

STATE OF CALIFORNIA  
THE RESOURCES AGENCY  
DEPARTMENT OF WATER RESOURCES  
DIVISION OF DESIGN AND CONSTRUCTION

CONCEPTUAL LEVEL  
DESIGN AND COST ESTIMATES  
FOR VARIOUS FACILITIES  
AFFECTING THE DELTA

SEPTEMBER 1994

Douglas P. Wheeler  
Secretary for Resources  
The Resources  
Agency

Pete Wilson  
Governor  
State of  
California

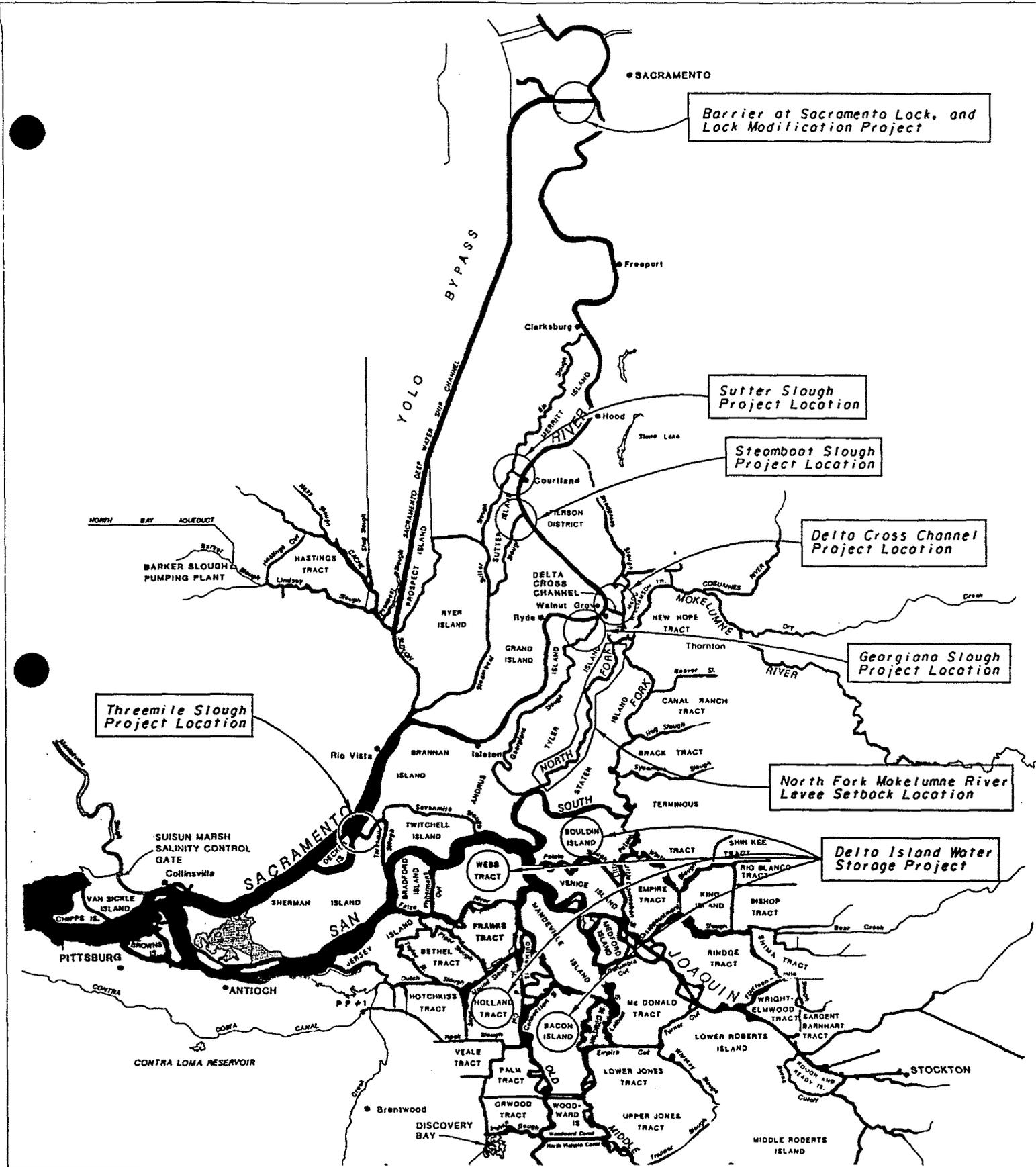
David N. Kennedy  
Director  
Department of  
Water Resources

## Foreword

The Civil Design Branch was requested to prepare conceptual level design and cost estimates of the facilities listed below for The Bay-Delta Oversight Council. The purpose of these conceptual design and cost estimates is to provide the council with a broad outline of the cost and description of the facilities listed below. A more refined work product can be provided if it is requested.

1. Georgiana Slough Barrier Alternatives.
2. Delta Cross Channel Three Gate Enlargement.
3. Threemile Slough Barrier Alternatives.
4. Deflector Walls at Steamboat and Sutter Sloughs.
5. William Stone Lock.
6. Delta Island Water Storage Project.
7. Desalinization Plant Costs.
8. North Delta Preferred Alternative.
9. Offstream Water Storage Projects.
10. Flood Control Storage Projects.

Each facility listed above is described either by a conceptual drawing or a brief written description or both. The total estimated cost of each facility is summarized in the written description. Itemized costs for each facility are also included.



*Proposed Project Locations*

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1. Georgiana Slough Barrier  
Alternatives

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Georgiana Slough Barrier Alternatives

Conceptual design drawings and cost estimates were prepared for the following alternatives: (1) rock barrier, (2) rubber dam, (3) fish deflector wall, (4) wicket gate, (5) permanent radial gate structure--built offsite and sunk in place, and (6) permanent radial gate structure--built in place. A brief description of each alternative studied follows:

Alternative I - Rock Barrier

The temporary rock barrier would be constructed of aggregate base material and be enclosed in a 3-foot layer of graded rockfill. The rock barrier is designed to provide structural stability, resistance to seepage flow, and yet be capable of being rapidly erodable if overtopped during a flood. A notch, 20 feet wide and 1 foot deep, would be placed near the center of the rock barrier to help in breaching the barrier during flood conditions. Additionally, a barge mounted crane that will be onsite to help with boat passage could be used to remove the barrier if flood flows were predicted. Approximately 8,000 cubic yards of material would be required for the barrier. The barrier would have a trapezoidal cross section with side slopes of 2 to 1. The crest will be 10 feet wide at an elevation of +11.0 feet. Additionally the channel bottom downstream of the barrier would be armored with riprap for a distance of 200 feet from the centerline of the barrier to prevent scour during the erosion process.

Lighted floating buoys and reflective signs would be placed to alert boaters of the blocked channel. A boat passage facility that would lift boats over the barrier with a barge mounted crane and sling would be incorporated in the barrier. A floating dock on each side of the barrier would allow boaters to disembark and cross the barrier while their boats are lifted across.

Two culverts, 48 inches and 72 inches in diameter, would be imbedded in the barrier. The culverts will provide water circulation in Georgiana Slough, to prevent water quality degradation, and provide a passageway for adult salmon migrating up Georgiana Slough. The culverts would have flap gates on the upstream end and a flared end section on the downstream end.

The approximate cost for the initial construction, operation and removal of the temporary rock barrier is \$2,055,000. If most of the materials could be stockpiled and reused each consecutive year, the cost would be reduced to approximately \$600,000 annually.

Alternative II - Inflatable Dam

A 33-foot high inflatable dam would be required for the Georgiana Slough barrier. Since this height is nearly three times the height of the largest rubber dam ever constructed, it was the opinion of the manufacturer's representative that the use of a rubber dam would be impossible to construct and operate using current technology. Therefore, the possibility of using a rubber dam across the head of Georgiana Slough was eliminated from further consideration.

Alternative III - Fish Deflector Dam

A fixed fish deflector wall that crosses the mouth of Georgiana Slough would be approximately 170 feet in length. The deflector is patterned after the trash deflector at the Red Bluff Diversion Dam. It consists of a 1/2-inch-thick steel plate attached to cross bracing beams. The bracing beams would be connected to a series of vertical and batter driven piles placed 20 feet on center across the channel.

The steel vertical piles would be 94 feet long with the top of the pile at elevation 14.0. To support the vertical piles, an identical set of piles battered at a 1 to 4 slope would be placed behind the vertical piles. The piles would be furnished in two equal lengths and be welded together at the job site. Three cross bracing beams would be placed horizontally at elevation 10.0, 0.0, and -5.0. The deflector plate would be attached to the vertical pile and the cross bracing structure at elevation 10.0 and extend down to elevation -5.0. The plate would be 17 feet 1 inch high. The lower section bends away from the piles at a 1 to 1 slope. Vertical plate stiffener strips 6 inches wide would be placed every 2 feet on center along the length of the deflector to provide additional support for the 1/2-inch plate.

The estimated cost of the Georgiana Slough fish deflector wall is \$362,000. This deflector cannot be raised or lowered with the river stage. A deflector that can be raised or lowered can be constructed; however, it will be more costly. When the merits of a movable deflector can be justified and criteria established, an estimate can be prepared at that time.

Alternative IV - Wicket Gate

A wicket gate at Georgiana Slough would consist of a steel gate, 185 feet wide, 40 feet tall and 3 feet in thickness connected with hinges attached to a 12-foot-thick concrete caisson. The concrete caisson with sidewalls would be constructed offsite and floated to the site and sunk in place.

The gate would be a 1/4-inch-thick steel plate reinforced vertically with wide flange beams every 15 feet on center and

reinforced horizontally with wide flange beams every 8 feet on center. The gate would be placed in pivot pins on the concrete bottom. A buoyancy tank, 3 feet thick, would be incorporated on the wicket gate to aid in raising or lowering the gate. When the buoyancy tank is allowed to fill with water and the support braces are released, the wicket gate will slowly pivot on its hinges and lower until it is horizontal on the concrete platform, thereby opening access to the channel. When the gate is to be lifted, air is pumped into the tank so the buoyant forces lift the wall into the upright position, it is then supported by a steel beam when in the vertical position. The gate can be lowered or raised in approximately five minutes.

The approximate cost of the wicket gate at Georgiana Slough is \$4,000,000. In theory this is a very efficient design, however, in a long term operation major maintenance problems such as the deposition of silt and debris accumulating on the operating mechanism may frequently occur. Any major repair will require that the entire channel be dewatered with cellular cofferdams that are costly and may make this alternative infeasible.

#### Alternative V - Permanent Radial Gate Structure - Built Off Site

This alternative would construct the components of the structure off site and float and sink them into place at Georgiana Slough. The construction method would be similar to that used for the Montezuma Slough Control Structure project. To reduce the weight of the structure, light weight concrete would be used for the construction. The concrete floatation rafts, when ballasted with water, would become the foundations for the structures. Placement of the barrier must be staged with the radial gate structure being placed first and then the flashboard structure. The boat lock and fish passageway would be placed last. This method of placement should preserve the capacity of the slough to carry its normal flows.

Excavation for these structures would be to a depth of 55 feet and would require at a minimum 2 to 1 side slopes to the river bottom. The total volume of material excavated would be approximately 140,000 cubic yards. This alternative would also require the placement of approximately 80,000 cubic yards of fill material to realign the south levee and the county road along the Sacramento River.

The cost of this alternative is approximately \$17,820,000.

#### Alternative VI - Permanent Radial Gate Structure - Built in Place

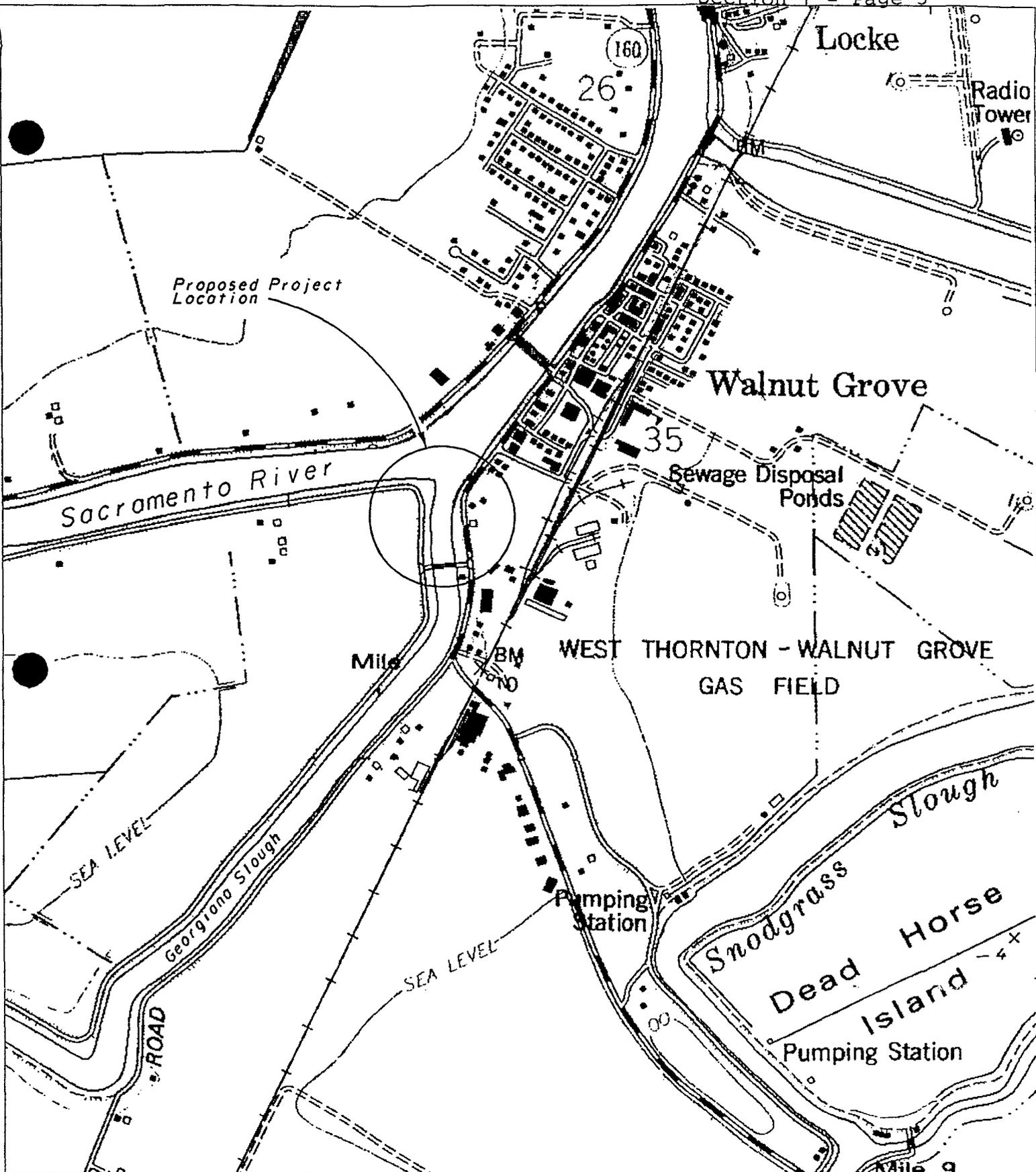
This second alternative would build the structures in their final positions within Georgiana Slough. This alternative would

require staged construction using a braced cofferdam system to build the structures in the dry.

Approximately 35,700 cubic yards of material would be excavated from the slough for placement of the barrier, and approximately 28,000 cubic yards of fill material would be required for the realignment of the south levee. This alternative also assumes that piles would be driven to a depth of 50 feet to support the structure. The pile lengths, diameters, and grouping sizes are based on a very limited amount of geological data, and therefore would change significantly if conditions are vastly different from those assumed.

The cross sectional area of the radial gates and the flashboard structure gives an area slightly larger than that of the original channel cross section. During periods when the structures would be closed to keep the downstream migrating salmon in the Sacramento River, the boat lock can be operated to handle boats up to 60 feet in length and 20 feet in beam. A fish passageway would allow for migratory fishes to move from Georgiana Slough into the Sacramento River when the gates are closed.

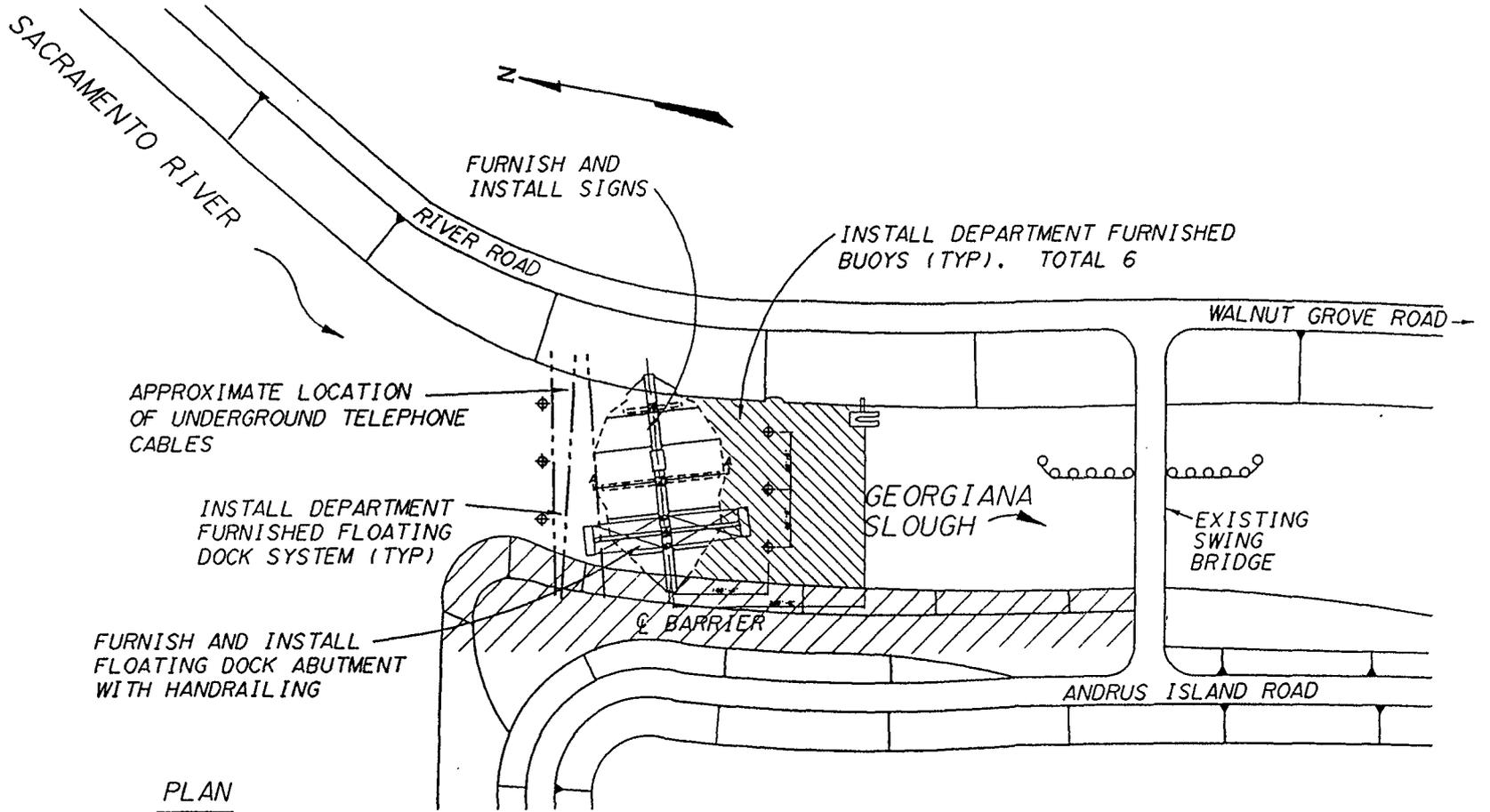
The cost of the radial gate structure built in place is approximately \$17,426,000.



