$ 9,229,984
	Excavation, rock and hauling to dam (borrow)	CY	$ 9.52	1,671,000	$ 15,900,312
	Placing impervious	CY	$ 0.95	3,517,500	$ 3,341,625
	Placing rockfines	CY	$ 0.75	1,212,500	$ 909,375
	Placing rock	CY	$ 0.75	2,387,500	$ 1,790,625
	F&P riprap	CY	$ 31.64	169,700	$ 5,369,308
	F&P filter blanket	CY	$ 8.54	504,100	$ 4,305,014
	F&P bedding for riprap	CY	$ 11.79	84,900	$ 1,000,971
	Grouting foundation	LS	$ 812,748	JOB	$ 812,748
	10% Minor items	LS		JOB	$ 5,765,284
	Subtotal				**$ 63,418,126**
VIII.	**SPILLWAY**				
	Excavation, open cut, all classes	CY	$ 4.03	8,557	$ 34,485
	Backfill	CY	$ 8.17	1,200	$ 9,804
	Special compacted backfill	CY	$ 13.51	300	$ 4,054
	Structural Concrete in floors and crest	CY	$ 365.24	485	$ 177,141
	Structural Concrete in walls	CY	$ 365.24	479	$ 174,950
	Drilling and grouting anchors	LF	$ 16.86	2,260	$ 38,095
	F&I 4" dia. S.P. drains	LF	$ 16.86	180	$ 3,034
	Riprap	CY	$ 31.64	200	$ 6,328
	Bedding for riprap	CY	$ 11.79	100	$ 1,179
	F&I 6" dia. S.P. drains	LF	$ 16.86	700	$ 11,799
	10% Minor items	LS		JOB	$ 46,087
	Subtotal				**$ 506,957**
IX.	**OUTLET WORKS**				
	Excavation all classes tailrace	CY	$ 7.40	36,000	$ 266,513
	Excavation, open cut	CY	$ 3.38	6,000	$ 20,280
	Excavation, tunnel	CY	$ 128.27	9,700	$ 1,244,219
	Excavation, gate chamber and shaft	CY	$ 146.59	6,300	$ 923,517
	Drilling grout holes	LF	$ 18.70	13,400	$ 250,580
	F&I grout pipe and fittings	LB	$ 4.59	6,700	$ 30,731
	Hookups to grout holes	EA	$ 91.73	446	$ 40,914
	Pressure grouting	Sack	$ 91.73	13,400	$ 1,229,241
	Concrete in tunnel lining	CY	$ 321	7,240	$ 2,321,723
	Structural Concrete in intake	CY	$ 340	3,950	$ 1,341,025
	Structural Concrete in gate chamber and shaft	CY	$ 340	3,110	$ 1,055,845
	Structural Concrete in stilling basin	CY	$ 340	3,850	$ 1,307,075
	Structural Concrete in anchor blocks	CY	$ 256	3,000	$ 768,450
	Metal control house	LS	$ 9,173	JOB	$ 9,173
	Specially compacted backfill	CY	$ 15.61	800	$ 12,489
	F&I 11x11 fixed wheel gates	LB	$ 5.55	116,000	$ 644,072

Description: **SITES RESERVOIR - 1.9 MAF ALTERNATIVE**

FACILITY GROUPING: STORAGE
CODE: BRSI19

ITEM No.	ITEM	UNIT	UNIT COST*	UANTITY	ITEM COST
	2-42" H.J. valves and controls	LB	$ 6.28	32,222	$ 202,243
	2 guard gates for 42" H.J. valves	LB	$ 6.92	32,000	$ 221,450
	4-6.5'x8.0' H.P. gates	LB	$ 4.59	564,000	$ 2,586,909
	144" dia. penstock & manifold for H.P. gates	LB	$ 1.65	2,000,000	$ 3,300,000
	F&I tunnel supports	LB	$ 3.66	288,000	$ 1,054,080
	Trashrack metalwork	LB	$ 3.63	74,000	$ 268,620
	F&I tower bulkhead	LB	$ 3.02	100,000	$ 302,000
	Tunnel vent system	LS	$ 129,555	JOB	$ 129,555
	Other misc. metalwork	LB	$ 3.63	3,000	$ 10,890
	Rockbolts	LF	$ 64.14	27,900	$ 1,789,506
	Chain link fabric	SF	$ 12.88	23,000	$ 296,125
	10% Minor items	LS		JOB	$ 2,162,722
	Subtotal				**$ 23,789,947**
	Upsize Outlet Works for Emergency Evacuation				
	Increase Outlet Works capacity from 2,100cfs to 22,000cfs				
	Cost Factor = $(22{,}000/2100)^{3/8} = 2.413$				
	Adjusted Subtotal				**$ 57,405,142**
X.	**SITES PUMPING - GENERATING PLANT (Located at Golden Gate Dam)**				
	(Q=5,000cfs, TDH=342, eff=75%, 258,680 HP)				
	Structures, Equipment and Electrical, Complete	LS	$ 187,800,000	JOB	$ 187,800,000
	Subtotal				**$ 187,800,000**
XI.	**SITES PUMPING-GENERATING PLANT SWITCHYARD**				
	Station Equipment, Electrical				
	Transformer, 3 Phase, 65 MVA, 230/6.9 kv	EA	$ 1,028,350	1	$ 1,028,350
	230-kv Line Bay, 10,000 MVA	EA	$ 650,325	3	$ 1,950,976
	230-kv Bus-Tie Bay, 10,000 MVA	EA	$ 573,089	1	$ 573,089
	Coupling Capacitor, (w/potential device)	EA	$ 12,049	5	$ 60,244
	Carrier equipment	EA	$ 30,894	2	$ 61,789
	Telemetering and supervisory control	LS	$ 183,722	JOB	$ 183,722
	Subtotal				**$ 3,858,169**
	Increase capacity from 2,100cfs to 5,000cfs				
	Cost Factor = (5,000/2100)6/10 = 1.683				
	Adjusted Subtotal				**$ 6,493,299**
XII.	**SITES-COTTONWOOD ELVERTA #2 LOOP**				
	Clearing Land	LS	$ 3,841	JOB	$ 3,841
	Towers and Fixtures	LS	$ 405,911	JOB	$ 405,911
	Conductors and Devices	LS	$ 215,416	JOB	$ 215,416
	Subtotal				**$ 625,167**
	CONSTRUCTION ESTIMATE				**$ 445,345,133**

REFERENCES: 1. Bookman-Edmonston Engineering, *CALFED Storage and Conveyance Components - Facility Description and* Cost Estimate Reports, October 1997.