Georgiana Slough  
 Project Location  
 Site Map

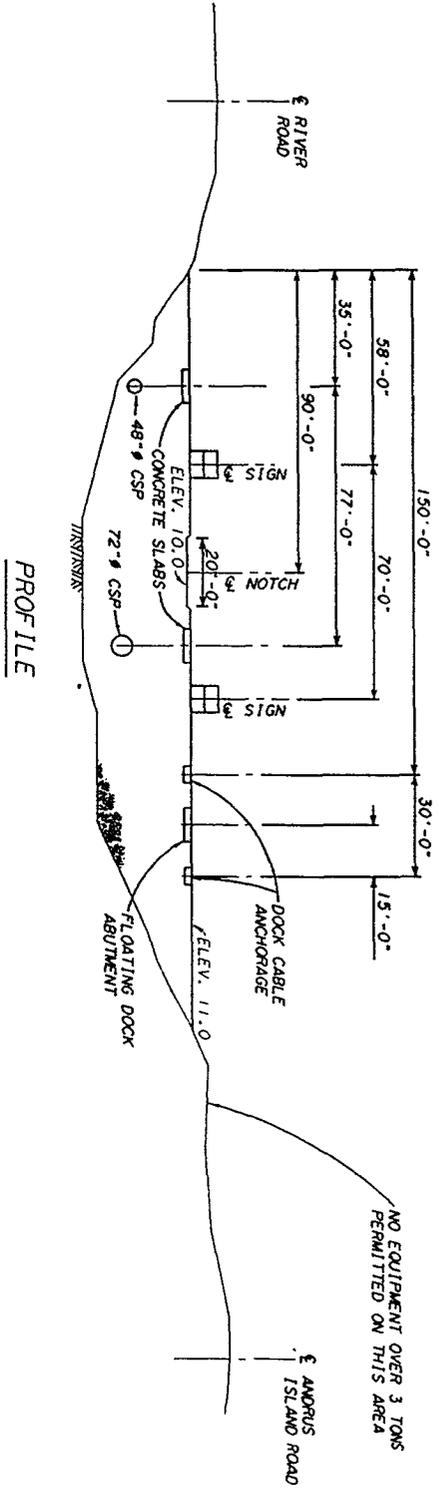
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GEORGIANA SLOUGH  
Rock Barrier  
Plan View



PLAN

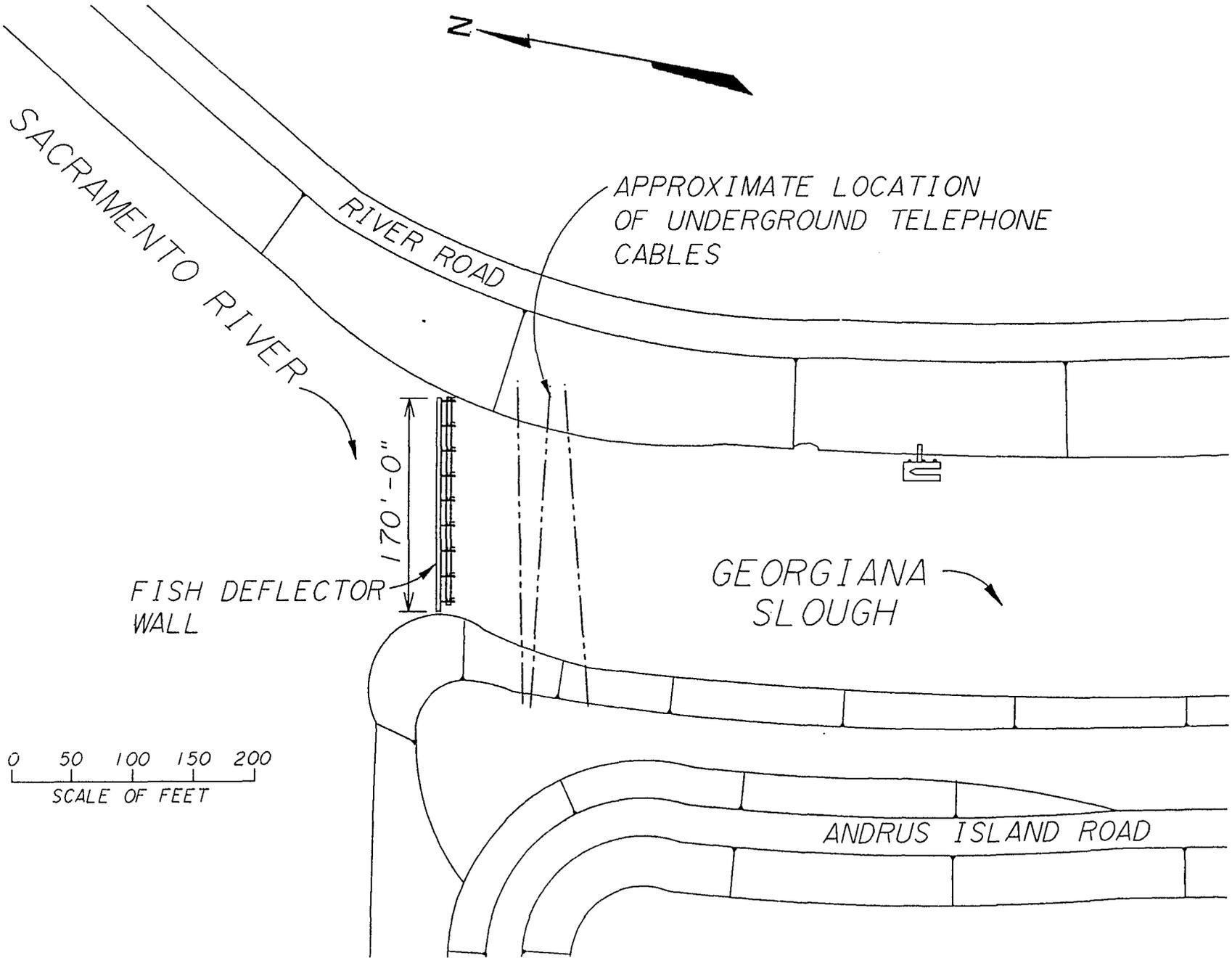
# GEORGIANA SLOUGH Rock Barrier Elevation View

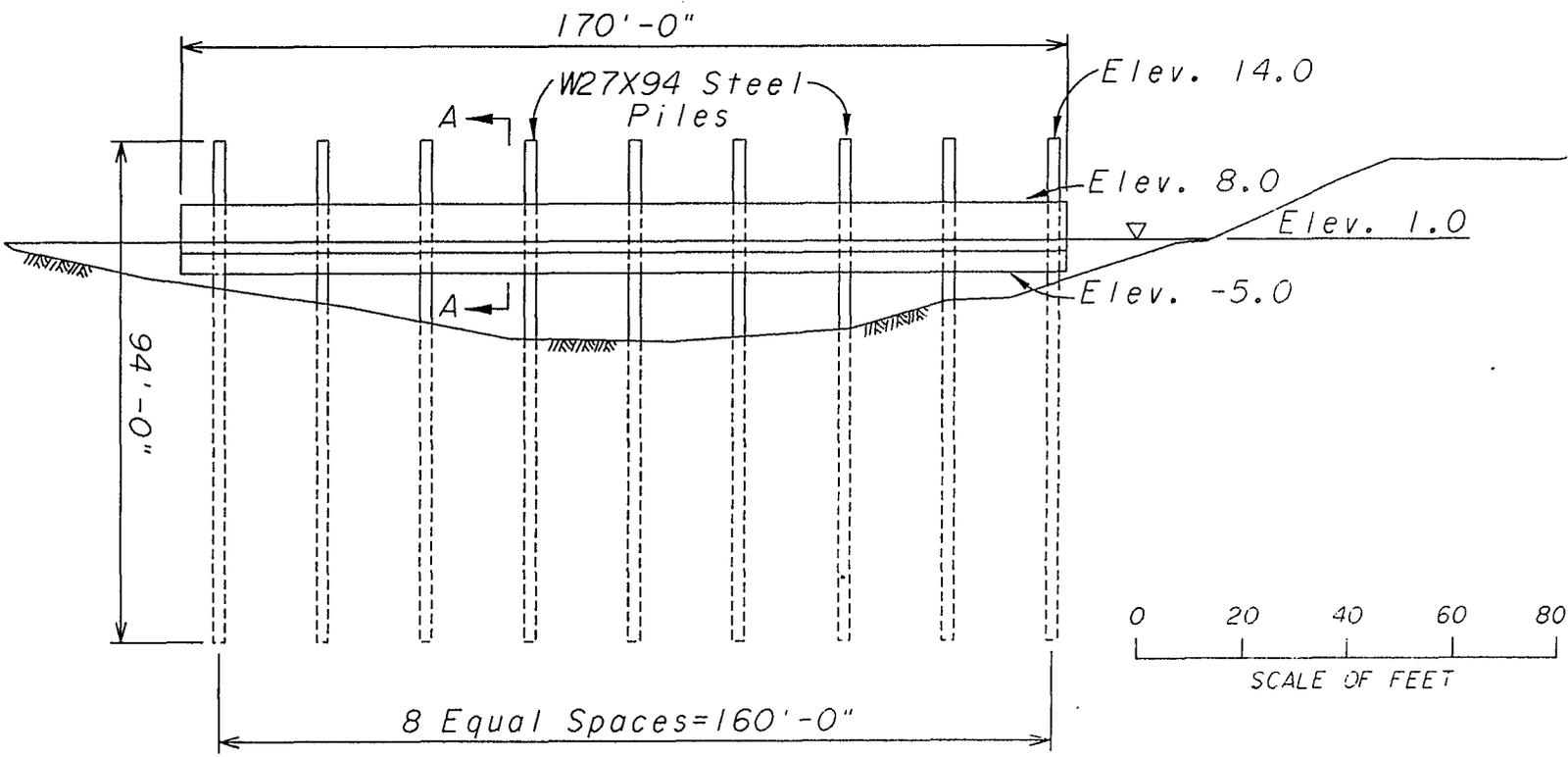


NO EQUIPMENT OVER 3 TONS  
PERMITTED ON THIS AREA

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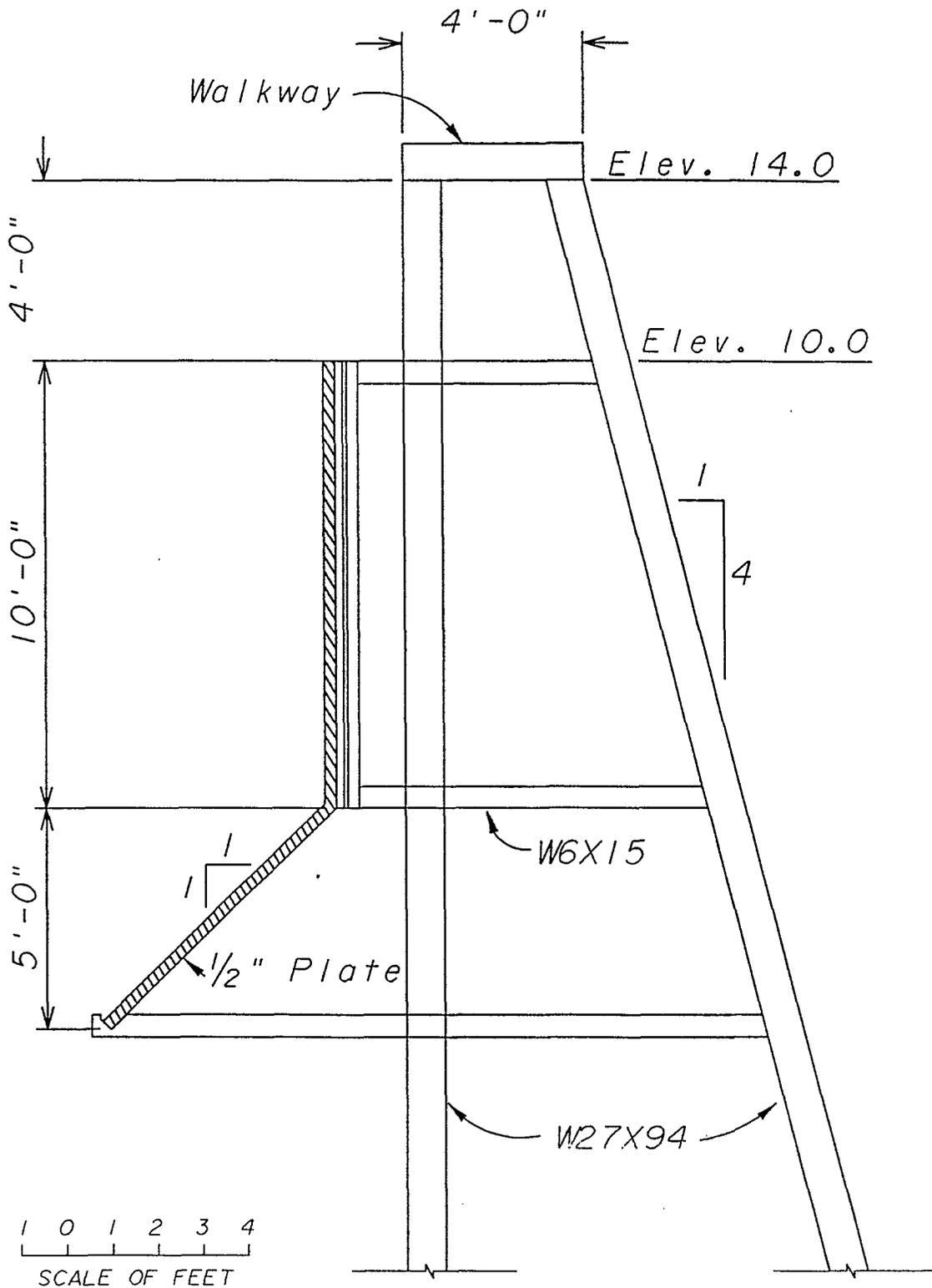
GEORGIANA SLOUGH  
Fish Deflector Wall  
Plan View