***NOTES:** The Unit Cost value was generated by Bookman-Edomonston and based on the USBR index according to the following formula:
Unit Cost New = (USBR New / USBR Previous) * Unit Cost Previous

APPENDIX A 4.3

Description: **SITES RESERVOIR - 1.9 MAF ALTERNATIVE**

FACILITY GROUPING: STORAGE
CODE: BRSI19

ITEM No.	I T E M	UNIT[a]	UNIT COST*	UANTITY	ITEM COST

[a]LS=lump sum; AC=acre; MI=mile; CY=cubic yard; LF=linear foot; LB=pound; SF=square foot; EA=each

CALFED Bay Delta Program
Technical Services Branch

Construction Estimate: $ 739,536,754
Revision Date: October-96

SAN JOAQUIN RIVER TRIBUTARY SURFACE STORAGE

Description: MILLERTON LAKE ENLARGEMENT

FACILITY GROUPING: STORAGE
CODE: CRML07

ITEM No.	ITEM	UNITa	UNIT COST	QUANTITY	ITEM COST
I.	LAND AND RIGHTS				
	Reservoir Rights-of-Way	AC	$ 3,000	5,280	$ 15,840,000
	Subtotal				$ 15,840,000
II.	RELOCATION OF HOMES				
	Homes	EA	$ 150,694	7	$ 1,054,858
	Subtotal				$ 1,054,858
III.	CLEARING LANDS				
	Reservoir Clearing	AC	$ 1,097	4,000	$ 4,388,000
	Subtotal				$ 4,388,000
IV.	FRIANT DAM ENLARGEMENT (includes Spillway and Outlet Works)				
	Diversion and Care of River	LS	$ 521,404	JOB	$ 521,404
	Excavation				
	All Classes of Dam & Stilling Basin Foundations	CY	$ 3.34	448,000	$ 1,494,970
	Excavation Concrete	CY	$ 16.68	11,800	$ 196,882
	Chipping and Roughening of Concrete Surfaces	SY	$ 6.95	112,600	$ 782,801
	Backfill and Compacted Backfill	CY	$ 8.34	39,000	$ 325,356
	Pressure Grouting Const. Joints & Cooling System	CF	$ 125	62,000	$ 7,758,493
	Concrete in Dam	CY	$ 73.69	3,842,500	$ 283,160,668
	Prepackt Concrete in Dam	CY	$ 142	86,500	$ 12,267,596
	Concrete in Spillway Crest & Piers	CY	$ 401	9,700	$ 3,889,700
	Concrete in Spillway Training Walls	CY	$ 401	4,220	$ 1,692,220
	Concrete in Stilling Basin Walls	CY	$ 401	3,180	$ 1,275,180
	Concrete in Stilling Basin Floors and Aprons	CY	$ 293	24,900	$ 7,295,700
	Concrete in Sidewalks, Curbs and Parapets	CY	$ 401	6,300	$ 2,526,300
	Concrete Cooling Treatment	CY	$ 4.73	3,842,000	$ 18,162,660
	F&P Cement	CW	$ 9.04	22,000,000	$ 198,828,767
	F&P Rebars	LBS	$ 0.90	5,317,000	$ 4,805,330
	Install Metal Tubing & Fittings for:				
	Grouting Concrete Construction joints	LBS	$ 0.56	331,000	$ 184,090
	Grouting Concrete Cooling Systems	LBS	$ 0.35	4,765,000	$ 1,656,327
	F&P Metal Seal Strips	FT	$ 5.91	87,000	$ 514,104
	Misc. Metal Work	LBS	$ 3.04	46,000	$ 139,840
	Electrical Conduit and Outlets	LS	$ 54,365	JOB	$ 54,365
	Track Rails	LBS	$ 1.53	85,000	$ 130,003
	Drum Gate	LBS	$ 0.56	1,435,000	$ 798,096
	Drum Gate Mechanisms	LBS	$ 0.56	102,000	$ 56,729
	Outlet Pipe Extensions	LBS	$ 0.56	915,000	$ 508,890
	Dismantling, modifying & Reinstalling Gantry	LBS	$ 0.70	370,000	$ 257,226
	Moving, Modifying and Resetting Gantry Cranes	LBS	$ 0.70	22,000	$ 15,295
	Moving, Modifying and Resetting Outlet Valves	LBS	$ 0.70	1,160,000	$ 806,438
	Dismantling Existing Drum Screen Gates	LBS	$ 0.35	1,430,000	$ 497,072
	Backfill	CY	$ 0.83	100,000	$ 83,425

Description: MILLERTON LAKE ENLARGEMENT

FACILITY GROUPING: STORAGE
CODE: CRML07

ITEM No.	ITEM	UNITa	UNIT COST	QUANTITY	ITEM COST
	Subtotal				**$550,685,929**
V.	**DIKES**				
	Excavation, Common				
	Stripping Dike	CY	$ 1.11	76,000	$ 84,219
	Embankment Foundation	CY	$ 3.23	96,000	$ 310,080
	Stripping Borrow Pits & Haul to Embankment	CY	$ 1.30	202,000	$ 263,348
	Borrow Pits & Haul to Embankment	CY	$ 2.61	9,000,000	$ 23,466,667
	Rock for Grout Caps	CY	$ 111	6,400	$ 709,215
	Earthfill in Embankments	CY	$ 3.91	10,100,000	$ 39,502,222
	Rockfill in Embankments	CY	$ 1.96	85,000	$ 166,222
	F&P Riprap	CY	$ 31.64	278,000	$ 8,795,920
	F&P Sand and Gravel	CY	$ 13.04	371,000	$ 4,836,741
	8" Diameter Sewer Pipe Drains in Gravel	LF	$ 22.16	12,500	$ 277,037
	10" Diameter Sewer Pipe Drains in Gravel	LF	$ 26.07	9,500	$ 247,704
	Grout Drilling	LF	$ 18.70	637,500	$ 11,921,250
	Grout	SKS	$ 0.85	36,000	$ 30,507
	Concrete in Curbs and Parapets	CY	$ 391	8,000	$ 3,128,889
	Concrete in Vertical Cut-off Wall	CY	$ 391	4,100	$ 1,603,556
	Concrete in Grout Cap	CY	$ 139	6,400	$ 892,776
	Cement	CY	$ 8.47	36,000	$ 305,067
	Rebar	LBS	$ 0.85	1,200,000	$ 1,016,889
	Seeding and Watering	AC	$ 1,304	16	$ 20,859
	Subtotal				**$97,579,167**
VI.	**POWER PLANTS**				
	River Outlet Power Plant (3.0 MW)	LS	$ 10,748,800	JOB	$ 10,748,800
	Friant-Kern Outlet Power Plant (22.0 MW)	LS	$ 34,546,400	JOB	$ 34,546,400
	Meadra Outlet Power Plant (12.0 MW)	LS	$ 24,693,600	JOB	$ 24,693,600
	Subtotal				**$ 69,988,800**
	CONSTRUCTION ESTIMATE				**739,536,754**