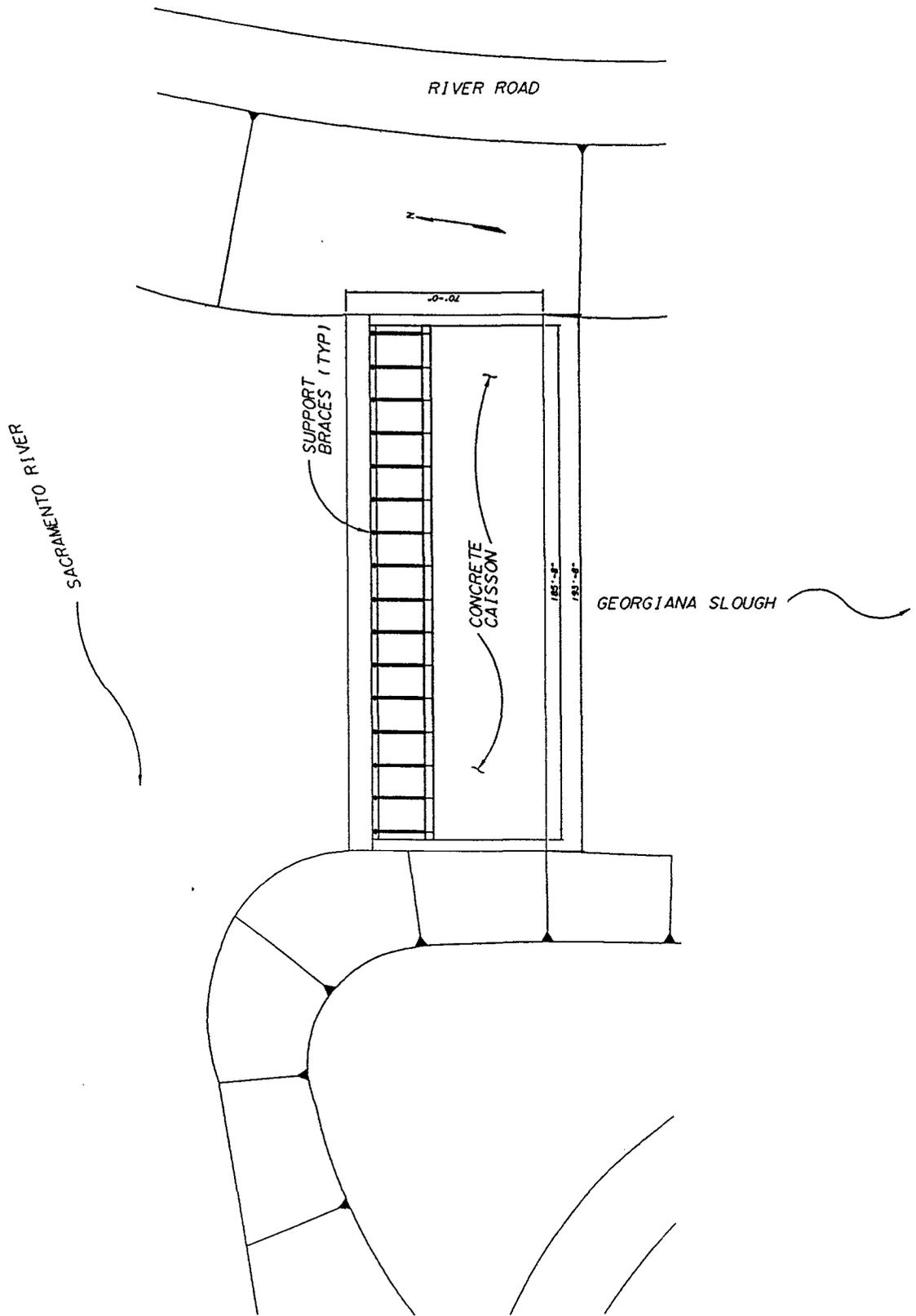


GEORGIANA SLOUGH  
Fish Deflector Wall  
Profile View

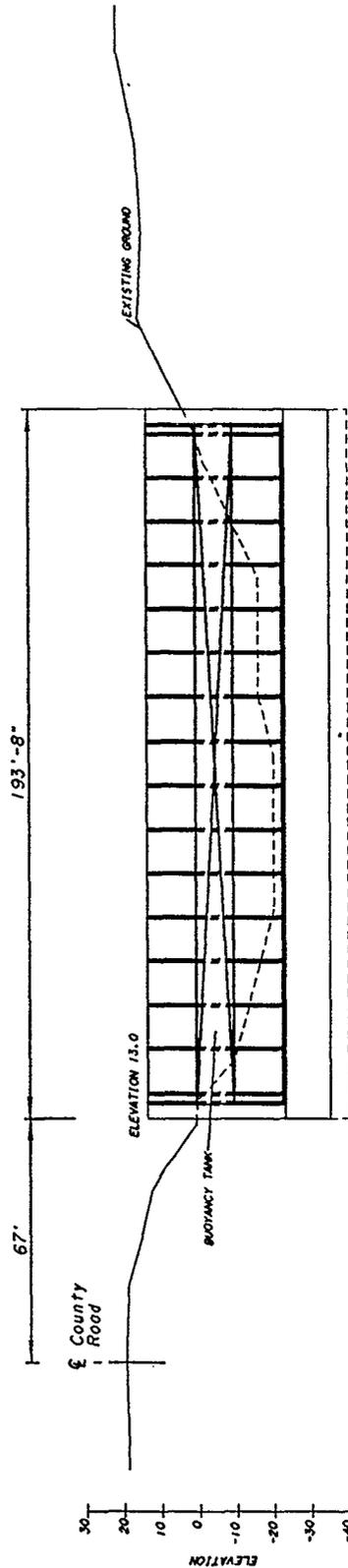
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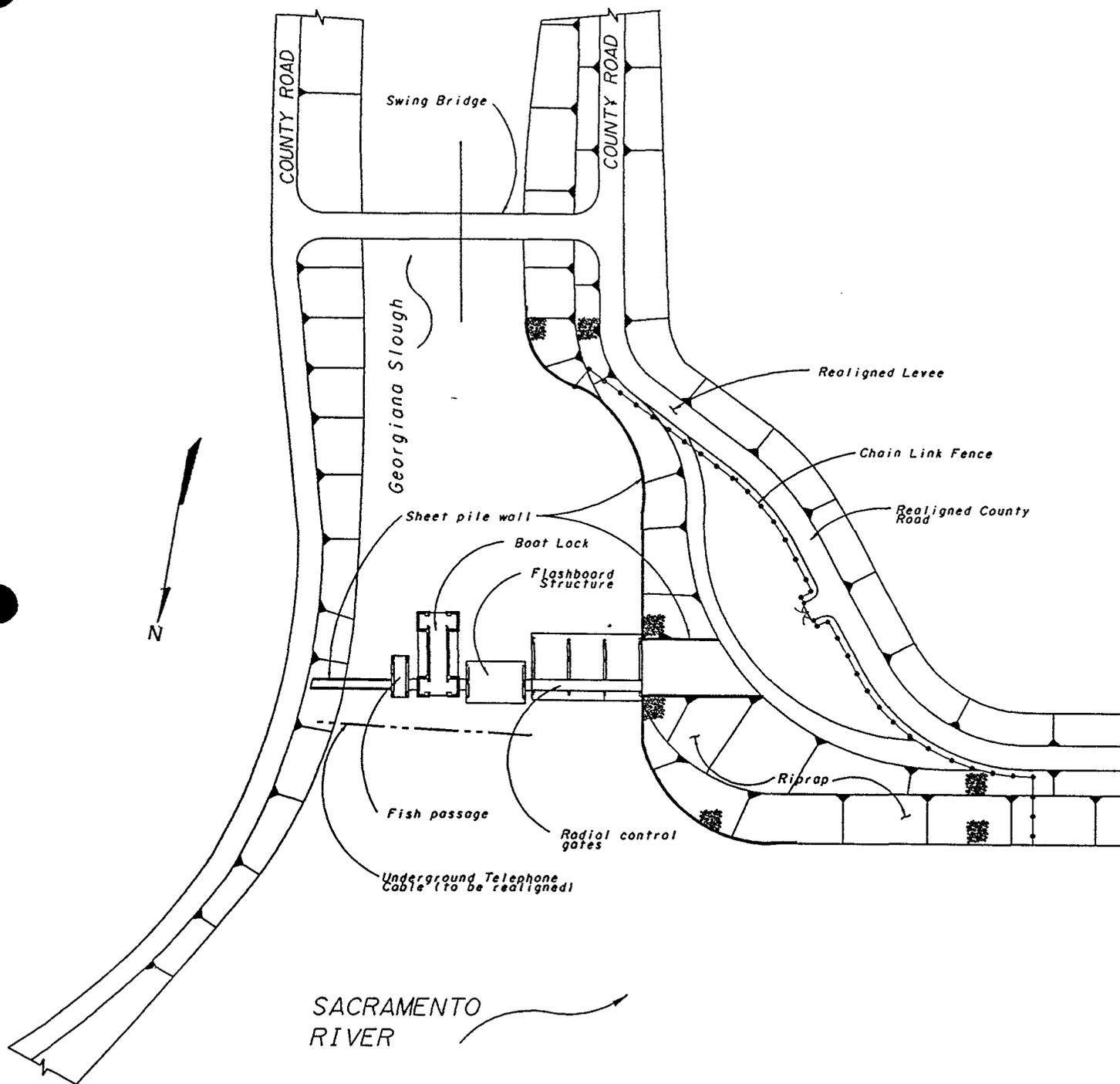
GEORGIANA SLOUGH  
Fish Deflector Wall  
Section View



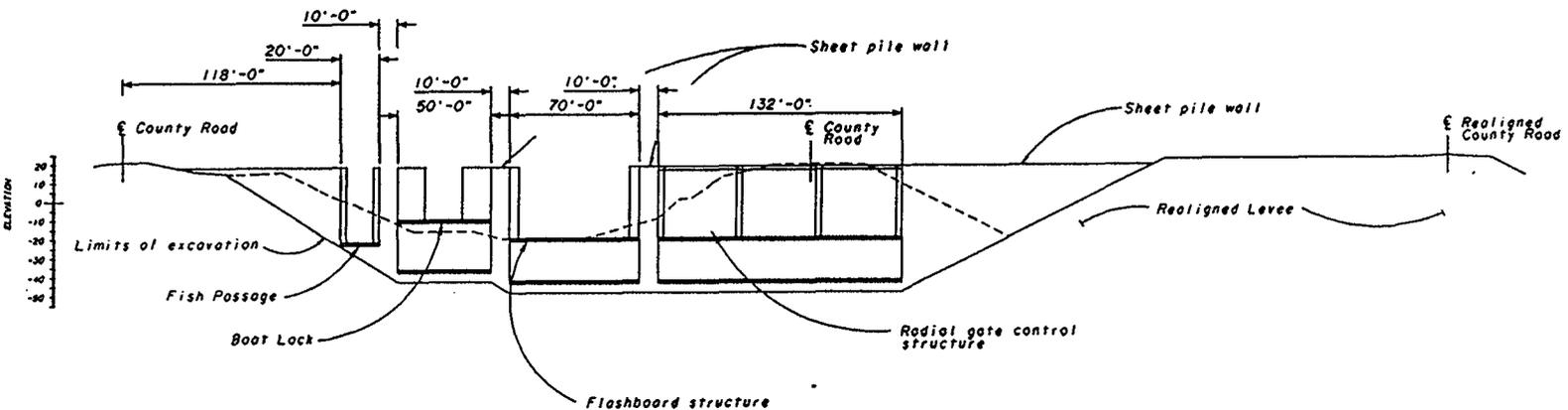
GEORGIANA SLOUGH  
Wicket Gate Structure  
Plan View



GEORGIANA SLOUGH  
Wicket Gate Structure  
Elevation View



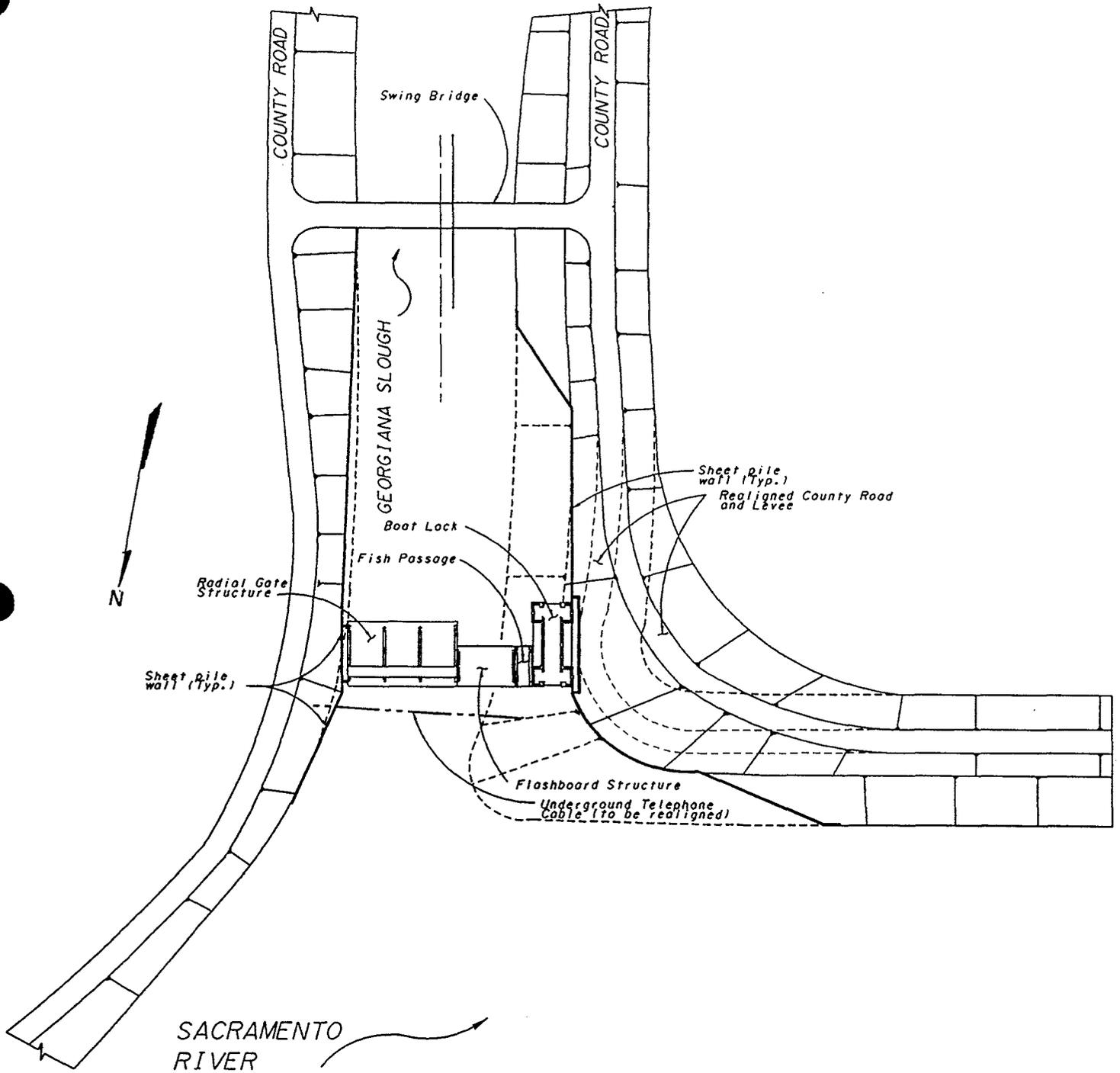
GEORGIANA SLOUGH PERMANENT BARRIER  
Float-into-Place Alternative  
Site Plan



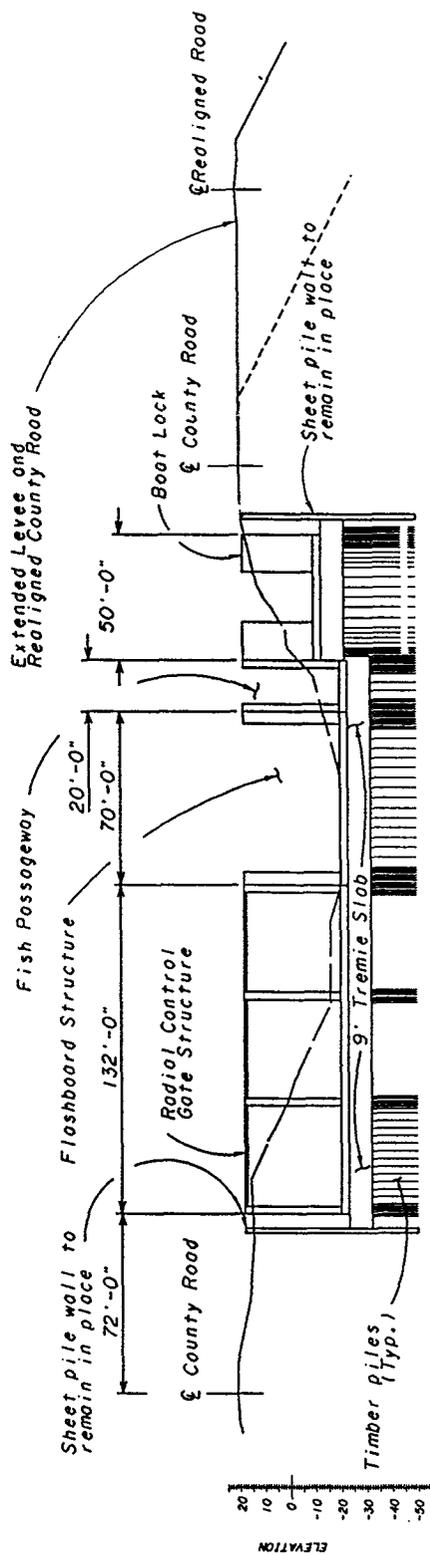
GEORGIANA SLOUGH PERMANENT BARRIER  
Float-into-Place Alternative  
Elevation View

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D-002557



GEORGIANA SLOUGH PERMANENT BARRIER  
Build-in-Place Alternative  
Site Plan



# GEORGIANA SLOUGH PERMANENT BARRIER

Build-In-Place Alternative

Elevation View

State of California  
 The Resources Agency of California  
 Department of Water Resources  
 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun - 94

PROJECT: Georgiana Slough Permanent Barrier  
 FEATURE: Rock Barrier

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Clearing	LS	1	\$4,000.00	\$4,000
Type I Rockfill	Ton	6,000	\$25.00	\$150,000
Type II Rockfill	Ton	23,600	\$21.00	\$496,000
72" dia. Flap Gate	Ea	1	\$8,000.00	\$8,000
48" dia. Flap Gate	Ea	1	\$3,250.00	\$3,000
72" dia. CSP	LF	100	\$85.00	\$9,000
48" dia. CSP	LF	100	\$30.00	\$3,000
Floating dock system	LS	1	\$38,000.00	\$38,000
Concrete slabs	Ea	4	\$35,000.00	\$140,000
Buoys	Ea	6	\$1,000.00	\$6,000
Signs	LS	2	\$1,000.00	\$2,000
Barge mounted crane and crew	MON	3	\$100,000.00	\$300,000
Boat Sling	Ea	2	\$450.00	\$1,000
72" dia. End section	Ea	1	\$1,200.00	\$1,000
48" dia. End section	Ea	1	\$6,000.00	\$6,000
Removal cost (25% of materials)	LS	1	\$216,750.00	\$217,000
Miscellaneous @ 10%	LS	1	\$138,400.00	\$138,000
			<b>SUBTOTAL</b>	<b>\$1,522,000</b>

LOW BID COST	\$1,522,000
S/O-DESIGN @ 10%	\$152,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$381,000

<b>FIRST COST</b>	<b>\$2,055,000</b>
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State of California  
 The Resources Agency of California  
 Department of Water Resources  
 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun - 94

PROJECT: Georgiana Slough Permanent Barrier  
 FEATURE: Fish Deflector Wall

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Piles (W27x94), approx. 95' deep	Ea	18	\$4,680.00	\$84,000
W6x15 Cross Bracing	Lb	3,510	\$3.60	\$13,000
1/2" Thick Galv. Steel Plate	Lb	31,350	\$3.00	\$94,000
5/8" dia. x 2" Bolts	Ea	400	\$9.60	\$4,000
Plate stiffeners (3/16" x 14' - 7") steel	Lb	5,900	\$4.80	\$28,000
Miscellaneous @ 20%	LS	1	\$44,600.00	\$45,000
			<b>SUBTOTAL</b>	<b>\$268,000</b>

LOW BID COST	\$268,000
S/O-DESIGN @ 10%	\$27,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$67,000
<b>FIRST COST</b>	<b>\$362,000</b>

State of California  
 The Resources Agency of California  
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 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun - 94

PROJECT: Georgiana Slough Permanent Barrier  
 FEATURE: Wicket Gate Design

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Clearing and Grubbing	LS	1	\$11,000.00	\$11,000
Channel Excavation	CY	12,500	\$9.46	\$118,000
Type II Rockfill	Ton	2,850	\$22.00	\$63,000
Concrete	CY	2,850	\$436.96	\$1,245,000
Steel Reinforcement	Lb	250,000	\$0.65	\$164,000
Structural Steel	Lb	245,000	\$3.54	\$868,000
Miscellaneous @ 20%	LS	1	\$493,800.00	\$494,000
			<b>SUBTOTAL</b>	<b>\$2,963,000</b>

LOW BID COST	\$2,963,000
S/O-DESIGN @ 10%	\$296,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$741,000
<b>FIRST COST</b>	<b>\$4,000,000</b>

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 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun-94

PROJECT: Georgiana Slough Permanent Barrier  
 FEATURE: Built Off Site Alternative

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Road Realignment	LS	1	\$105,100.00	\$105,000
New South Levee Fill	CY	80,200	\$2.10	\$168,000
Channel Excavation	CY	140,000	\$3.15	\$441,000
Type I Rockfill/Riprap Material	CY	5,700	\$40.00	\$228,000
Lightweight Structural Concrete	CY	8,983	\$473.00	\$4,249,000
Reinforcing Bars	Lb	2,148,221	\$0.63	\$1,353,000
Radial Gates	Ea	3	\$263,000.00	\$789,000
Radial Gate Hoist	Ea	3	\$118,000.00	\$354,000
Flashboards - 60 ft.	Ea	6	\$48,000.00	\$288,000
Stoplogs - 40 ft.	Ea	12	\$32,000.00	\$384,000
Stoplogs - 20 ft.	Ea	12	\$16,000.00	\$192,000
Sector Gates	Ea	4	\$132,000.00	\$528,000
Sector Gate Operation System	LS	1	\$71,000.00	\$71,000
Sheet Piles (Drive & Cut)	SF	79,000	\$10.50	\$830,000
Log Booms (12' Length)	Ea	25	\$1,275.00	\$32,000
Piles (12" Dia. Timber)	LF	8,800	\$36.00	\$317,000
Tremie Concrete	CY	425	\$68.50	\$29,000
Guide Wall Timber (10x12)	LF	1,120	\$37.00	\$41,000
Chain Link Fence	LF	1,500	\$10.50	\$16,000
Fish Passageway Gate	Ea	1	\$131,500.00	\$132,000
Fish Passageway Screen	Ea	1	\$32,000.00	\$32,000
Fish Passageway Hoist & Lift Platform	Ea	2	\$116,000.00	\$232,000
Control Building	Ea	1	\$118,000.00	\$118,000
Operator Building	Ea	1	\$71,000.00	\$71,000
Miscellaneous @ 20%	LS	1	\$2,200,000.00	\$2,200,000
			SUBTOTAL	\$13,200,000
			LOW BID COST	\$13,200,000
			S/O-DESIGN @ 10%	\$1,320,000
			S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$3,300,000
			<b>FIRST COST</b>	<b>\$17,820,000</b>

State of California  
 The Resources Agency of California  
 Department of Water Resources  
 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun-94

PROJECT: Georgiana Slough Permanent Barrier  
 FEATURE: Built in Place Alternative

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Road Realignment	LS	1	\$53,000.00	\$53,000
Excavation	CY	36,200	\$3.15	\$114,000
Drive & Cut Timber Piles	Ea	928	\$225.00	\$209,000
Bracing	Ton	261	\$1,850.00	\$483,000
Place Tremie Concrete	CY	8,550	\$68.50	\$586,000
Remove Bracing	Ton	261	\$840.00	\$219,000
Remove Sheet Piles	SF	75,080	\$5.50	\$413,000
Structural Concrete	CY	5,013	\$475.00	\$2,381,000
Reinforcing Bars	Lb	1,002,600	\$0.63	\$632,000
Radial Gates	Ea	3	\$265,000.00	\$795,000
Radial Gate Hoist	Ea	3	\$118,000.00	\$354,000
Sector Gates	Ea	4	\$132,000.00	\$528,000
Sector Gate Operation System	LS	1	\$71,000.00	\$71,000
Flashboards - 60 ft.	Ea	6	\$48,000.00	\$288,000
Additional Sheet Piles for Bank Protection	SF	75,750	\$10.50	\$795,000
Riprap	Ton	18,750	\$26.50	\$497,000
Control Building	LS	1	\$118,000.00	\$118,000
Operator Building	LS	1	\$71,000.00	\$71,000
Sheet Piles	SF	75,080	\$10.50	\$788,000
Stoplogs - 40 ft.	Ea	12	\$32,000.00	\$384,000
Stoplogs - 20 ft.	Ea	12	\$16,000.00	\$192,000
Log Booms (12' Length)	Ea	25	\$1,275.00	\$32,000
Piles (12" Dia. Timber)	LF	8,800	\$36.00	\$317,000
Guide Wall Timber (10x12)	LF	1,120	\$37.00	\$41,000
Fish Passageway Gate	Ea	1	\$131,500.00	\$132,000
Fish Passageway Screen	Ea	1	\$32,000.00	\$32,000
Fish Passageway Hoist & Lift Platform	Ea	2	\$116,000.00	\$232,000
Miscellaneous @ 20%	LS	1	\$2,151,400.00	\$2,151,000
			<b>SUBTOTAL</b>	<b>\$12,908,000</b>
			LOW BID COST	\$12,908,000
			S/O-DESIGN @ 10%	\$1,291,000
			S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$3,227,000
			<b>FIRST COST</b>	<b>\$17,426,000</b>

2. Delta Cross Channel Three  
Gate Enlargement

Delta Cross Channel Three Gate Enlargement

A new three gate intake structure and intake channel would be constructed just north of the existing Delta Cross Channel. The major components of this project include a concrete control structure, intake channel, enlargement of the existing Delta Cross Channel, a fish deflector wall, a new bridge over the proposed channel, buried utility line supplying power to a control building used to house the control systems for the radial gates, and a propane tank building to house the standby power source.

The concrete control structure is composed of a 200-foot-wide by 75-foot-long and 36-foot-high concrete gate structure that would house three radial gates, each 60 feet wide by 30 feet high. The new intake channel would link the new control structure with the Sacramento River and the enlarged Delta Cross Channel. The new intake channel levees would be approximately 3,700 feet in total length and require approximately 215,000 cubic yards of compacted embankment. Levee roads would be at least 16 feet in width and have a gravel surface. The levee crown would be at elevation +21 NGVD with side slopes of 2 to 1. The waterside slopes of the new levees would be protected from erosion using approximately 21,000 tons of 24 inch riprap.

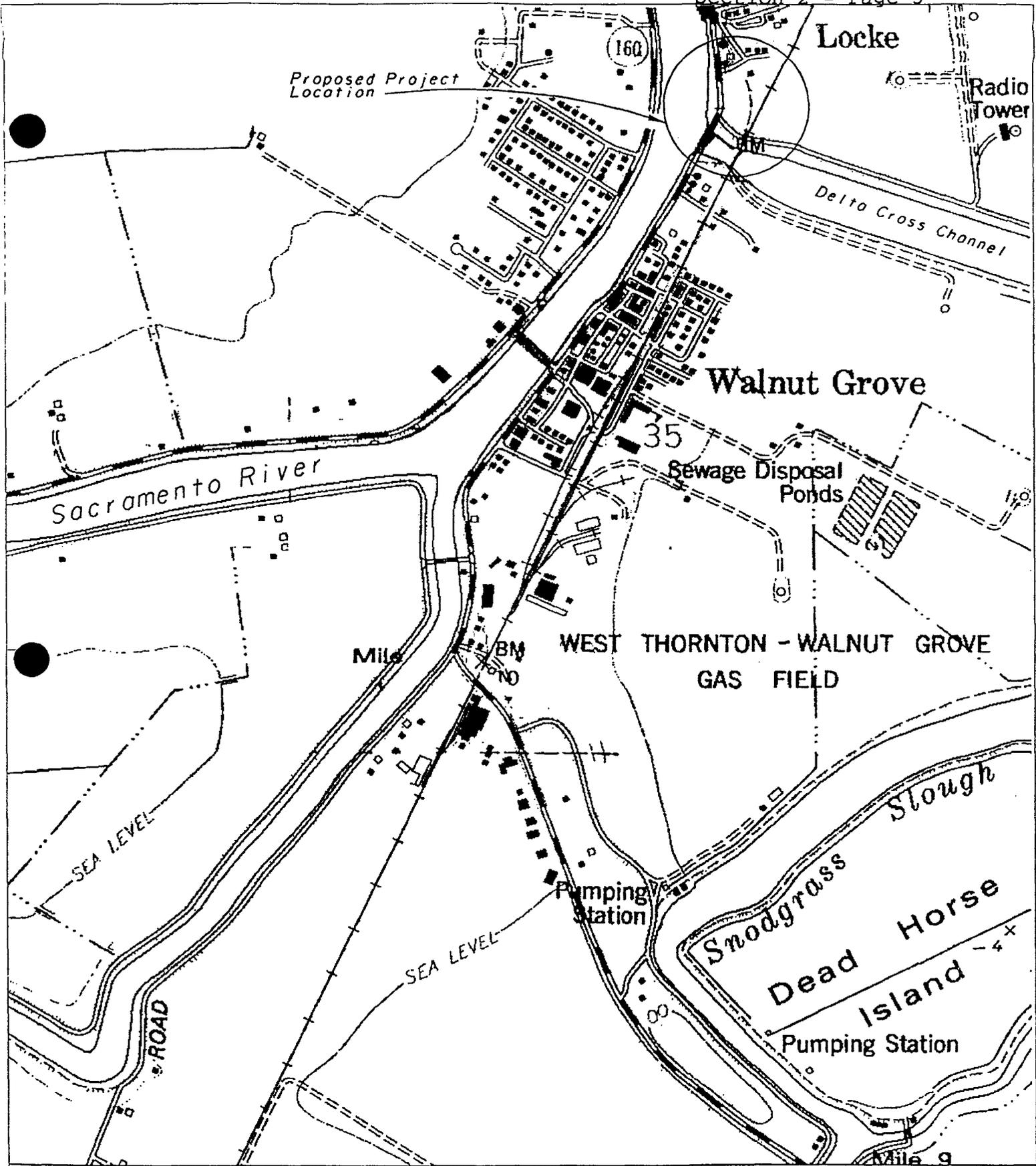
The existing levees bordering the Sacramento River and the Delta Cross Channel would be breached after the control structure and appurtenant levees have been constructed. Any spoil material would be removed from the site, or used as a stabilizing berm since it was assumed that the new levees would be constructed of imported borrow. The new intake channel would be excavated to an invert elevation of -15.0 feet. The existing Delta Cross Channel would be enlarged to accommodate the increased flow capacity afforded by the new radial gates by offsetting approximately 900 linear feet of the existing north levee downstream of the confluence of the new intake channel. This new levee would be offset approximately 95 feet and would be a part of the new intake levee system. The existing reach of levee would be removed after construction of the new intake channel levee was completed.

A fish deflector wall would cross the mouth of the newly constructed intake channel and would be approximately 200 feet in length. The deflector consists of a 1/2-inch-thick steel plate attached to cross bracing beams. The bracing beams would be connected to a series of vertical and batter driven piles placed 20 feet on center across the channel. The steel vertical piles would be 94 feet long with the top of the pile at elevation +14.0. An identical set of piles battered at a 1 to 4 slope would be placed behind the vertical piles for support. The piles

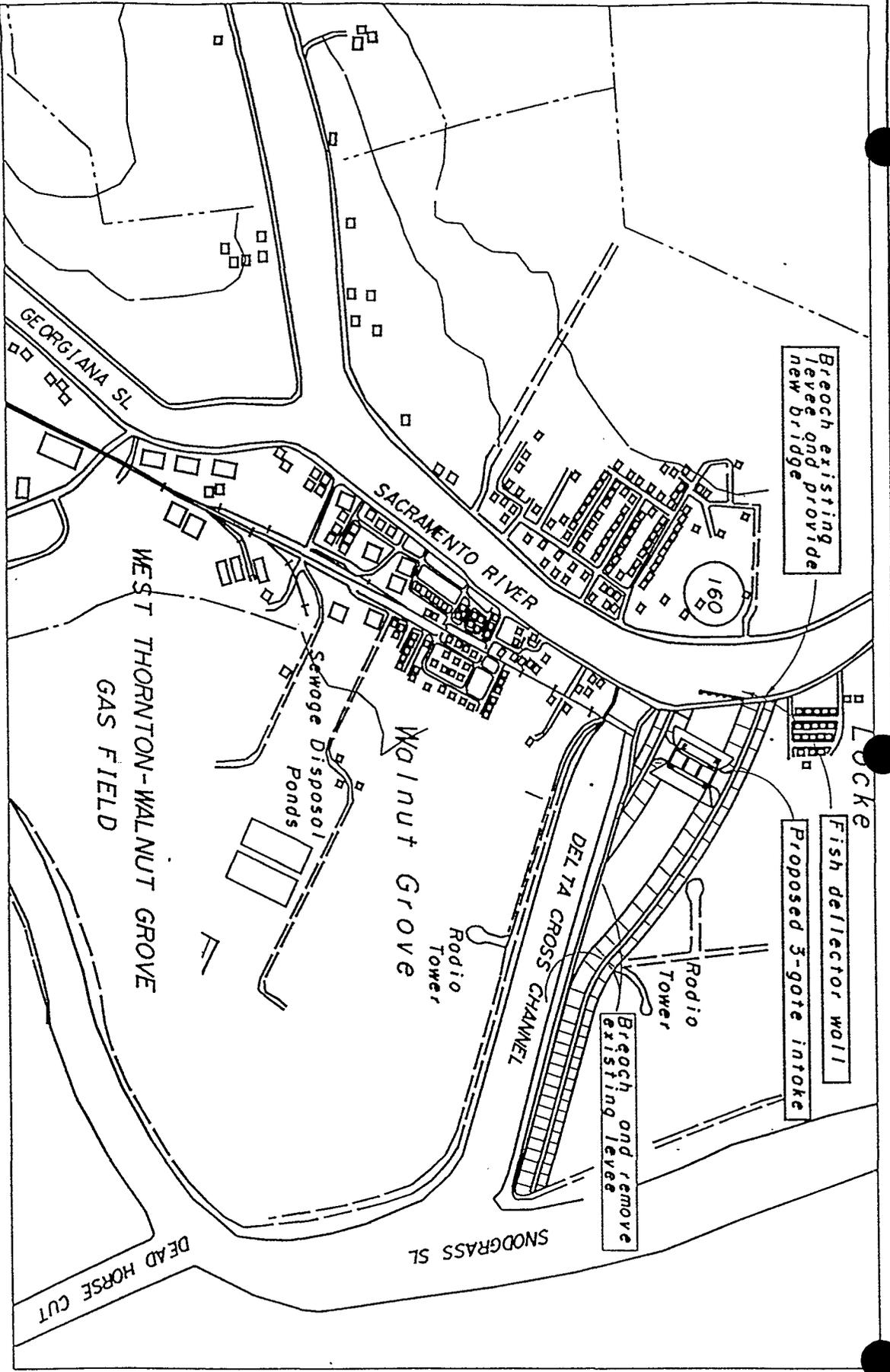
would be furnished in two equal lengths and be welded together at the job site. Three cross bracing beams would be placed horizontally at elevation 8.0, 2.0 and -5.0. The deflector plate would be attached to the pile and the cross bracing structure at elevation 8.0 and extend down to elevation -5.0. The plate would be 15 feet 1 inch high. The lower section bends away from the piles at a 1 to 1 slope. Vertical plate stiffener strips 6 inches wide would be placed every 2 feet on center along the length of the deflector to provide additional support for the 1/2-inch plate.

A new reinforced concrete slab bridge will be provided over the new intake channel. The bridge will span approximately 500 feet and be approximately 40 feet wide.

The construction period for the Delta Cross Channel Three Gate Enlargement would last approximately 30 months with a maximum construction crew of about 75 people. Estimated cost is approximately \$31,962,000.



*Delta Cross Channel*  
*Project Location*  
*Site Map*



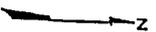
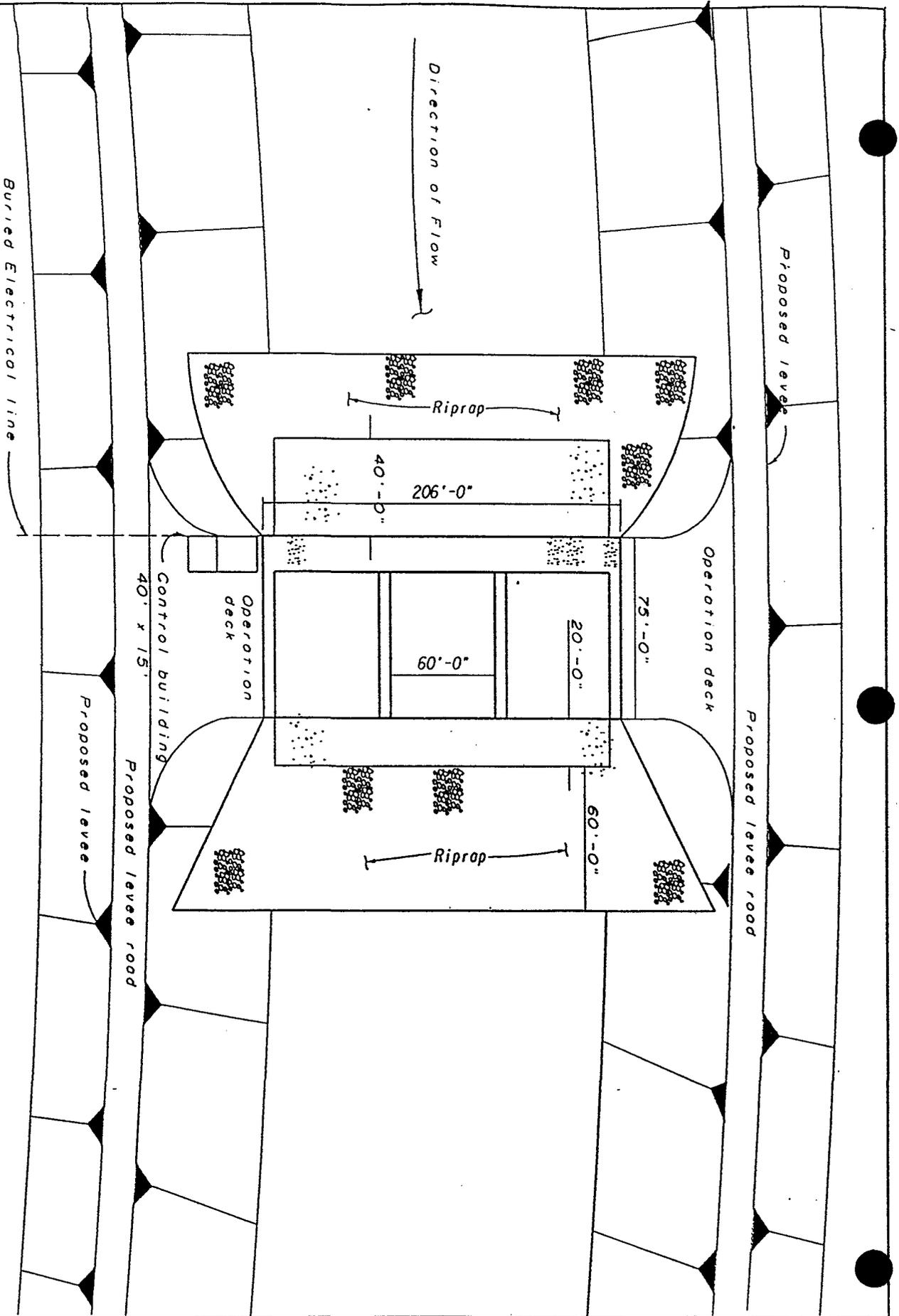
SITE MAP

DELTA CROSS CHANNEL

3-GATE ENLARGEMENT

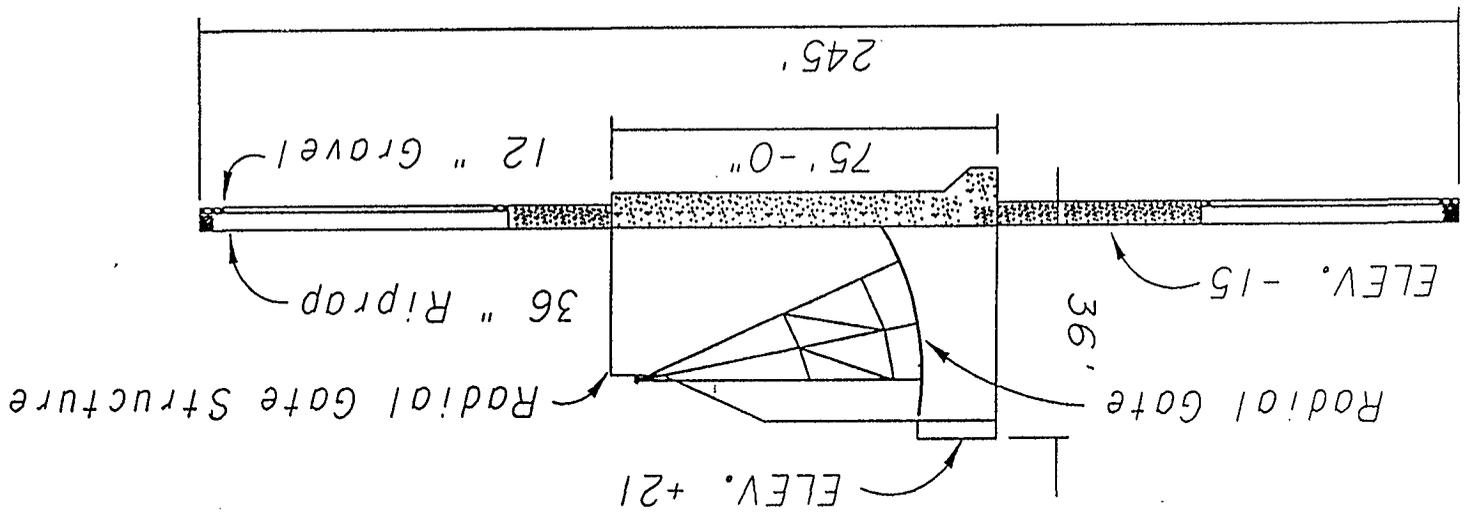
# DELTA CROSS CHANNEL 3-GATE ENLARGEMENT