REFERENCES: 1. Bookman-Edmonston Engineering, *CALFED Storage and Conveyance Components - Facility Description and* Cost Estimate Reports, October 1997.

***NOTES:** The Unit Cost value was generated by Bookman-Edomonston and based on the USBR index according to the following formula:
Unit Cost New = (USBR New / USBR Previous) * Unit Cost Previous

[a]CY=cubic yard; LB=pound; EA=each; LS=lump sum; LF=linear foot; SF=square foot; TON=ton; MI=mile; AC=acre, SCK= sack

CALFED Bay Delta Program
Technical Services Branch

Construction Estimate: $ 1,124,087,311
Revision Date: October-96

SOUTH OF DELTA OFF-AQUEDUCT SURFACE STORAGE

Description: LOS VAQUEROS RESERVOIR ENLARGEMENT

FACILITY GROUPING: STORAGE
CODE: FRLV10

ITEM No.	ITEM	UNIT	UNIT COST*	QUANTITY	ITEM COST
	LOS VAQUEROS DAM AND RESERVOIR				
I.	MOBILIZATION	LS	$ 1,000,000	JOB	$ 1,000,000
II.	DEMOLITION OF SPILLWAY & INTAKE STRUCT.	LS	$ 500,000	JOB	$ 500,000
III.	REMOVE EXISTING DAM & STOCKPILE MAT'LS	CY	$ 3.00	2,700,000	$ 8,100,000
IV.	LAND ACQUISITION	AC	$ 3,500	6,400	$ 22,400,000
V.	RESERVOIR CLEARING	AC	$ 1,097	340	$ 372,980
VI.	MAIN DAM				
	Stripping/Excavation	CY	$ 1.76	3,920,000	$ 6,899,200
	Foundation Preparation	SY	$ 0.68	609,000	$ 414,120
	Foundation Special Treatment		$ 1.37	426,300	$ 584,031
	Dewatering	LS	$ 343,000	JOB	$ 343,000
	Impervious Core	CY	$ 6.63	8,140,000	$ 53,968,200
	Filter & Drain	CY	$ 27.50	3,330,000	$ 91,575,000
	Sandstone & Shale	CY	$ 6.85	21,630,000	$ 148,165,500
	Pit Run	CY	$ 11.70	1,520,000	$ 17,784,000
	Riprap & Bedding	CY	$ 42.50	887,000	$ 37,697,500
	Grout Curtain				
	Drill Holes	LF	$ 3.02	120,600	$ 364,212
	Grout	SKS	$ 18.60	60,300	$ 1,121,580
	Consolidation Grout				
	Drill Holes	LF	$ 3.26	33,500	$ 109,210
	Grout	SKS	$ 21.70	20,100	$ 436,170
	Instrumentation	LS	$ 143,000	JOB	$ 143,000
	Subtotal				$ 359,604,723
VII.	SADDLE DAMS				
	Stripping/Excavation	CY	$ 1.76	1,036,000	$ 1,823,360
	Foundation Preparation	SY	$ 0.68	161,000	$ 109,480
	Foundation Special Treatment	SY	$ 1.37	113,000	$ 154,810
	Impervious Core	CY	$ 6.63	734,000	$ 4,866,420
	Filter & Drain	CY	$ 27.50	300,000	$ 8,250,000
	Sandstone & Shale	CY	$ 6.85	1,950,000	$ 13,357,500
	Pit Run	CY	$ 11.70	137,000	$ 1,602,900
	Riprap & Bedding	CY	$ 42.50	80,000	$ 3,400,000
	Grout Curtain				
	Drill Holes	LF	$ 3.02	28,000	$ 84,560
	Grout	SKS	$ 18.60	14,000	$ 260,400
	Consolidation Grout				
	Drill Holes	LF	$ 3.26	7,800	$ 25,428

Description: LOS VAQUEROS RESERVOIR ENLARGEMENT

FACILITY GROUPING: STORAGE
CODE: FRLV10

ITEM No.	ITEM	UNIT	UNIT COST*	QUANTITY	ITEM COST
	Grout	SKS	$ 21.70	4,700	$ 101,990
	Subtotal				**$ 34,036,848**
VIII.	**SPILLWAY**				
	Excavation	CY	$ 4.72	438,000	$ 2,067,360
	Slope Protection	SY	$ 16.00	41,000	$ 656,000
	Riprap (Exit Channel)	CY	$ 42.50	27,000	$ 1,147,500
	Riprap Bedding	CY	$ 42.50	14,000	$ 595,000
	Control Structure Concrete	CY	$ 378	6,900	$ 2,608,200
	Chute Concrete	CY	$ 378	18,000	$ 6,804,000
	Stilling Basin Concrete	CY	$ 378	11,000	$ 4,158,000
	Subtotal				**$ 18,036,060**
IX.	**OUTLET WORKS**				
	Excavation	CY	$4.72	56,000	$ 264,320
	Slope Protection	SY	$16.00	8,000	$ 128,000
	Outlet Tunnel	LF	$ 1,698	4,000	$ 6,792,000
	Cut and Cover Conduit	LF	$ 2,075	310	$ 643,250
	Steel Liner	LF	$ 1,415	2,800	$ 3,962,000
	Middle Outlet Tunnel	LF	$ 1,698	1,036	$ 1,759,128
	Upper Outlet Tunnel	LF	$ 1,698	725	$ 1,231,050
	Shaft	LF	$ 3,396	660	$ 2,241,360
	Shaft House Concrete	CY	$ 378	660	$ 249,480
	Control House Concrete	CY	$ 378	1,000	$ 378,000
	Stilling Basin Concrete	CY	$ 378	1,500	$ 567,000
	Wheel Gate (In Shaft)	EA	$ 188,000	4	$ 752,000
	Control Gates (In Control House)	EA	$ 142,000	2	$ 284,000
	Guard Gates (In Control House)	EA	$ 142,000	2	$ 284,000
	Bifurcations	LBS	$ 3.78	35,000	$ 132,300
	Trashracks and Misc. Metal	LBS	$ 1.88	32,000	$ 60,160
	Electrical	LS	$ 283,000	JOB	$ 283,000
	Riprap Bedding	CY	$ 42.50	4,000	$ 170,000
	Riprap	CY	$ 42.50	8,000	$ 340,000
	Subtotal				**$ 20,521,048**
	FACTOR FOR EMERGENCY RELEASE = 2.29				
	Adjusted Subtotal				**$ 46,993,200**
X.	**ACCESS ROADS**	LF	$ 65.00	9,900	**$ 643,500**
	Subtotal Los Vaqueros Dam and Reservoir				**$ 491,687,311**
	KELLOGG FOREBAY				
XI.	**LAND ACQUISITION**	AC	$ 3,500	164	**$ 574,000**
XII.	**RESERVOIR CLEARING**	AC	$ 1,097	13	**$ 14,261**
XIII.	**MAIN DAM**				
	Stripping/Excavation	CY	$ 1.76	146,000	$ 256,960
	Foundation Preparation	SY	$ 0.68	23,000	$ 15,640
	Foundation Special Treatment	SY	$ 1.37	16,000	$ 21,920
	Dewatering	LS	$ 15,000	JOB	$ 15,000

Description: LOS VAQUEROS RESERVOIR ENLARGEMENT

FACILITY GROUPING: STORAGE
CODE: FRLV10

ITEM No.	ITEM	UNIT	UNIT COST*	QUANTITY	ITEM COST
	Impervious Core	CY	$ 6.63	92,000	$ 609,960
	Filter & Drain	CY	$ 27.50	38,000	$ 1,045,000
	Sandstone & Shale	CY	$ 6.85	244,000	$ 1,671,400
	Pit Run	CY	$ 11.70	17,000	$ 198,900
	Riprap & Bedding	CY	$ 42.50	10,000	$ 425,000
	Grout Curtain				
	Drill Holes	LF	$ 3.02	3,400	$ 10,268
	Grout	SKS	$ 18.60	1,700	$ 31,620
	Consolidation Grout				
	Drill Holes	LF	$ 3.26	1,000	$ 3,260
	Grout	SKS	$ 21.70	600	$ 13,020
	Subtotal				**$ 4,317,948**
XIV.	**SADDLE DAMS**				
	Stripping/Excavation	CY	$ 1.76	56,000	$ 98,560
	Foundation Preparation	SY	$ 0.68	8,700	$ 5,916
	Foundation Special Treatment	SY	$ 1.37	6,100	$ 8,357
	Impervious Core	CY	$ 6.63	31,000	$ 205,530
	Filter & Drain	CY	$ 27.50	13,000	$ 357,500
	Sandstone & Shale	CY	$ 6.85	82,215	$ 563,173
	Pit Run	CY	$ 11.70	5,800	$ 67,860
	Riprap & Bedding	CY	$ 42.50	3,400	$ 144,500
	Grout Curtain				
	Drill Holes	LF	$ 3.02	900	$ 2,718
	Grout	SKS	$ 18.60	450	$ 8,370
	Consolidation Grout				
	Drill Holes	LF	$ 3.26	250	$ 815
	Grout	SKS	$ 21.70	150	$ 3,255
	Subtotal				**$ 1,466,554**
XV.	**SPILLWAY**				
	Excavation	CY	$ 4.72	67,000	$ 316,240
	Slope Protection	SY	$ 16.00	6,300	$ 100,800
	Riprap (Exit Channel)	CY	$ 42.50	4,200	$ 178,500
	Riprap Bedding	CY	$ 42.50	2,100	$ 89,250
	Control Structure Concrete	CY	$ 378	1,100	$ 415,800
	Chute Concrete	CY	$ 378	2,700	$ 1,020,600
	Stilling Basin Concrete	CY	$ 378	1,700	$ 642,600
	Subtotal				**$ 2,763,790**
XVI.	**OUTLET WORKS**				
	Excavation	CY	$4.72	56,000	$ 264,320
	Slope Protection	SY	$16.00	8,000	$ 128,000
	Outlet Tunnel	LF	$ 1,698	670	$ 1,137,660
	Cut and Cover Conduit	LF	$ 2,075	50	$ 103,750
	Steel Liner	LF	$ 1,415	470	$ 665,050
	Middle Outlet Tunnel	LF	$ 1,698	170	$ 288,660
	Upper Outlet Tunnel	LF	$ 1,698	120	$ 203,760
	Shaft	LF	$ 3,396	105	$ 356,580
	Shaft House Concrete	CY	$ 378	105	$ 39,690
	Control House Concrete	CY	$ 378	1,000	$ 378,000
	Stilling Basin Concrete	CY	$ 378	1,500	$ 567,000
	Wheel Gate (In Shaft)	EA	$ 188,000	4	$ 752,000