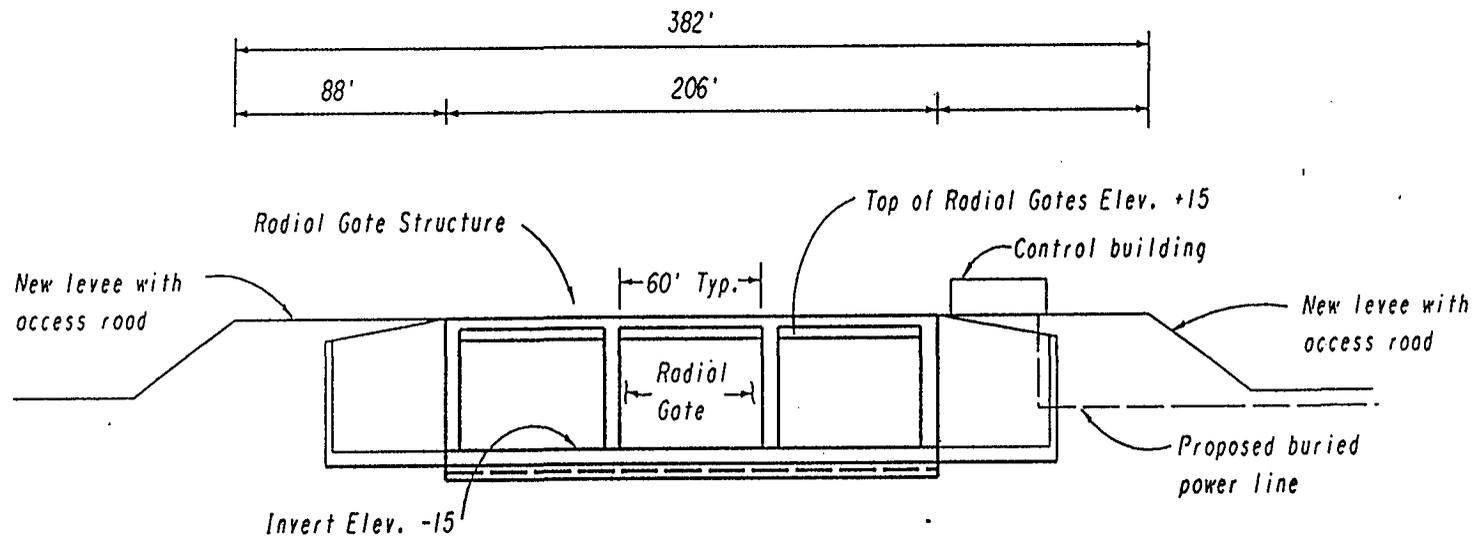
## PLAN VIEW



DELTA CROSS CHANNEL  
3-GATE ENLARGEMENT

SECTION VIEW





ELEVATION VIEW  
DELTA CROSS CHANNEL  
3-GATE ENLARGEMENT

State of California  
 The Resources Agency of California  
 Department of Water Resources  
 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun-94

PROJECT: Delta Cross Channel 3 - Gate Expansion  
 FEATURE:

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Slab Bridge	SF	19,200	\$77.33	\$1,485,000
Radial Gate	Ea	3	\$310,000.00	\$930,000
Excavation (structural)	CY	123,400	\$4.00	\$494,000
Excavation (channel)	CY	250,000	\$2.75	\$688,000
Backfill (structural)	CY	5,840	\$17.60	\$103,000
Backfill (channel)	CY	139,100	\$5.00	\$696,000
Riprap (36")	Ton	40,700	\$23.00	\$936,000
Riprap (24")	Ton	20,500	\$15.30	\$314,000
Bedding	CY	13,650	\$13.30	\$182,000
Concrete (structural)	CY	13,470	\$346.00	\$4,661,000
Steel (structural)	Lb	2,694,000	\$0.53	\$1,428,000
Radial Gate Hoist	Ea	6	\$125,000.00	\$750,000
Handrail	LF	800	\$46.00	\$37,000
Business relocation	LS	1	\$500,000.00	\$500,000
Fish Deflector Wall	LS	1	\$450,000.00	\$450,000
Embankment	CY	215,000	\$5.00	\$1,075,000
Transmission Tower Relocation	LS	1	\$5,000,000.00	\$5,000,000
Miscellaneous @ 20%	LS	1	\$3,945,800.00	\$3,946,000
			<b>SUBTOTAL</b>	<b>\$23,675,000</b>

LOW BID COST	\$23,675,000
S/O - DESIGN @ 10%	\$2,368,000
S/O - CONST. SUPERVISION & CONTINGENCIES @ 25%	\$5,919,000
<b>FIRST COST</b>	<b>\$31,962,000</b>

State of California  
 The Resources Agency of California  
 Department of Water Resources  
 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun-94

PROJECT: Delta Cross Channel - Fish Deflector Wall  
 FEATURE:

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Fish Deflector Wall	LS	1	\$450,000.00	\$450,000
Miscellaneous @ 20%	LS	1	\$90,000.00	\$90,000
			<b>SUBTOTAL</b>	<b>\$540,000</b>

LOW BID COST	\$540,000
S/O - DESIGN @ 10%	\$54,000
S/O - CONST. SUPERVISION & CONTINGENCIES @ 25%	\$135,000
<b>FIRST COST</b>	<b>\$729,000</b>

3. Threemile Slough Barrier  
Alternatives

D-002575

D-002575

Threemile Slough Barrier Alternatives

Conceptual design drawings and cost estimates were prepared for the following alternatives: (1) rock barrier, (2) fish deflector wall, (3) wicket gate, (4) permanent radial gate structure--built offsite and sunk in place, and (5) permanent radial gate structure--built in place. A brief description of each alternative studied follows:

Alternative I - Rock Barrier

The temporary rock barrier would be constructed of aggregate base material and be enclosed in a 3-foot layer of graded rockfill. The rock barrier was designed to provide structural stability, resistance to seepage flow, and yet be able to rapidly erode by streamflows if overtopped during a flood. A notch, 20 feet wide and 1 foot deep, would be placed near the center of the rock barrier to help in breaching the barrier during flood conditions. Additionally, a barge mounted crane that will be onsite to help with boat passage could be used to remove the barrier if flood flows were predicted. Approximately 43,000 cubic yards of material would be required for the barrier. The barrier would have a trapezoidal cross section with side slopes of 2 to 1, and a crest width of 10 feet at an elevation of 11 feet.

Lighted floating buoys and reflective signs would be placed to alert boaters of the blocked channel. A boat passage facility that would lift boats over the barrier with a barge mounted crane and sling would be incorporated in the barrier. A floating dock on each side of the barrier would allow boaters to disembark and cross the barrier while their boats are lifted across.

Two culverts, 48 inches and 72 inches in diameter, would be imbedded in the barrier. The culverts will provide water circulation in Threemile Slough, to prevent water quality degradation, and provide a passageway for adult salmon migrating up Threemile Slough. The culverts would have flap gates on the upstream end and a flared end section on the downstream end.

The approximate cost for the initial construction, operation and removal of the temporary rock barrier is \$4,305,000. If most of the materials could be stockpiled and reused each consecutive year, the cost would be reduced to approximately \$600,000 annually.

Alternative II - Fish Deflector Wall

A fixed fish deflector wall that crosses the mouth of Threemile Slough would be approximately 500 feet in length. The deflector is patterned after the trash deflector at the Red Bluff Diversion Dam. It consists of a 1/2-inch-thick steel plate

attached to cross bracing beams. The bracing beams would be connected to a series of vertical and batter driven piles placed 20 feet on center across the channel.

The steel vertical piles would be 94 feet long with the top of the pile at elevation 14.0. To support the vertical piles, an identical set of piles battered at a 1 to 4 slope would be placed behind the vertical piles. The piles would be furnished in two equal lengths and welded together at the job site. Three cross bracing beams would be placed horizontally at elevation 10.0, 0.0, and -5.0. The deflector plate would be attached to the vertical pile and the cross bracing structure at elevation 10.0 and extend down to elevation -5.0. The plate would be 17 feet 1 inch high. The lower section bends away from the piles at a 1 to 1 slope. Vertical plate stiffener strips 6 inches wide would be placed every 2 feet on center along the length of the deflector to provide additional support for the 1/2-inch plate.

The estimated cost of the Threemile Slough fish deflector wall is \$1,744,000. This deflector cannot be raised or lowered with the river stage. A deflector that can be raised or lowered can be constructed; however, it will be more costly. When the merits of a movable deflector can be justified and criteria established, an estimate can be prepared at that time.

#### Alternative III - Wicket Gate

A wicket gate at Threemile Slough would consist of a steel gate, 380 feet wide, 36 feet tall and 3 feet in thickness connected with hinges attached to a 12-foot thick concrete caisson. The concrete caisson with sidewalls would be constructed offsite and floated to the site and sunk in place.

The gate would be a 1/4-inch-thick steel plate reinforced vertically with wide flange beams every 15 feet on center and reinforced horizontally with wide flange beams every 8 feet on center. The gate would be placed in pivot pins on the concrete bottom. A buoyancy tank, 3 feet thick, would be incorporated on the wicket gate to aid in raising or lowering the gate. When the buoyancy tank is allowed to fill with water and the support braces are released, the wicket gate will slowly pivot on its hinges and lower until it is horizontal on the concrete platform, thereby opening access to the channel. When the gate is to be lifted, air is pumped into the tank so the buoyant forces lift the wall into the upright position, it is then supported by a steel beam when in the vertical position. The gate can be lowered or raised in approximately five minutes.

The approximate cost of the wicket gate at Threemile Slough is \$13,420,000. In theory this is a very efficient design, however, in a long term operation major maintenance problems such as the deposition of silt and debris accumulating on the

operating mechanism may occur frequently. Any major repair will require that the entire channel be dewatered with cellular cofferdams that are costly and may make this alternative infeasible.

Alternative IV - Permanent Radial Gate Structure - Built Off Site

This alternative would construct the components of the structure offsite, then float and sink them into place at Threemile Slough. The construction method would be similar to that used for the Montezuma Slough Control Structure project. To reduce the weight of the structure, light weight concrete would be used for the construction. The concrete floatation rafts, when ballasted with water, would become the foundations for the structures. Placement of the barrier must be staged with the radial gate structure being placed first and then the flashboard structure. The boat lock and fish passageway would be placed last. This method of placement should preserve the capacity of the slough to carry its normal flows.

Excavation for these structures would be to a depth of 50 feet and would require at least 2 to 1 waterside slopes. The total volume of material excavated would be approximately 43,000 cubic yards.

The cost of this alternative is approximately \$20,462,000.

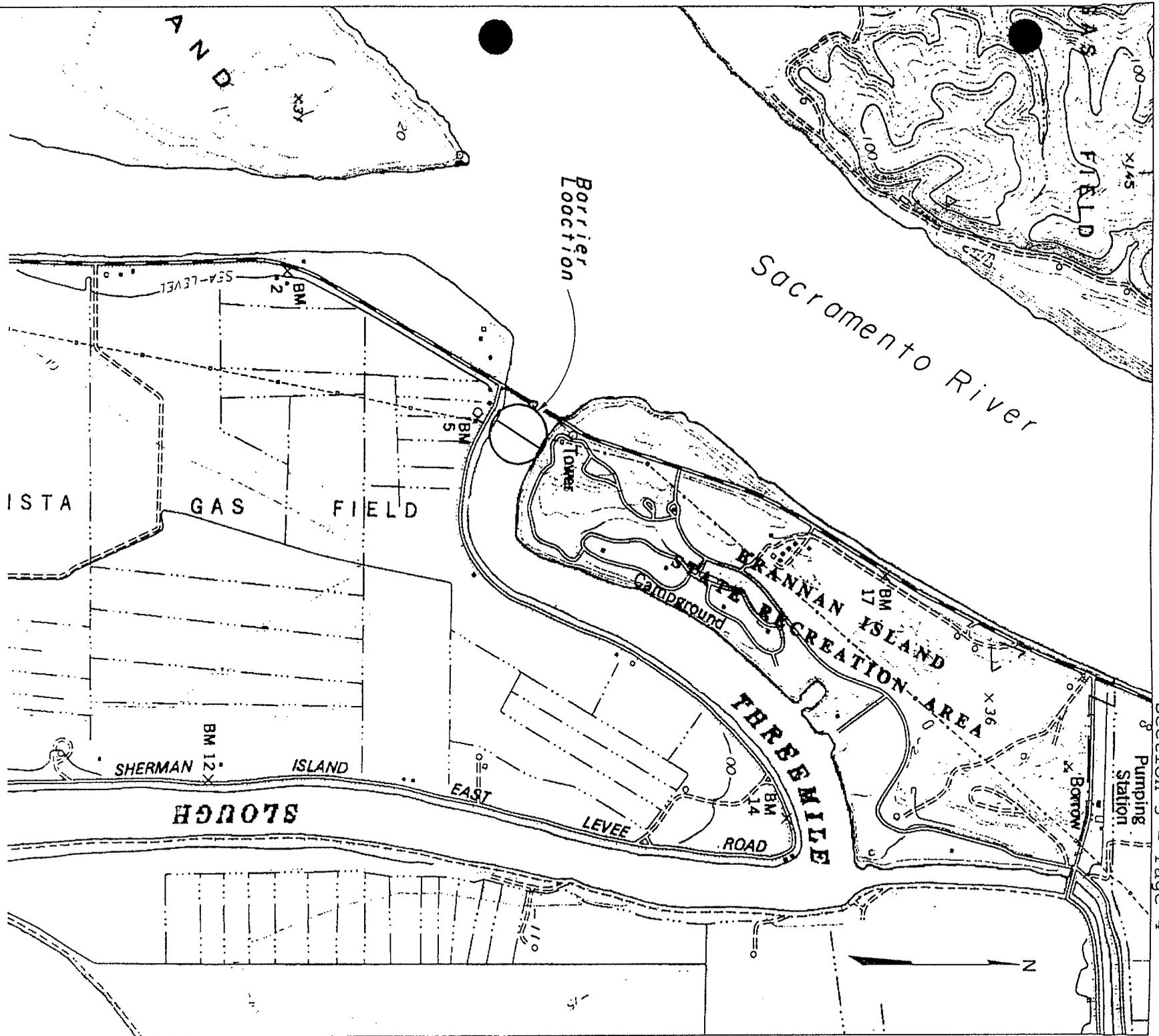
Alternative V - Permanent Radial Gate Structure - Built in Place

This second alternative would build the structures in their final positions within Threemile Slough. This alternative would require staged construction using a braced cofferdam system to build the structures in the dry.

Approximately 20,000 cubic yards of material would be excavated from the slough for placement of the barrier. This alternative also assumes that piles would be driven to a depth of 50 feet to support the structure. The pile lengths, diameters, and grouping sizes are based on a very limited amount of geological data, and therefore would change significantly if conditions are vastly different from those assumed.

The cross sectional area of the radial gates and the flashboard structure give an area slightly larger than that of the original channel cross section. During periods when the structures would be closed to keep the downstream migrating salmon in the Sacramento River, the boat lock can be operated to handle boats up to 60 feet in length and 20 feet in beam. A fish passageway would allow for migratory fishes to move from Threemile Slough into the Sacramento River when the gates are closed.

The cost of the radial gate structure built in place is approximately \$19,083,000.



THREEMILE SLOUGH BARRIER  
SITE MAP

D-002579

N

Install Department Furnished  
Buoys (Typ.) - 6 Total

Furnish and Install Floating  
Dock Abutment with  
Handrailing

48"  $\phi$  CSP

72"  $\phi$  CSP

To San Joaquin  
River

To Sacramento  
River

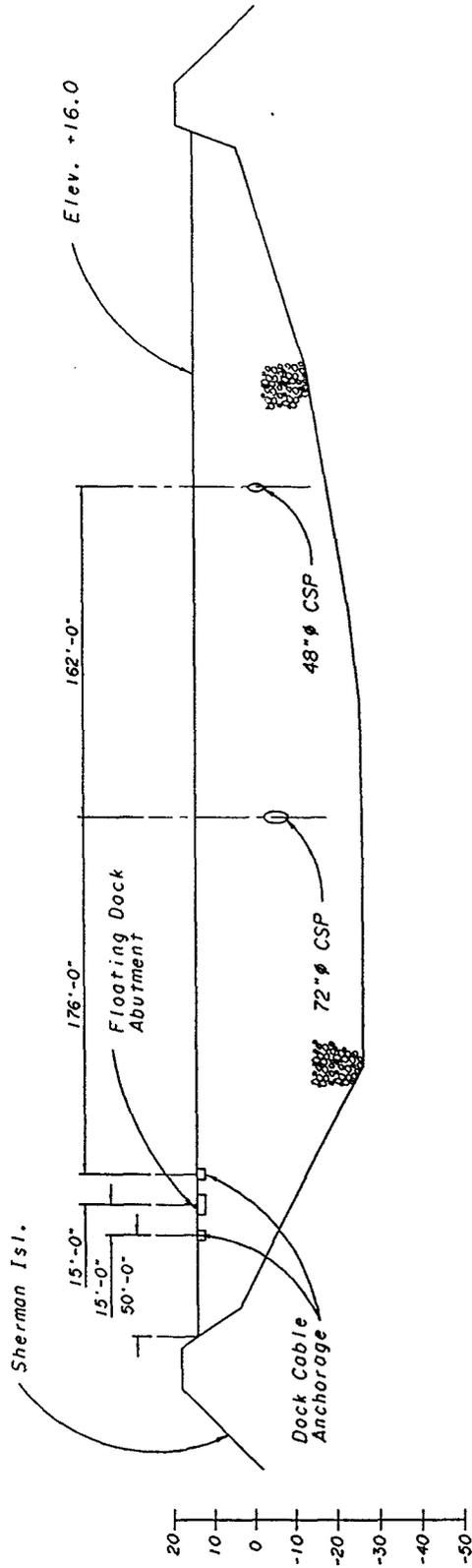
# THREEMILE SLOUGH BARRIER

Rock Barrier

Plan View

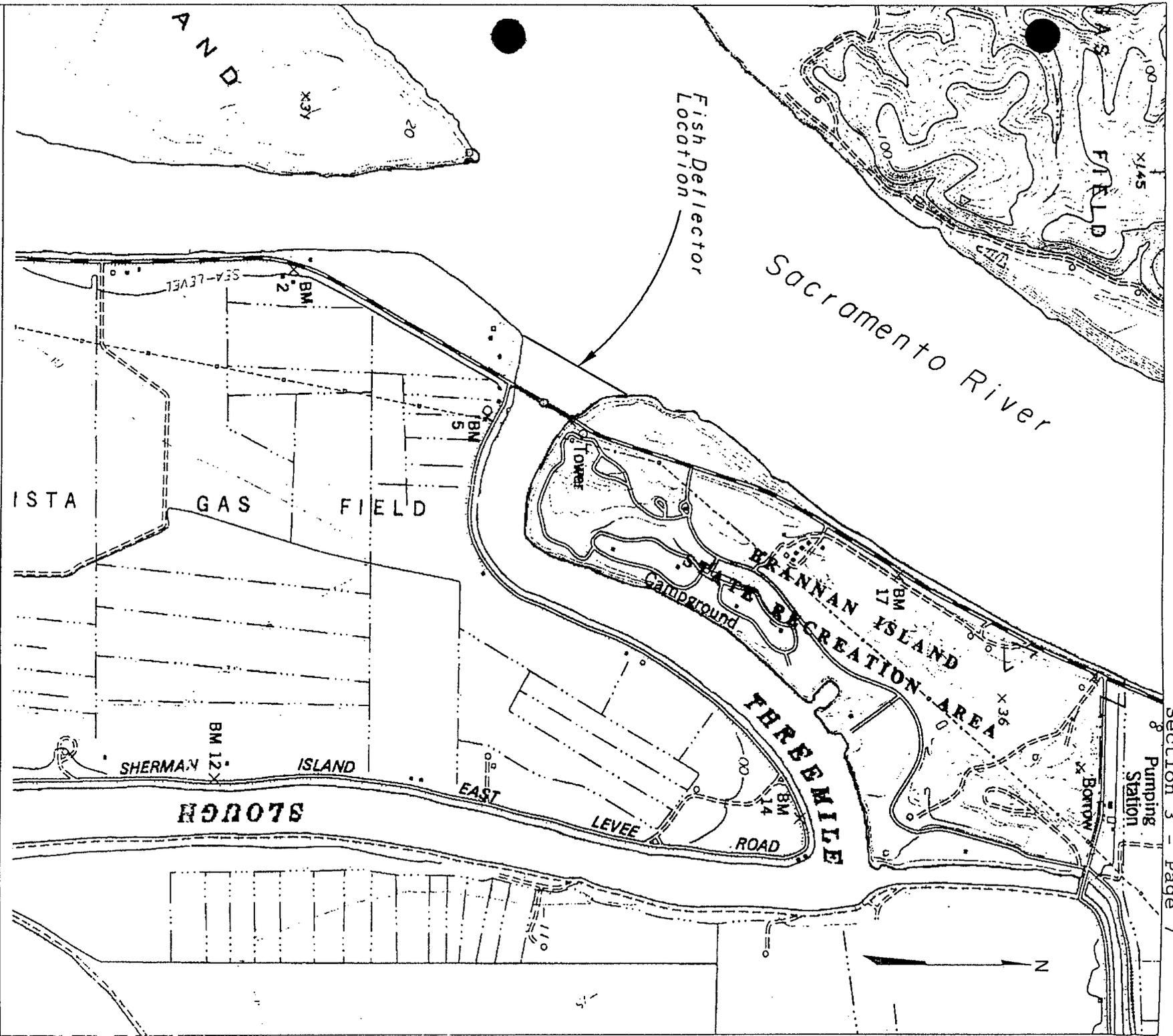
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D-002580



# THREEMILE SLOUGH BARRIER

Rock Barrier  
Elevation View

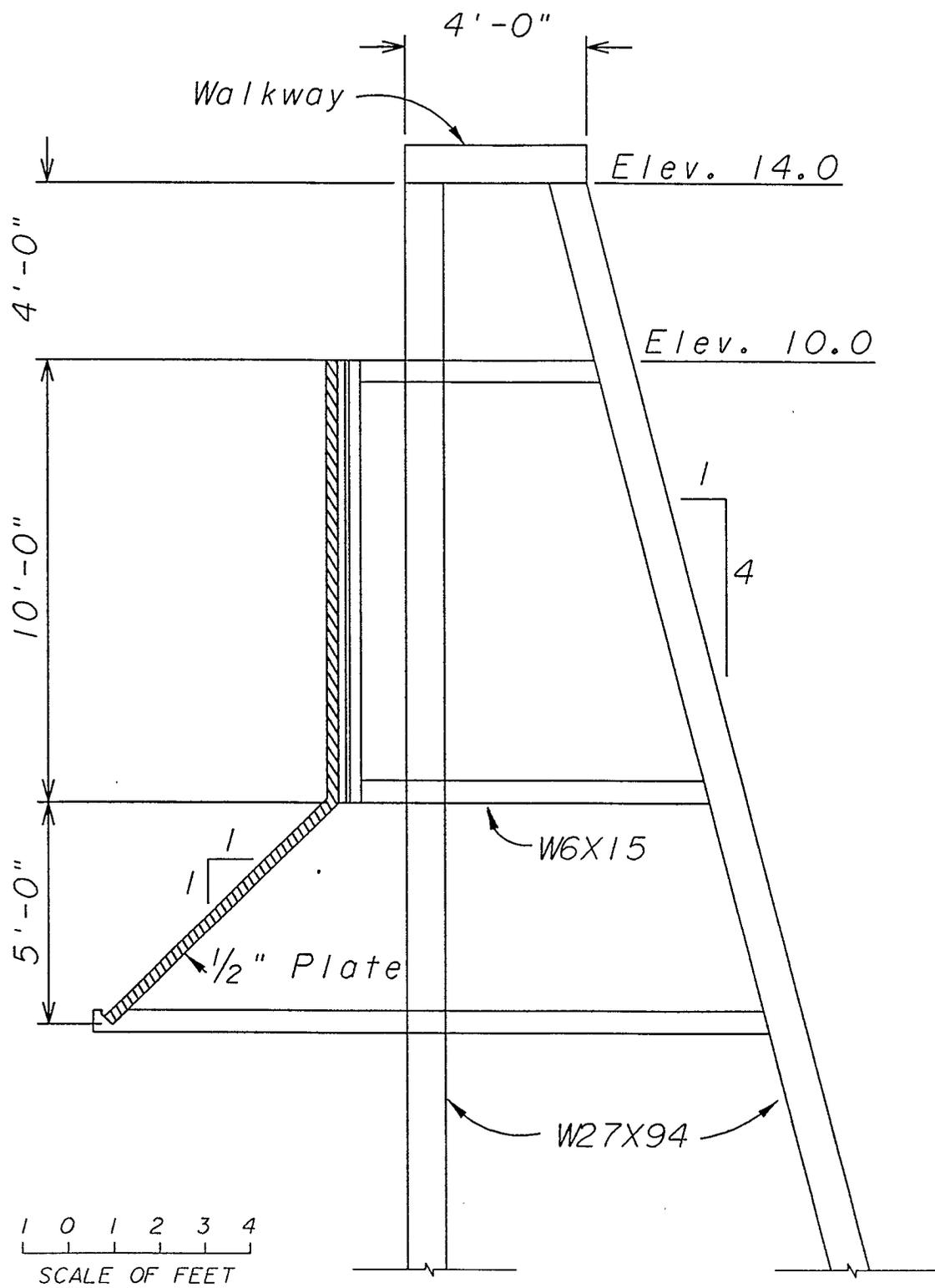


THREEMILE SLOUGH BARRIER

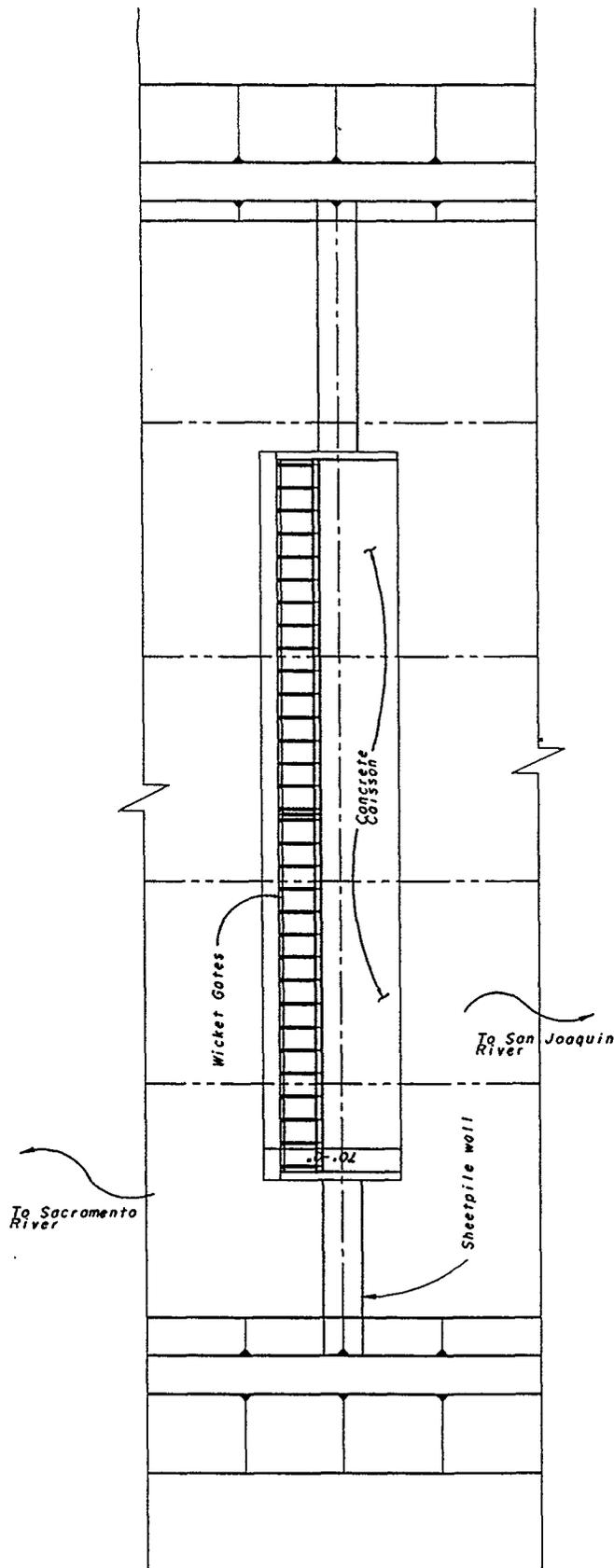
Fish Deflector Wall  
Plan View

D-002582

D-002582



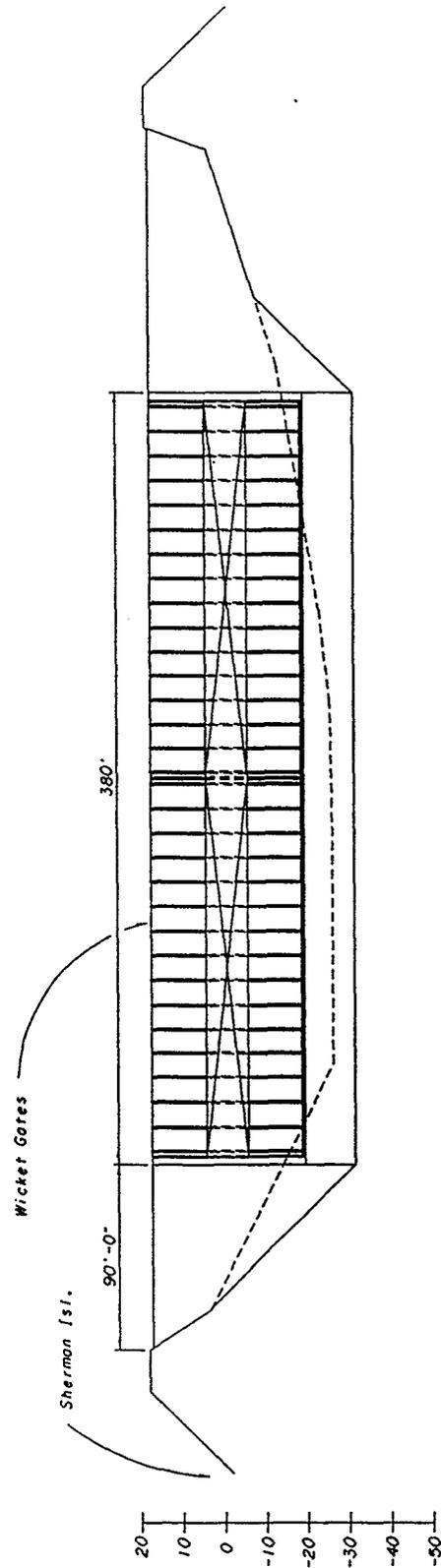
THREEMILE SLOUGH  
Fish Deflector Wall  
Section View



# THREEMILE SLOUGH PERMANENT BARRIER

Wicket Gate Structure

Plan View

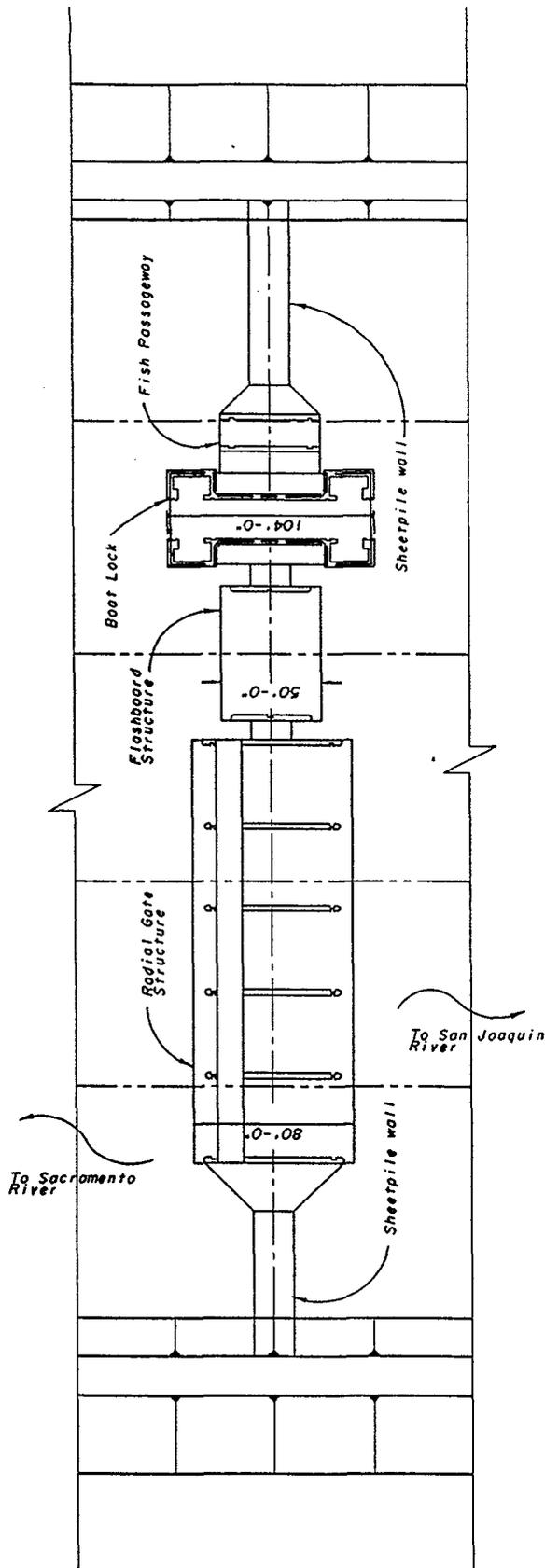


THREEMILE SLOUGH PERMANENT BARRIER

Wicket Gate Structure

Elevation View

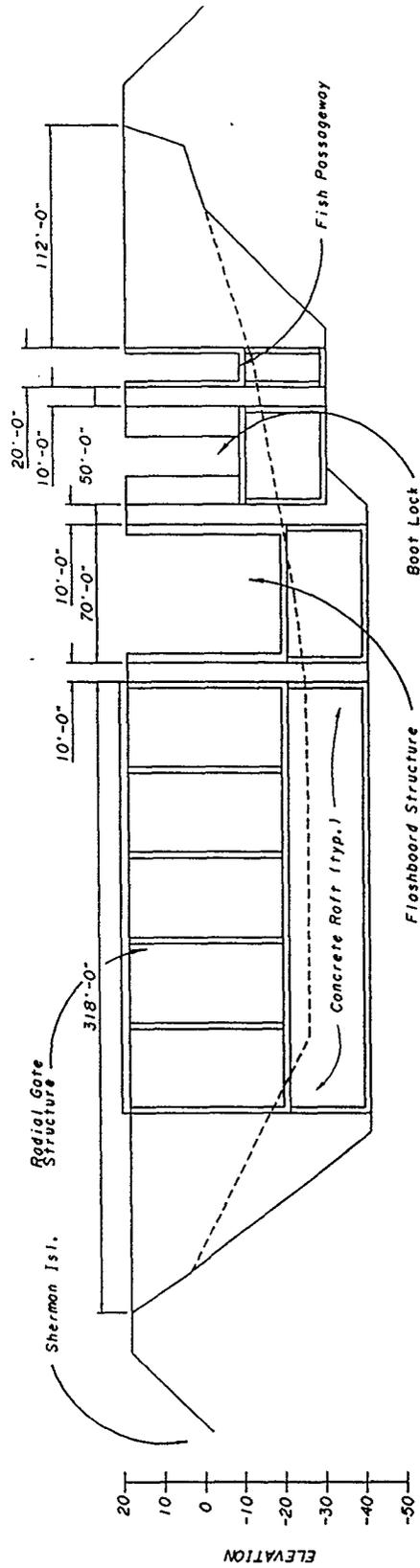
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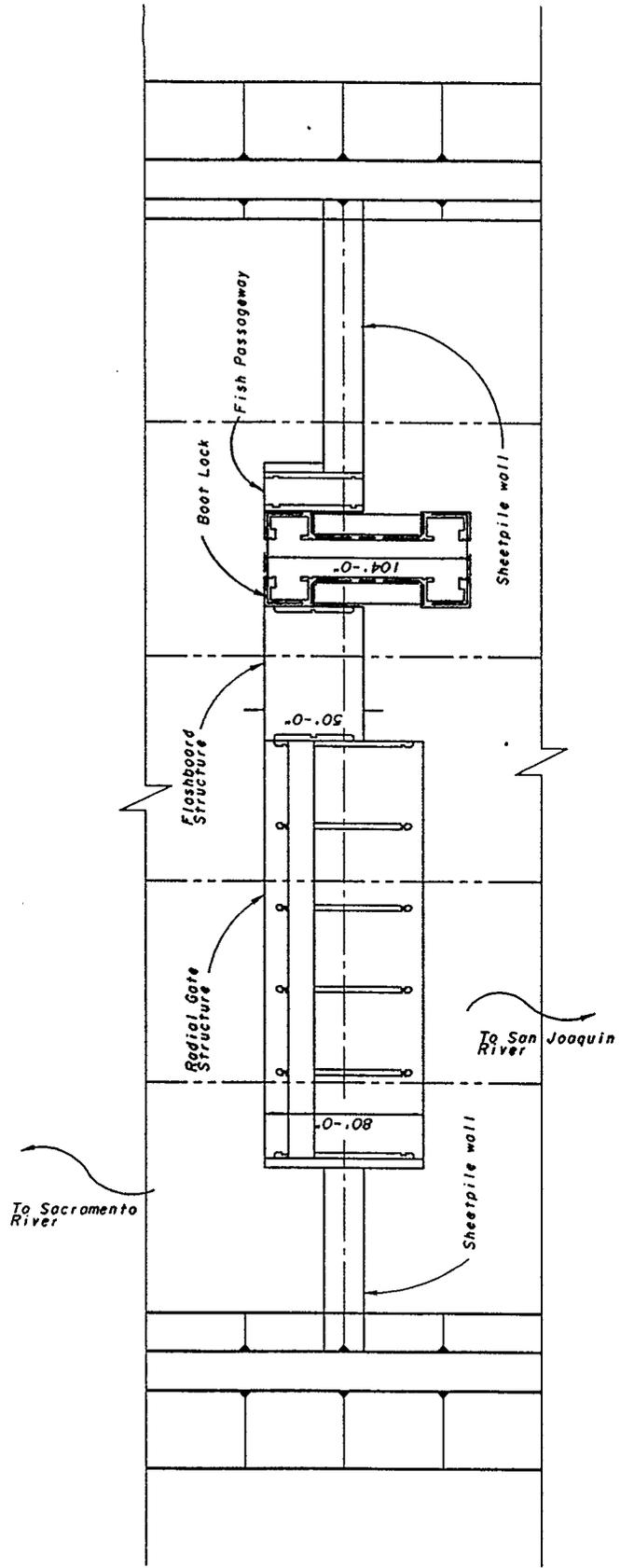
# THREEMILE SLOUGH PERMANENT BARRIER

Float-into-Place Alternative

Plan View



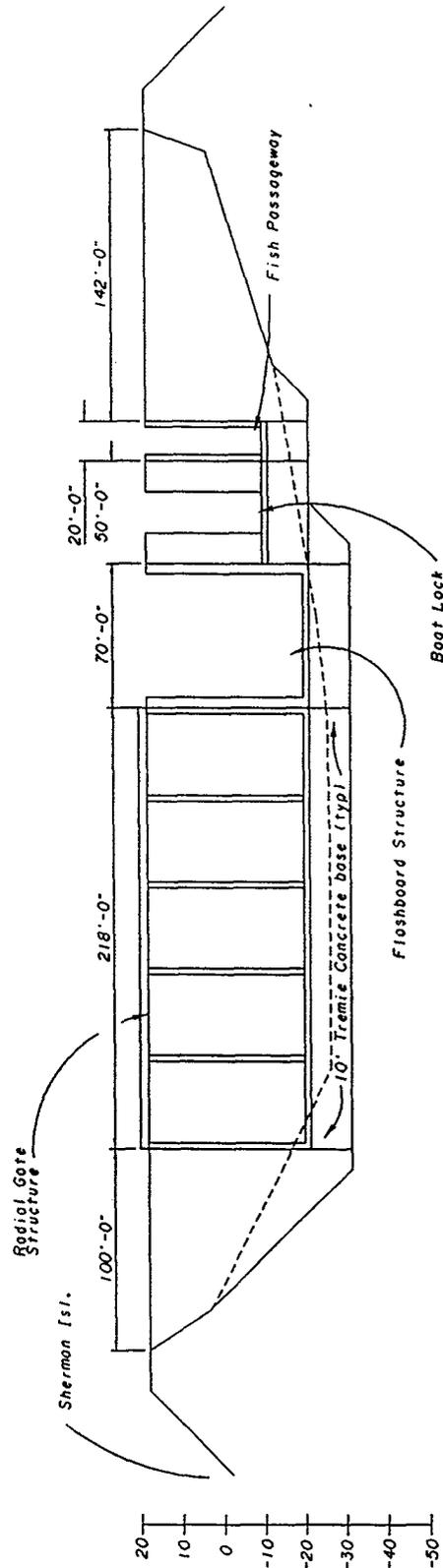
THREEMILE SLOUGH PERMANENT BARRIER  
Float-into-Place Alternative  
Elevation View