Description: **LOS VAQUEROS RESERVOIR ENLARGEMENT**

FACILITY GROUPING: STORAGE
CODE: FRLV10

ITEM No.	ITEM	UNIT	UNIT COST*	QUANTITY	ITEM COST
	Control Gates (In Control House)	EA	$ 142,000	2	$ 284,000
	Guard Gates (In Control House)	EA	$ 142,000	2	$ 284,000
	Bifurcations	LBS	$ 3.78	35,000	$ 132,300
	Trashracks and Misc. Metal	LBS	$ 1.88	32,000	$ 60,160
	Electrical	LS	$ 283,000	JOB	$ 283,000
	Riprap Bedding	CY	$ 42.50	4,000	$ 170,000
	Riprap	CY	$ 42.50	8,000	$ 340,000
	Subtotal				**$ 6,437,930**
	FACTOR FOR EMERGENCY RELEASE = 0.29				
	Adjusted Subtotal				**$ 1,867,000**
XVII.	**ACCESS ROADS**	LF	$ 65.00	300	**$ 19,500**
	Subtotal Kellog Forebay				**$ 11,000,000**
	CONVEYANCE FACILITIES				
XVIII.	**LOS VAQUEROS PIPELINE (Q=5,000 CFS) - 9 BARREL**	LF	$ 720	99,000	**$ 71,280,000**
XIX.	**LOS VAQUEROS PUMPING-GENERATING PLANT (Q=5,000 cfs, TDH=552 ft., HP = 418,000)**	LS	$ 250,400,000	JOB	**$ 250,400,000**
XX.	**TUWAY CANAL (Q=5,000CFS)**				
	Canal				
	Excavation	CY	$ 2.00	4,066,000	$ 8,132,000
	Compacted Embankment	CY	$ 0.80	183,000	$ 146,400
	Common Embankment	CY	$ 0.50	155,000	$ 77,500
	Clearing and Grubbing	SF	$ 0.03	8,767,000	$ 219,175
	Concrete Lining	CY	$ 80.00	37,900	$ 3,032,000
	Operating Road-Gravel Surfacing	TONS	$ 11.20	10,200	$ 114,240
	Siphons				
	Siphon	CY	$ 600	51,000	$ 30,600,000
	Inlet and Outlet Transitions	CY	$ 600	3,500	$ 2,100,000
	Outlet Works Facility				
	Check Structure	CY	$ 600	1,170	$ 702,000
	Concrete	CY	$ 600	3,250	$ 1,950,000
	Radial Gates (25ft x 55ft)	EA	$ 690,000	3	$ 2,070,000
	Outlet Structure Concrete	CY	$ 600	1,700	$ 1,020,000
	144" Dia. Pipe	LF	$ 720	900	$ 648,000
	Control Building	SF	$ 150	1,000	$ 150,000
	Electrical Installation	LS	$ 500,000	JOB	$ 500,000
	Misc. Metalwork	LS	$ 150,000	JOB	$ 150,000
	Cofferdam Sheetpiling	SF	$ 28.00	50,300	$ 1,408,400
	Cofferdam Gravel Fill	CY	$ 21.00	9,310	$ 195,510
	Land Acquisition				
	Canal	AC	$ 3,500	330	$ 1,155,000
	Pipeline	AC	$ 3,500	80	$ 280,000
	Subtotal				**$ 54,650,225**
XXI.	**NORTH SAN JOAQUIN INTAKE CHANNEL WIDENING**				
	Cofferdam Sheetpiling	SF	$ 28.00	2,513,000	$ 70,364,000
	Cofferdam Gravel Fill	CY	$ 21.00	465,000	$ 9,765,000

Description: **LOS VAQUEROS RESERVOIR ENLARGEMENT**

FACILITY GROUPING: STORAGE
CODE: FRLV10

ITEM No.	ITEM	UNIT[a]	UNIT COST*	QUANTITY	ITEM COST
	Excavation	CY	$ 3.00	850,000	$ 2,550,000
	Salvage Riprap and Replace on New Sideslope	LS	$ 1,800,000	JOB	$ 1,800,000
	Subtotal				**$ 84,479,000**
XXII.	**KELLOGG PUMPING PLANT**				
	Pumping Plant (Q=5,000cfs, TDH=255ft, HP=193,000)	LS	$ 135,200,000	JOB	**$ 135,200,000**
XXIII.	**KELLOGG PUMPING PLANT DISCHARGE FACILITY**				
	144" Dia. Pipeline	LF	$ 720	28,800	$ 20,736,000
	Canal	LF	$ 570	1,000	$ 570,000
	Check Structure				
	Concrete	CY	$ 600	3,250	$ 1,950,000
	Radial Gates (25ft x 55ft)	EA	$ 690,000	3	$ 2,070,000
	Land Acquisition				
	Canal	AC	$ 3,500	14	$ 49,000
	Pipeline	AC	$ 3,500	14	$ 49,000
	Subtotal				**$ 25,424,000**
	Subtotal Conveyance Facilities				**$ 621,400,000**
	CONSTRUCTION ESTIMATE				**$ 1,124,087,311**

REFERENCES: 1. Bookman-Edmonston Engineering, *CALFED Storage and Conveyance Components - Facility Description and* Cost Estimate Reports, October 1997.

***NOTES:** The Unit Cost value was generated by Bookman-Edomonston and based on the USBR index according to the following formula:
Unit Cost New = (USBR New / USBR Previous) * Unit Cost Previous

[a]CY=cubic yard; LB=pound; EA=each; LS=lump sum; LF=linear foot; SF=square foot; TON=ton; MI=mile; AC=acre

CALFED Facility Components

(Million of 1998 Dollars)

Facility Component	Base Construction Estimate	Contingency Cost	Construction Cost	Engineering Cost	Regulatory Cost	Subtotal Cost	Forgone Investment Adjustment	TOTAL CAPITAL COST	Annual Capital Cost	Annual O&M Cost	Annual Energy Cost	TOTAL ANNUAL COST
A	B	C	D	E	F	G	H	I	J	K	L	M
		0.2 x B	B + C	0.35 x D	0.2 x D	D + E + F		G + H	0.0634 x I	0.015 x D	0.005 x D	J + K + L
SURFACE STORAGE												
Sacramento River Tributary Storage												
Auburn Reservoir (2,300 taf)	1,127.0	225.4	1,352.4	473.3	270.5	2,096.2	286.3	2,382.6	151.2	20.3		171.4
Colusa Reservoir (3,300 taf)	946.9	189.4	1,136.3	397.7	227.3	1,761.2	240.6	2,001.8	127.0	17.0	5.7	149.7
Fiddlers Reservoir (545 taf)	173.5	34.7	208.3	72.9	41.7	322.8	44.1	366.9	23.3	3.1	1.0	27.4
Folsom Reservoir Enlargement (366 taf)	312.0	62.4	374.4	131.0	74.9	580.3	79.3	659.5	41.8	5.6		47.5
Freemans Crossing (1,019 taf)	763.2	152.6	915.9	320.6	183.2	1,419.6	193.9	1,613.5	102.4	13.7	4.6	120.7
Freemans Crossing (225 taf)	293.2	58.6	351.8	123.1	70.4	545.4	74.5	619.9	39.3	5.3	1.8	46.4
Garden Bar Reservoir (260 taf)	134.1	26.8	160.9	56.3	32.2	249.3	34.1	283.4	18.0	2.4	0.8	21.2
Glenn Reservoir (2,694 taf)	1,212.9	242.6	1,455.4	509.4	291.1	2,255.9	308.2	2,564.1	162.7	21.8	7.3	191.8
Glenn Reservoir (5,014 taf)	1,631.0	326.2	1,957.1	685.0	391.4	3,033.6	414.4	3,448.0	218.8	29.4	9.8	257.9
Kosk Reservoir (796 taf)	465.5	93.1	558.7	195.5	111.7	865.9	118.3	984.2	62.4	8.4	2.8	73.6
Lake Berryessa Enlargement (6,000 taf)	1,076.5	215.3	1,291.8	452.1	258.4	2,002.3	273.5	2,275.8	144.4	19.4	6.5	170.2
Lake Berryessa Enlargement (13,000 taf)	1,671.3	334.3	2,005.6	702.0	401.1	3,108.7	424.6	3,533.3	224.2	30.1	10.0	264.3
Red Bank Project (359 taf)	137.0	27.4	164.4	57.5	32.9	254.8	34.8	289.6	18.4	2.5	0.8	21.7
Shasta Lake Enlargement (14,300 taf)	3,031.9	606.4	3,638.3	1,273.4	727.7	5,639.3	770.3	6,409.6	406.7	54.6		461.2
Shasta Lake Enlargement (6,750 taf)	1,746.8	349.4	2,096.2	733.7	419.2	3,249.1	443.8	3,693.0	234.3	31.4		265.7
Sites (1,200 taf)	319.8	64.0	383.7	134.3	76.7	594.8	81.2	676.0	42.9	5.8	1.9	50.6
Sites (1,900 taf)	460.0	92.0	552.0	193.2	110.4	855.7	116.9	972.6	61.7	8.3	2.8	72.7
Squaw Valley Reservoir (442 atf)	432.9	86.6	519.4	181.8	103.9	805.1	110.0	915.1	58.1	7.8		65.9
Thomes-Newville Reservoir (1,840 taf)	965.6	193.1	1,158.7	405.5	231.7	1,796.0	245.3	2,041.3	129.5	17.4	5.8	152.7
Thomes-Newville Reservoir (3,080 taf)	1,101.5	220.3	1,321.8	462.6	264.4	2,048.8	279.9	2,328.6	147.7	19.8	6.6	174.2
Waldo Reservoir (300 taf)	334.8	67.0	401.7	140.6	80.3	622.6	85.1	707.7	44.9	6.0	2.0	52.9
San Joaquin River Tributary Storage												
Cooperstown Reservoir (441 taf)	303.2	60.6	363.9	127.4	72.8	564.0	77.0	641.1	40.7	5.5	1.8	47.9
Cooperstown Reservoir (933 taf)	508.4	101.7	610.1	213.5	122.0	945.6	129.2	1,074.7	68.2	9.2	3.1	80.4
Millerton Lake Enlargement (720 taf)	763.9	152.8	916.7	320.9	183.3	1,420.9	194.1	1,615.0	102.5	13.8	4.6	120.8
Montgomery Reservoir (240 taf)	161.1	32.2	193.3	67.7	38.7	299.6	40.9	340.5	21.6	2.9	1.0	25.5
Nashville Reservoir (1,154 taf)	540.9	108.2	649.1	227.2	129.8	1,006.1	137.4	1,143.5	72.5	9.7	3.2	85.5
Off-Aqueduct Storage												
Garzas Reservoir (1,999 taf)	1,863.7	372.7	2,236.5	782.8	447.3	3,466.5	473.5	3,940.0	250.0	33.5	11.2	294.7
Ingram Reservoir (401 taf)	450.3	90.1	540.3	189.1	108.1	837.5	114.4	951.9	60.4	8.1	2.7	71.2
Ingram Reservoir (1,375 taf)	1,017.3	203.5	1,220.7	427.3	244.1	1,892.1	258.5	2,150.6	136.4	18.3	6.1	160.9
Kettleman Plain Reservoirm (338 taf)	244.0	48.8	292.8	102.5	58.6	453.9	62.0	515.9	32.7	4.4	1.5	38.6
Little Salado-Crow Reservoir (206 taf)	367.9	73.6	441.5	154.5	88.3	684.3	93.5	777.8	49.3	6.6	2.2	58.2
Los Banos Grandes (1,729 taf)	716.8	143.4	860.1	301.0	172.0	1,333.2	182.1	1,515.3	96.1	12.9	4.3	113.3
Los Banos Grandes (2,030 taf)	843.7	168.7	1,012.4	354.3	202.5	1,569.2	214.4	1,783.6	113.2	15.2	5.1	133.4
Los Vaqueros Enlargement (1,065)	1,161.2	232.2	1,393.4	487.7	278.7	2,159.8	295.0	2,454.8	155.7	20.9	7.0	183.6
Orestimba Reservoir (380 taf)	693.1	138.6	831.7	291.1	166.3	1,289.2	427.9	1,717.1	108.9	12.5	4.2	125.6
Orestimba Reservoir (1,140 taf)	1,684.2	336.8	2,021.0	707.3	404.2	3,132.5	176.1	3,308.7	209.9	30.3	10.1	250.3
Panoche Reservoir (3,100 taf)	2,527.0	505.4	3,032.4	1,061.3	606.5	4,700.2	642.0	5,342.2	338.9	45.5	15.2	399.6
Quinto Reservoir (378 taf)	444.0	88.8	532.8	186.5	106.6	825.9	112.8	938.7	59.6	8.0	2.7	70.2
Quinto Reservoir (434 taf)	615.6	123.1	738.7	258.6	147.7	1,145.0	156.4	1,301.4	82.6	11.1	3.7	97.3
San Luis Enlargement (390 taf)	509.4	101.9	611.3	213.9	122.3	947.4	129.4	1,076.9	68.3	9.2	3.1	80.5