# THREEMILE SLOUGH PERMANENT BARRIER

Build-in-Place Alternative

Plan View



# THREEMILE SLOUGH PERMANENT BARRIER

Build-in-Place Alternative

Elevation View

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State of California  
 The Resources Agency of California  
 Department of Water Resources  
 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun-94

PROJECT: Threemile Slough  
 FEATURE: Rock Barrier

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Clearing	LS	1	\$4,260.00	\$4,000
Type I Rockfill	Ton	10,000	\$26.63	\$266,000
Type II Rockfill	Ton	71,600	\$22.37	\$1,602,000
72" dia. Flap gate	Ea	1	\$8,520.00	\$9,000
48" dia. Flap gate	Ea	1	\$3,461.25	\$3,000
72" dia. CSP	LF	100	\$90.53	\$9,000
48" dia. CSP	LF	100	\$31.95	\$3,000
Floating dock system	LS	1	\$40,470.00	\$40,000
Concrete slabs	Ea	4	\$37,275.00	\$149,000
Buoys	Ea	18	\$1,065.00	\$19,000
Signs	LS	2	\$1,065.00	\$2,000
Barge mounted crane and crew	MON	3	\$106,500.00	\$320,000
Boat sling	Ea	2	\$479.25	\$1,000
72" dia. End section	Ea	1	\$1,278.00	\$1,000
48" dia. End section	Ea	1	\$639.00	\$1,000
Removal cost (25% of materials)	LS	1	\$470,000.00	\$470,000
Miscellaneous @ 10%	LS	1	\$289,900.00	\$290,000
			<b>SUBTOTAL</b>	<b>\$3,189,000</b>

CONTRACT PRICE	\$3,189,000
S/O - DESIGN @ 10%	\$319,000
S/O - CONST. SUPERVISION & CONTINGENCIES @ 25%	\$797,000

**FIRST COST** **\$4,305,000**

State of California  
 The Resources Agency of California  
 Department of Water Resources  
 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun-94

PROJECT: Threemile Slough  
 FEATURE: Fish Deflector Wall

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Piles (W27X94), approx. 100' deep	Ea	52	\$8,100.00	\$421,000
W6X15 Cross Bracing	Lb	10,150	\$6.50	\$66,000
1/2" Thick Galv. Steel Plate	Lb	174,300	\$1.95	\$340,000
5/8" dia. x 2" Bolts	Ea	2,000	\$27.00	\$54,000
Plate stiffeners (3/16" x 14'-7") steel	Lb	16,300	\$4.00	\$65,000
Riprap	Ton	3,450	\$38.00	\$131,000
Miscellaneous @ 20%	LS	1	\$215,400.00	\$215,000
			<b>SUBTOTAL</b>	<b>\$1,292,000</b>

LOW BID COST	\$1,292,000
S/O - DESIGN @ 10%	\$129,000
S/O - CONST. SUPERVISION & CONTINGENCIES @ 25%	\$323,000
<b>FIRST COST</b>	<b>\$1,744,000</b>

State of California  
 The Resources Agency of California  
 Department of Water Resources  
 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun - 94

PROJECT: Threemile Slough  
 FEATURE: Wicket Gate Alternative

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Clearing and grubbing	LS	1	\$10,350.00	\$10,000
Channel excavation	CY	50,000	\$8.90	\$445,000
Type II Rockfill	Ton	4,350	\$20.70	\$90,000
Concrete	CY	8,000	\$414.00	\$3,312,000
Steel reinforcement	Lb	800,000	\$0.62	\$496,000
Structural steel	Lb	1,170,000	\$3.36	\$3,931,000
Miscellaneous @ 20%	LS	1	\$1,656,800.00	\$1,657,000
			SUBTOTAL	<u>\$9,941,000</u>

CONTRACT PRICE	\$9,941,000
S/O - DESIGN @ 10%	\$994,000
S/O - CONST. SUPERVISION & CONTINGENCIES @ 25%	<u>\$2,485,000</u>
<b>FIRST COST</b>	<b><u>\$13,420,000</u></b>

State of California  
 The Resources Agency of California  
 Department of Water Resources  
 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun-94

PROJECT: Three Mile Slough Permanent Barrier  
 FEATURE: Built Off Site Alternative

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Channel Excavation	CY	43,000	\$3.15	\$135,000
Type I Rockfill/Riprap Material	CY	5,700	\$40.00	\$228,000
Lightweight Structural Concrete	CY	11,100	\$473.00	\$5,250,000
Reinforcing Bars	Lb	2,616,000	\$0.63	\$1,648,000
Radial Gates	Ea	5	\$263,000.00	\$1,315,000
Radial Gate Hoist	Ea	5	\$118,000.00	\$590,000
Flashboards - 60 ft.	Ea	6	\$48,000.00	\$288,000
Stoplogs - 40 ft.	Ea	12	\$32,000.00	\$384,000
Stoplogs - 20 ft.	Ea	12	\$16,000.00	\$192,000
Sector Gates	Ea	4	\$132,000.00	\$528,000
Sector Gate Operation System	LS	1	\$71,000.00	\$71,000
Sheet Piles (Drive & Cut)	SF	90,000	\$10.50	\$945,000
Log Booms (12' Length)	Ea	25	\$1,275.00	\$32,000
Piles (12" Dia. Timber)	LF	9,500	\$36.00	\$342,000
Tremie Concrete	CY	600	\$68.50	\$41,000
Guide Wall Timber (10x12)	LF	1,120	\$37.00	\$41,000
Chain Link Fence	LF	1,500	\$10.50	\$16,000
Fish Passageway Gate	Ea	1	\$131,500.00	\$132,000
Fish Passageway Screen	Ea	1	\$32,000.00	\$32,000
Fish Passageway Hoist & Lift Platform	Ea	2	\$116,000.00	\$232,000
Control Building	Ea	1	\$118,000.00	\$118,000
Operator Building	Ea	1	\$71,000.00	\$71,000
Miscellaneous @ 20%	LS	1	\$2,526,200.00	\$2,526,000
			<b>SUBTOTAL</b>	<b>\$15,157,000</b>

LOW BID COST	\$15,157,000
S/O-DESIGN @ 10%	\$1,516,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$3,789,000

<b>FIRST COST</b>	<b>\$20,462,000</b>
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State of California  
 The Resources Agency of California  
 Department of Water Resources  
 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun-94

PROJECT: Three Mile Slough Permanent Barrier  
 FEATURE: Built in Place Alternative

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Sheet Piles	SF	76,000	\$10.50	\$798,000
Excavation	CY	20,000	\$3.15	\$63,000
Drive & Cut Timber Piles	Ea	1,020	\$225.00	\$230,000
Bracing	Ton	270	\$1,850.00	\$500,000
Place Tremie Concrete	CY	9,735	\$68.50	\$667,000
Remove Bracing	Ton	270	\$840.00	\$227,000
Remove Sheet Piles	SF	76,000	\$5.50	\$418,000
Structural Concrete	CY	6,000	\$475.00	\$2,850,000
Reinforcing Bars	Lb	1,200,000	\$0.63	\$756,000
Radial Gates	Ea	5	\$265,000.00	\$1,325,000
Radial Gate Hoist	Ea	5	\$118,000.00	\$590,000
Sector Gates	Ea	4	\$132,000.00	\$528,000
Sector Gate Operation System	LS	1	\$71,000.00	\$71,000
Flashboards - 60 ft.	Ea	6	\$48,000.00	\$288,000
Additional Sheet Piles for Bank Protection	SF	40,000	\$10.50	\$420,000
Riprap	Ton	18,750	\$26.50	\$497,000
Control Building	LS	1	\$118,000.00	\$118,000
Operator Building	LS	1	\$71,000.00	\$71,000
Stoplogs - 40 ft.	Ea	12	\$32,000.00	\$384,000
Stoplogs - 20 ft.	Ea	12	\$16,000.00	\$192,000
Log Booms (12' Length)	Ea	25	\$1,275.00	\$32,000
Piles (12" Dia. Timber)	LF	8,800	\$36.00	\$317,000
Guide Wall Timber (10x12)	LF	1,120	\$37.00	\$41,000
Fish Passageway Gate	Ea	1	\$131,500.00	\$132,000
Fish Passageway Screen	Ea	1	\$32,000.00	\$32,000
Fish Passageway Hoist & Lift Platform	Ea	2	\$116,000.00	\$232,000
Miscellaneous @ 20%	LS	1	\$2,355,800.00	\$2,356,000
			<b>SUBTOTAL</b>	<b>\$14,135,000</b>

LOW BID COST	\$14,135,000
S/O-DESIGN @ 10%	\$1,414,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$3,534,000

**FIRST COST** **\$19,083,000**

4. Deflector Walls at  
Steamboat & Sutter Sloughs

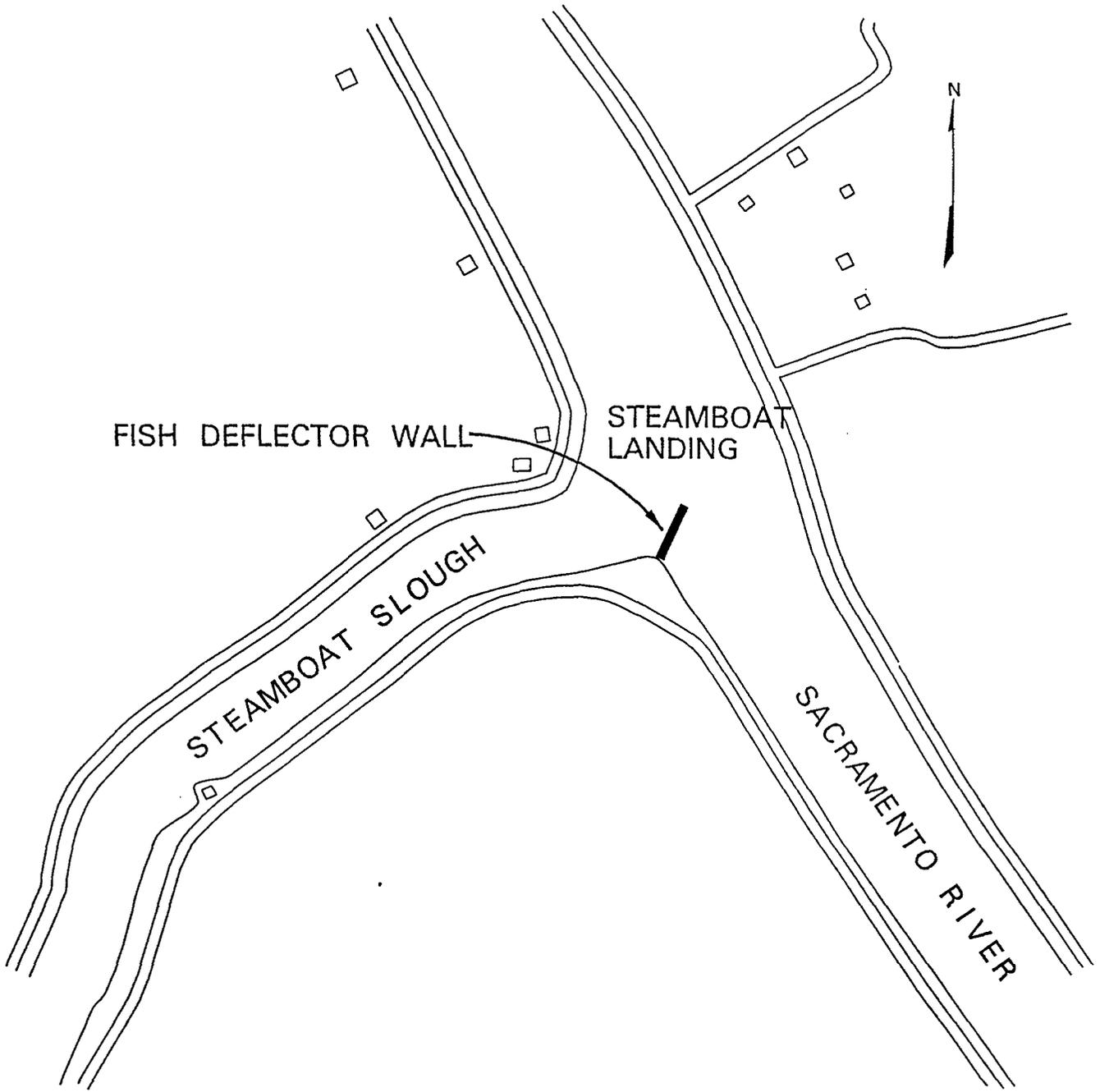
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D-002595

Deflector Walls at Steamboat and Sutter Sloughs

A conceptual design and cost estimate were prepared for deflector walls at both Steamboat and Sutter sloughs. The purpose of these walls is to divert downstream migrating salmon into the two sloughs on the west side of the Sacramento River, and prevent them from entering sloughs leading to the Central Delta on the east side of the river. The proposed deflector walls are approximately 200 feet in length. The deflector is a 1/2-inch-thick steel plate attached to cross bracing beams. The bracing beams are connected to a series of vertical and battered driven piles placed 20 feet on center at a 45-degree angle from the confluence of the Sacramento River and both sloughs.

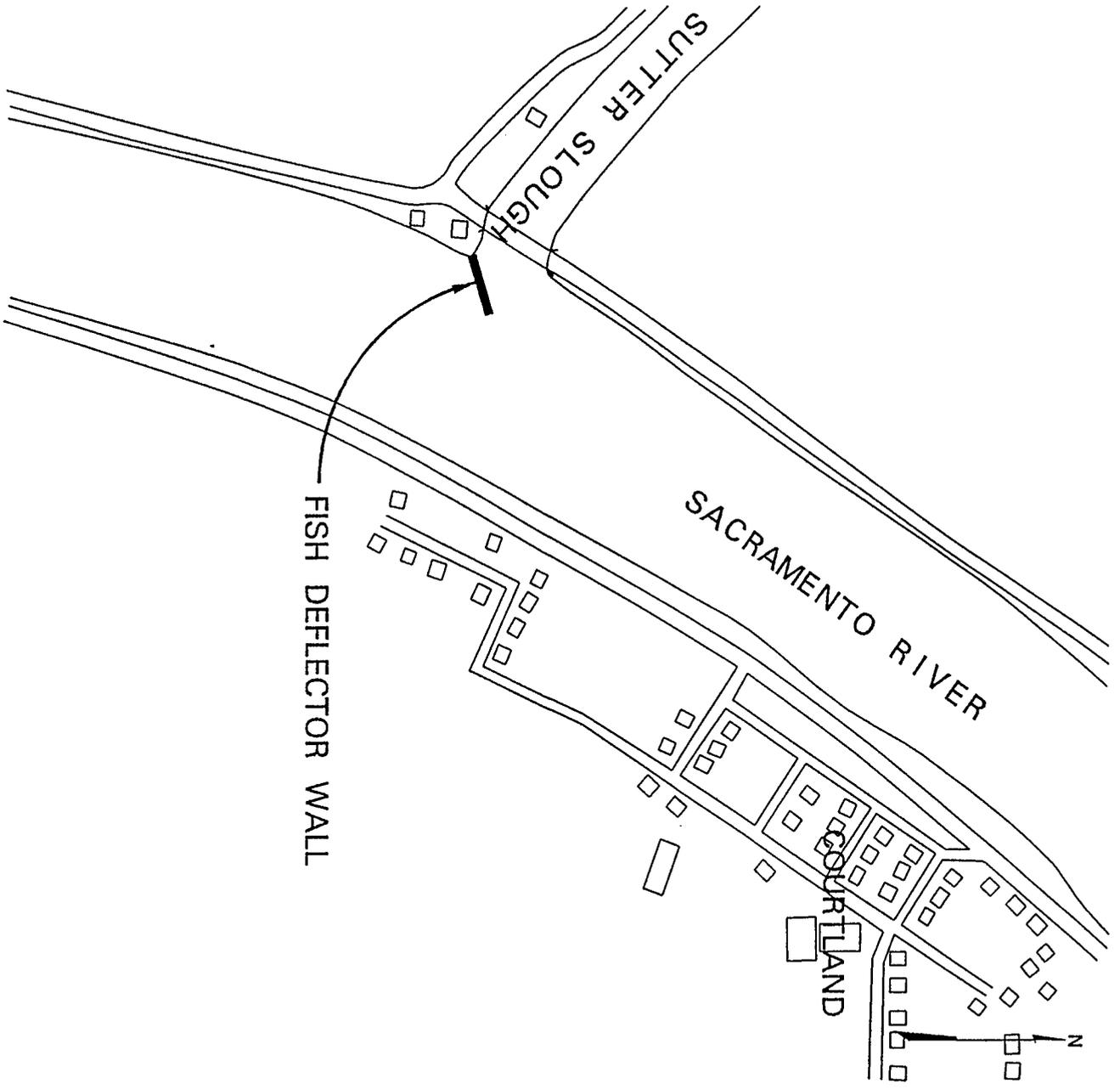
The W27x94 vertical piles are approximately 95 feet long for the Steamboat Slough site, and approximately 88 feet long for the Sutter Slough site. The piles will be driven to a final top elevation of +14.0 feet. An identical set of battered piles is placed at a 1 to 4 slope, 4 feet behind the vertical piles, for support. The piles are assumed to be A-36 steel furnished in two equal lengths and welded together at the job site. Three W6x15 cross bracing beams are placed horizontally at elevation 10.0, 0.0, and -5.0 feet. The deflector plate is attached to the pile and cross bracing structure at elevation 10.0 and extends down to elevation -5.0 feet. The vertical portion of the plate is 10.0 feet high and rests in a track. The lower 5.0 foot section bends away from the piles at a 1 to 1 slope and rests on the bottom cross bracing beam. Vertical plate stiffener strips 6 inches wide are placed every 2 feet on center along the length of the deflector to provide additional support for the 1/2-inch plate. All construction activity will be done from a barge. The estimated combined cost of the fish deflector walls at Steamboat Slough and Sutter Slough is \$1,492,000.