TABLE E

G-004395

G-004395

CALFED Facility Components

(Million of 1998 Dollars)

Facility Component	Base Construction Estimate	Contingency Cost	Construction Cost	Engineering Cost	Regulatory Cost	Subtotal Cost	Forgone Investment Adjustment	TOTAL CAPITAL COST	Annual Capital Cost	Annual O&M Cost	Annual Energy Cost	TOTAL ANNUAL COST
A	B	C	D	E	F	G	H	I	J	K	L	M
		0.2 x B	B + C	0.35 x D	0.2 x D	D + E + F		G + H	0.0634 x I	0.015 x D	0.005 x D	J + K + L
Sunflower Reservoir (363 taf)	386.3	77.3	463.6	162.3	92.7	718.6	98.2	816.7	51.8	7.0	2.3	61.1
Sunflower Reservoir (600 taf)	459.1	91.8	550.9	192.8	110.2	853.8	116.6	970.5	61.6	8.3	2.8	72.6
MAJOR RESERVOIR CONVEYANCE												
(1a) Enlarge by widening existing T-C Canal from Funks Reservoir to Bird Creek (Reaches 6 through 8) plus extend new canal from Bird Creek to Winters Pumping Plant at Berryessa Intertie	231.2	46.2	277.4	97.1	55.5	429.9	12.9	442.8	28.1	4.2	1.4	33.6
(1b) Same as (1a), except enlarge by constructing new parallel canal	279.2	55.8	335.0	117.2	67.0	519.2	15.6	534.8	33.9	5.0	1.7	40.6
(2a1) Enlarge existing T-C Canal from Red Bluff Diversion to Funks Reservoir (Reaches 1 through 5) -- Fish Ladder Alternative	192.3	38.5	230.8	80.8	46.2	357.7	10.7	368.4	23.4	3.5	1.2	28.0
(2a2) Enlarge existing T-C Canal from Red Bluff Diversion to Funks Reservoir (Reaches 1 through 5) -- Screened Pump Alternative	244.7	48.9	293.7	102.8	58.7	455.2	13.7	468.8	29.7	4.4	1.5	35.6
(2b1) Same as (2a1), except enlarge by constructing new parallel canal (Reaches 1 through 5) -- Fish Ladder Alternative	273.4	54.7	328.1	114.8	65.6	508.5	15.3	523.8	33.2	4.9	1.6	39.8
(2b2) Same as (2a2), except enlarge by constructing new parallel canal (Reaches 1 through 5) -- Screened Pump Alternative	325.8	65.2	391.0	136.8	78.2	606.0	18.2	624.2	39.6	5.9	2.0	47.4
(2c) Enlarge existing T-C Canal structure from the intersection of the Chico Landing Canal to Funks Reservoir (Reaches 3 through 5)	72.9	14.6	87.5	30.6	17.5	135.7	4.1	139.7	8.9	1.3	0.4	10.6
(2d) Same as (2c), except enlarge by constructiong new parallel canal	119.1	23.8	142.9	50.0	28.6	221.5	6.6	228.1	14.5	2.1	0.7	17.3
(2e1) Enlarge existing T-C Canal structure from the Red Bluff Diversion to the Sour Grass Canal (Reaches 1 through 2) -- Fish Ladder Alternative	119.4	23.9	143.2	50.1	28.6	222.0	6.7	228.7	14.5	2.1	0.7	17.4
(2e2) Enlarge existing T-C Canal structure from the Red Bluff Diversion to the Sour Grass Canal (Reaches 1 through 2) -- Screened Pump Alternative	171.8	34.4	206.1	72.1	41.2	319.5	9.6	329.1	20.9	3.1	1.0	25.0
(2f1) Same as (2e1), except enlarge by constructing new parallel canal -- Fish Ladder Alternative	154.3	30.9	185.2	64.8	37.0	287.0	8.6	295.6	18.8	2.8	0.9	22.5
(2f2) Same as (2e2), except enlarge by constructing new parallel canal -- Screned Pump Alternative	206.7	41.3	248.1	86.8	49.6	384.5	11.5	396.1	25.1	3.7	1.2	30.1
Lake Berryessa Intertie (3)	413.6	82.7	496.3	173.7	99.3	769.2	23.1	792.3	50.3	7.4	2.5	60.2
Chico Landing Intertie (4)	261.0	52.2	313.2	109.6	62.6	485.5	14.6	500.1	31.7	4.7	1.6	38.0
Mid-Valley Canal	575.7	115.1	690.9	241.8	138.2	1,070.8	32.1	1,102.9	70.0	10.4	3.5	83.8
DELTA CONVEYANCE												
CVP-SWP Improvements												
No Intake; New Fish Screens @ Tracy; and Tracy/CCFB Interite	73.9	14.8	88.6	31.0	17.7	137.4	18.8	156.1	9.9	1.3	0.4	11.7
5,000 cfs Pump Station @ CCFB; New Fish Screens @ Tracy; and Tracy/CCFB Interite	239.3	47.9	287.2	100.5	57.4	445.1	60.8	506.0	32.1	4.3	1.4	37.8
New Fish Screen @ Skinner; New Fish Screen @ Tracy; and Tracy/CCFB Interite	180.3	36.1	216.3	75.7	43.3	335.3	45.8	381.1	24.2	3.2	1.1	28.5
15,000 cfs Pump Station @ CCFB; New Fish Screens @ Tracy; and Tracy/CCFB Interite	408.0	81.6	489.5	171.3	97.9	758.8	103.7	862.4	54.7	7.3	2.4	64.5
North Delta Improvements												
10,000 cfs Hood Diversion; Flooded McCormick Williamson; Setback Levees @New Hope, Staten/Tyler, and Boulden	454.9	91.0	545.9	191.1	109.2	846.2	115.6	961.8	61.0	8.2	2.7	71.9
Setback Levees @New Hope, Staten/Tyler, and Boulden	155.6	31.1	186.7	65.3	37.3	289.4	39.5	328.9	20.9	2.8	0.9	24.6
East Floodway; 10,000 cfs Hood Diversion; Flooded McCormick Williamson, Canal Ranch, Brack, and boulden; Setback Levees @New Hope, Terminous, and Staten	588.4	117.7	706.1	247.1	141.2	1,094.4	149.5	1,243.9	78.9	10.6	3.5	93.0

TABLE E

G-004396

G—004396

CALFED Facility Components

(Million of 1998 Dollars)

Facility Component	Base Construction Estimate	Contingency Cost	Construction Cost	Engineering Cost	Regulatory Cost	Subtotal Cost	Forgone Investment Adjustment	TOTAL CAPITAL COST	Annual Capital Cost	Annual O&M Cost	Annual Energy Cost	TOTAL ANNUAL COST
A	B	C	D	E	F	G	H	I	J	K	L	M
		0.2 x B	B + C	0.35 x D	0.2 x D	D + E + F		G + H	0.0634 x I	0.015 x D	0.005 x D	J + K + L
West Floodway; Wier Intake; Flooded McCormickson Williamson, Tyler, and Boulden Islands; East Delta Habitat on Canal Ranch and Brack	281.5	56.3	337.8	118.2	67.6	523.6	71.5	595.1	37.8	5.1	1.7	44.5
South Delta Improvements												
Dredging on Old River; one Operable Fish Barrier and three Flow Barriers	42.9	8.6	51.4	18.0	10.3	79.7	10.9	90.6	5.7	0.8	0.3	6.8
NO Dredging; one Operable Fish Barrier and three Flow Barriers	29.8	6.0	35.7	12.5	7.1	55.3	7.6	62.9	4.0	0.5	0.2	4.7
Setback Levees; one Operable Fish Barrier and South Delta habitat with setback levees from Franks Track to CCFB	146.8	29.4	176.1	61.7	35.2	273.0	37.3	310.3	19.7	2.6	0.9	23.2
One Operable Fish Barrier ONLY	9.2	1.8	11.0	3.9	2.2	17.1	2.3	19.4	1.2	0.2	0.1	1.5
Multiple Intakes												
Small version -- Three intakes; Northern (15,000 cfs), Western (15,000 cfs) and Eastern (5,000 cfs)	1,398.3	279.7	1,677.9	587.3	335.6	2,600.8	355.3	2,956.0	187.5	25.2	8.4	221.1
Extended version -- Four intakes; Northern (15,000 cfs), Western (15,000 cfs) and Eastern (5,000 cfs) - the Northern intake is extended to Hood with a new supplementary intake structure at Hood	2,025.7	405.1	2,430.9	850.8	486.2	3,767.8	514.7	4,282.5	271.7	36.5	12.2	320.3
Isolated Facility												
5,000 cfs Isolated open channel with a diversion at Hood	570.6	114.1	684.8	239.7	137.0	1,061.4	145.0	1,206.4	76.5	10.3	3.4	90.2
5,000 cfs Isolated pipeline with a diversion at Hood	2,057.4	411.5	2,468.9	864.1	493.8	3,826.8	522.7	4,349.6	276.0	37.0	12.3	325.3
10,000 cfs Isolated open channel with a diversion at Hood	749.8	150.0	899.7	314.9	179.9	1,394.5	190.5	1,585.0	100.6	13.5	4.5	118.6
15,000 cfs Isolated open channel with a diversion at Hood	799.3	159.9	959.2	335.7	191.8	1,486.8	203.1	1,689.9	107.2	14.4	4.8	126.4
5,000 cfs Deep Water Ship Channel and Western Tunnel	1,490.6	298.1	1,788.7	626.1	357.7	2,772.6	378.7	3,151.3	199.9	26.8	8.9	235.7
In Delta Storage												
Flooding of Victoria, Woodward, and Bacon Islands with siphons used to convey water through interior canals	558.6	111.7	670.4	234.6	134.1	1,039.1	141.9	1,181.0	74.9	10.1	3.4	88.3
Flooding of Victoria, Woodward, and Bacon Islands with interior canals cutoff to allow conveyance	526.0	105.2	631.2	220.9	126.2	978.4	133.6	1,112.0	70.6	9.5	3.2	83.2
Chain of Lakes -- Delta Islands converted to water storage from Tyler Island to CCFB (with Siphons); Enlarged Delta Cross Channel	1,656.7	331.3	1,988.1	695.8	397.6	3,081.5	420.9	3,502.4	222.2	29.8	9.9	262.0
Chain of Lakes -- Delta Islands converted to water storage from Tyler Island to CCFB (with Siphons and Pump); Enlarged Delta Cross Channel	1,660.4	332.1	1,992.5	697.4	398.5	3,088.4	421.9	3,510.3	222.7	29.9	10.0	262.6
Groundwater Storage												
North of Delta												
280 TAF Eastern Sutter Co. Project @$125/AF	36.2	7.2	43.4	15.2	8.7	67.2	2.0	69.3	4.4	0.7	0.2	5.3
250 TAF Sacramento Valley Projects	31.0	6.2	37.2	13.0	7.4	57.6	1.7	59.4	3.8	0.6	0.2	4.5
220 TAF Thomes Creek Fan Project @$128/AF	29.1	5.8	34.9	12.2	7.0	54.1	1.6	55.7	3.5	0.5	0.2	4.2
280 TAF Yuba Co. Project @$111/AF	32.1	6.4	38.5	13.5	7.7	59.7	1.8	61.5	3.9	0.6	0.2	4.7
South of Delta												
350 TAF Madera Ranch Project @$171/AF	61.8	12.4	74.2	26.0	14.8	115.0	3.4	118.4	7.5	1.1	0.4	9.0
500 TAF San Joaquin Valley Projects	74.9	15.0	89.9	31.5	18.0	139.3	4.2	143.5	9.1	1.3	0.4	10.9
740 TAF Folsom South Canal Area Project @$140/AF	107.0	21.4	128.4	44.9	25.7	199.1	6.0	205.0	13.0	1.9	0.6	15.6
930 TAF Kern River Fan Project @$134/AF	128.7	25.7	154.5	54.1	30.9	239.4	7.2	246.6	15.6	2.3	0.8	18.7

TABLE E

G-004397

G-004397