# STEAMBOAT SLOUGH

*Fish Deflector Wall*

*Plan View*

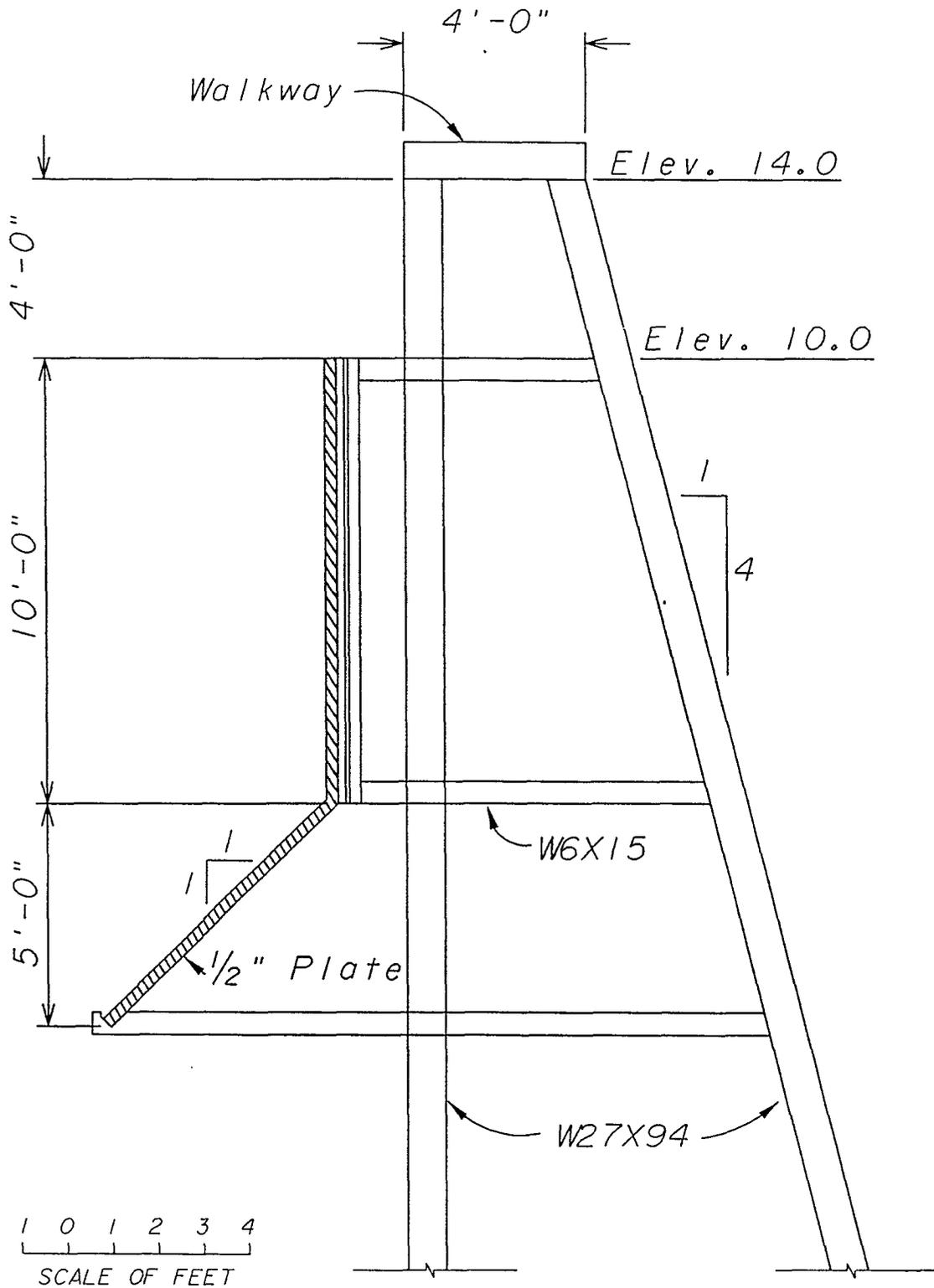


# SUTTER SLOUGH

Fish Deflector Wall  
Plan View

D-002598

D-002598



STEAMBOAT AND SUTTER SLOUGHS  
Fish Deflector Wall  
Section View

State of California  
 The Resources Agency of California  
 Department of Water Resources  
 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun - 94

PROJECT: Fish Deflector Wall  
 FEATURE: Steamboat Slough

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Piles (W27X94) approx. 95' deep	Ea	22	\$8,100.00	\$178,200
W6X15 Cross Bracing	Lb	4,300	\$6.50	\$27,950
1/2" Thick Galvanized Steel Plate	Lb	70,000	\$1.95	\$136,500
5/8" dia. x 2" Bolts	Ea	800	\$27.00	\$21,600
Plate stiffeners (3/16" x 17.1') steel	Lb	6,525	\$4.00	\$26,100
Riprap	Ton	1,850	\$38.00	\$70,300
Miscellaneous @ 20%	LS	1	\$92,130.00	\$92,000
			<b>SUBTOTAL</b>	<b>\$553,000</b>

CONTRACT PRICE	\$553,000
S/O - DESIGN @ 10%	\$55,000
S/O - CONST. SUPERVISION & CONTINGENCIES @ 25%	\$138,000
<b>FIRST COST</b>	<b>\$746,000</b>

State of California  
 The Resources Agency of California  
 Department of Water Resources  
 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun - 94

PROJECT: Fish Deflector Wall  
 FEATURE: Sutter Slough

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Piles (W27X94) approx. 95' deep	Ea	22	\$8,100.00	\$178,000
W6X15 Cross Bracing	Lb	4,300	\$6.50	\$28,000
1/2" Thick Galvanized Steel Plate	Lb	70,000	\$1.95	\$137,000
5/8" dia. x 2" Bolts	Ea	800	\$27.00	\$22,000
Plate stiffeners (3/16" x 17.1') steel	Lb	6,525	\$4.00	\$26,000
Riprap	Ton	1,850	\$38.00	\$70,000
Miscellaneous @ 20%	LS	1	\$92,200.00	\$92,000
			<b>SUBTOTAL</b>	<b>\$553,000</b>

CONTRACT PRICE	\$553,000
S/O - DESIGN @ 10%	\$55,000
S/O - CONST. SUPERVISION & CONTINGENCIES @ 25%	\$138,000
<b>FIRST COST</b>	<b>\$746,000</b>

5. William Stone Lock

D - 0 0 2 6 0 2

D-002602

William Stone Lock

The William Stone Lock and barge canal was completed in 1963 to provide a navigational link between the Sacramento River Deepwater Ship Channel and the Sacramento River. The barge canal is 1.5 miles long, 120 feet wide, and 11 feet deep; and the lock is 640 feet long, 86 feet wide and has a 21-foot lift. The lock employs sector gates at each end of the lock to control the raising and lowering of the water surface since the water stage in the Sacramento River can be much higher than the tidal stages in the Deepwater Channel. The barge canal and lock is no longer in use.

A conceptual design and cost estimate was prepared for a barrier that will allow downstream migrating fish to be diverted into the Deepwater Channel to avoid being diverted into the channels of the Central Delta where the mortality rates are assumed to be much higher.

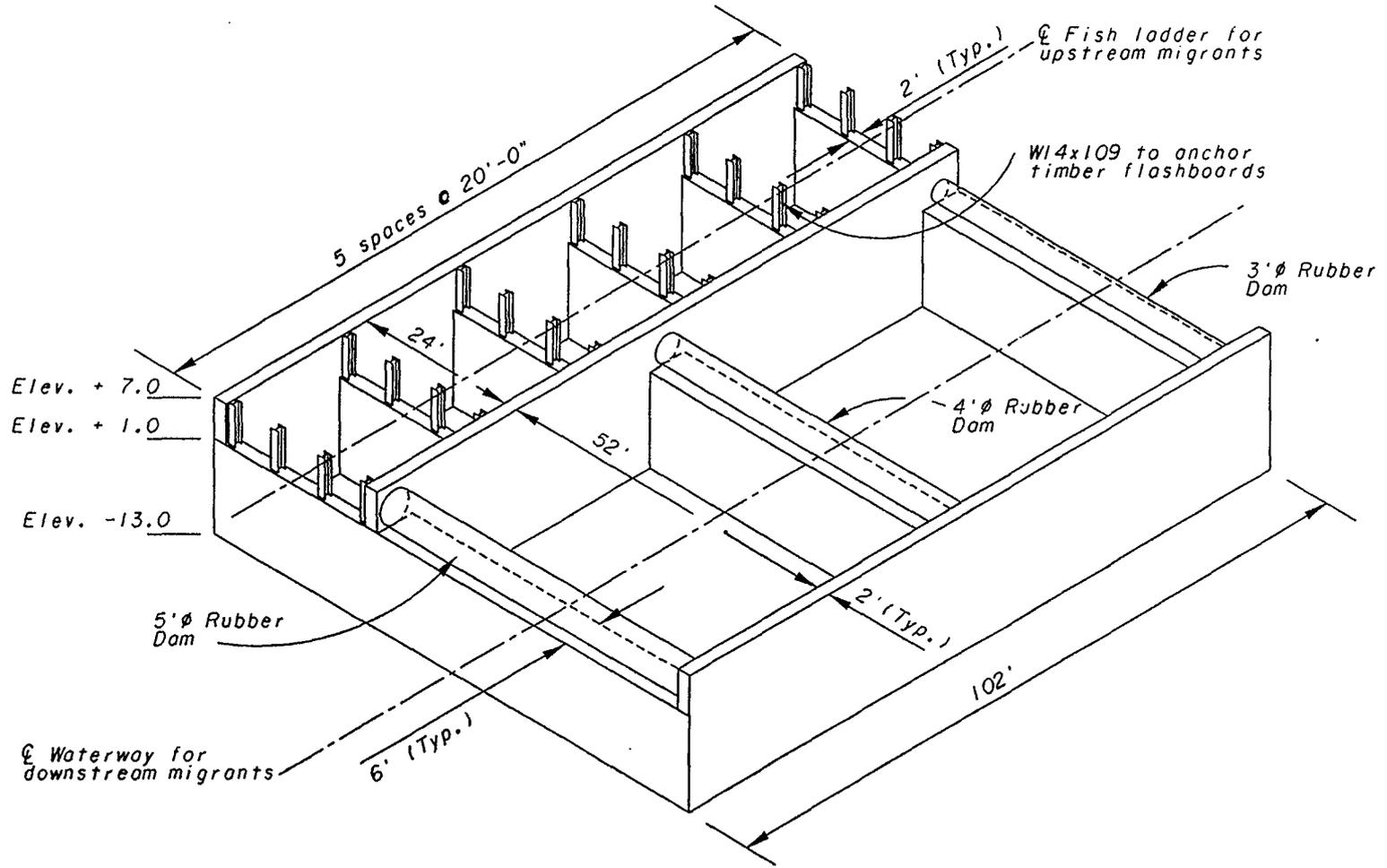
The operable barrier will consist of a concrete structure, 80 feet wide by 102 feet long, constructed within the existing lock. Three water inflatable rubber dams will control the flow of water from the Sacramento River. The diameters of the inflatable dams are 5 feet, 4 feet, and 3 feet. Also incorporated into the concrete structure is a 20 foot wide fish ladder for the upstream migrants. Flows in the fish ladder will be controlled by using timber flashboards. A schematic drawing depicting the proposed barrier is attached.

Construction of this barrier can be accomplished within the existing lock. After the lock cell has been dewatered the concrete can be placed into the forms. The rubber dams and flashboards can then be placed along with the necessary controls. The estimated construction cost of this facility will be approximately \$1,608,000. Approximately 18 months will be required to construct the barrier.

Although the cost of this structure is relatively inexpensive, additional studies will be necessary to determine the effect of tidal hydraulics on the operation. Furthermore, additional investigation must be undertaken to the impact on the fisheries.

D-002604

STONE LOCK MODIFICATIONS  
Deep Water Ship Channel and Sacramento River  
Fish Passageway



State of California  
 The Resources Agency of California  
 Department of Water Resources  
 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun-94

PROJECT: Stone Lock Modifications  
 FEATURE: Fish Passageway

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Concrete	CY	1,720	\$150.00	\$258,000
Reinforcing Steel	Lb	387,000	\$0.50	\$194,000
Structural Steel	Lb	21,000	\$1.20	\$25,000
Timber Flashboard	BF	860	\$2.00	\$2,000
Rubber Dam #1	LS	1	\$170,000.00	\$170,000
Rubber Dam #2	LS	1	\$164,000.00	\$164,000
Rubber Dam #3	LS	1	\$140,000.00	\$140,000
Miscellaneous @ 25%	LS	1	\$238,250.00	\$238,000
			<b>SUBTOTAL</b>	<b>\$1,191,000</b>

LOW BID COST	\$1,191,000
S/O-DESIGN @ 10%	\$119,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$298,000
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<b>FIRST COST</b>	<b>\$1,608,000</b>
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6. Delta Island Water Storage  
Projects

D - 0 0 2 6 0 6

Delta Island Water Storage Project

The Delta Island Water Storage Project is the latest version of the Delta Wetlands Project as proposed by John Winther. This project proposes to convert Bacon Island and Webb Tract from agricultural uses to water storage reservoirs. The stored water will be pumped from the reservoirs into Delta channels for sale to water purveyors. Bouldin Island and Holland Tract will be operated for wildlife benefits, although some water can be stored on these islands.

The two water storage islands, Bacon Island and Webb Tract are designed to store water to a maximum pool elevation of +6.0 feet. The proposed storage capacity of this project is listed below.

<u>Island</u>	<u>Storage</u>
Webb Tract	120,000 AF
Bacon Island	118,000 AF
Holland Tract	3,000 AF
Bouldin Island	6,000 AF

Cost estimates for the storage islands and the habitat islands have been prepared. The quantities for the individual islands that compromise this project were furnished to our office by Mr. John Winther, President of Delta Wetlands. The unit cost of each item was determined by our cost estimating section. A summary of the total cost that also includes the right of way cost is shown on the attached table.

Costs Table

<u>Island</u>	<u>Contract Cost</u>	<u>S.O. + 25% Contingencies</u>	<u>R/W Cost</u>	<u>Total Cost</u>
Bacon	\$41,000,000	\$14,350,000	\$ 6,084,000	\$ 61,434,000
Webb	\$36,328,000	\$12,715,000	\$13,725,000	\$ 62,768,000
Holland	\$ 5,294,000	\$ 1,853,000	\$ 6,090,000	\$ 62,768,000
Bouldin	\$17,582,000	\$ 6,154,000	\$12,012,000	\$ 35,748,000
Total:				\$173,187,000

State of California  
 The Resources Agency of California  
 Department of Water Resources  
 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun-94

PROJECT: Delta Wetlands Project  
 FEATURE: Bacon Island Reservoir

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Earthwork				
I. Levee Earthwork				
A. Toe Berm	CY	285,000	\$2.50	\$712,500
B. Crown Fill	CY	43,000	\$4.50	\$193,500
II. Rockwork				
A. Interior Slope				
1. Riprap	Ton	394,000	\$20.00	\$7,880,000
2. Geofabric	SF	3,600,000	\$0.25	\$900,000
B. Exterior Slope				
1. Riprap	Ton	48,000	\$20.00	\$960,000
III. Pump and Siphon Sumps				
A. Pump Sump Excavation	CY	78,000	\$5.00	\$390,000
B. Siphon Sump Excavation	CY	14,000	\$5.00	\$70,000
C. Riprap	Ton	29,000	\$20.00	\$580,000
IV. Levee Road Surface				
A. Import Fill	Ton	37,000	\$10.00	\$370,000
B. Geofabric	SF	1,520,000	\$0.25	\$380,000
C. Surface	SF	1,520,000	\$0.05	\$76,000
V. Interior Work				
A. New Drainage Canals	CY	90,000	\$3.50	\$315,000
B. Interior Design	LS	1	\$200,000.00	\$200,000
C. Inner-Levee Earthwork	CY	160,000	\$2.00	\$320,000
D. Water Control Structures	Ea	84	\$2,000.00	\$168,000
E. New Vegetation	Ac	4,600	\$500.00	\$2,300,000
F. New Ditches	LF	3,700	\$15.00	\$55,500
G. Rework Existing Ditches	LF	37,000	\$6.00	\$222,000
H. Existing Ditch Crossing Removal	LS	1	\$10,000.00	\$10,000
I. New Ditch Crossing	Ea	1	\$15,000.00	\$15,000
Pumping Stations				
I. Pump Structures				
A. Platform and Superstructure	Ea	40	\$25,000.00	\$1,000,000
B. Trashracks	Ea	40	\$16,500.00	\$660,000

C.	Gangway Ramps	Ea	5	\$4,000.00	\$20,000
D.	Access Ramps	Ea	1	\$5,000.00	\$5,000
E.	Piles	Ea	60	\$1,500.00	\$90,000
F.	Wave Suppression	LF	1,200	\$15.00	\$18,000
G.	Miscellaneous	Ea	1	\$40,000.00	\$40,000
II. Pumping Plants					
A.	Pumps	Ea	40	\$31,000.00	\$1,240,000
B.	Motors/ Gear Drives	Ea	40	\$34,000.00	\$1,360,000
C.	Weather/ Noise Housing	Ea	40	\$2,500.00	\$100,000
D.	Supports	Ea	40	\$3,750.00	\$150,000
E.	Flow Meters and Data Loggers	Ea	40	\$7,500.00	\$300,000
III. Utilities					
A.	Electrical Design	LS	1	\$75,000.00	\$75,000
B.	Power Wiring	Ea	40	\$5,000.00	\$200,000
C.	Controls	Ea	40	\$5,000.00	\$200,000
D.	Lighting and Electric	Ea	40	\$2,500.00	\$100,000
IV. Discharge Piping					
A.	Flex. HDP Pipe and Fittings, 36" Dia.	LF	11,000	\$70.00	\$770,000
B.	HDP Pipe Bands	Ea	80	\$100.00	\$8,000
C.	Rigid Steel Pipe and Fittings, 36" Dia.	LF	4,000	\$125.00	\$500,000
D.	Concrete Cross Ties for Pipe Runs	Ea	45	\$2,500.00	\$112,500
E.	Guard Pilings	Ea	80	\$1,500.00	\$120,000
F.	Siphon Breakers	Ea	40	\$2,000.00	\$80,000
G.	Expansion Chambers	Ea	40	\$5,000.00	\$200,000
H.	Backfill and Cover Material	Ton	3,400	\$10.00	\$34,000
V. Existing Pumps					
A.	Modify Existing Pumps	Ea	4	\$20,000.00	\$80,000
B.	Modify Existing Platforms	Ea	2	\$2,500.00	\$5,000
VI.	Circulation Pumps	Ea	-	N/A	\$0
Siphon Stations					
I. Siphon Structures					
A.	Platform and Superstructure	Ea	32	\$15,000.00	\$480,000
B.	Gangway Ramps	Ea	4	\$6,000.00	\$24,000
C.	Access Ramps	Ea	2	\$5,000.00	\$10,000
D.	Piles	Ea	48	\$1,500.00	\$72,000
E.	Wave Suppression	LF	1,300	\$15.00	\$19,500
II. Booster Pumping Plants					
A.	Booster Pumps and Motors	Ea	32	\$12,500.00	\$400,000
B.	Supports	Ea	32	\$2,000.00	\$64,000
C.	Portable Flowmeters	Ea	2	\$7,500.00	\$15,000

## III. Utilities

A.	Electrical Design	LS	1	\$75,000.00	\$75,000
B.	Power Wiring	Ea	32	\$5,000.00	\$160,000
C.	Controls	Ea	32	\$5,000.00	\$160,000
D.	Lighting and Electric	Ea	32	\$2,500.00	\$80,000

## IV. Siphon Piping

A.	Flex. HDP Pipe and Fittings, 36" Dia.	LF	6,400	\$70.00	\$448,000
B.	HDP Pipe Bands	Ea	65	\$100.00	\$6,500
C.	Valves	Ea	32	\$25,000.00	\$800,000
D.	Rigid Steel Pipe and Fittings, 36" Dia.	LF	3,200	\$125.00	\$400,000
E.	Hinged Flange Device	Ea	32	\$3,000.00	\$96,000
F.	Guard Pilings	Ea	64	\$1,500.00	\$96,000
G.	Siphon Breakers	Ea	32	\$2,000.00	\$64,000
H.	Expansion Chambers	Ea	32	\$5,000.00	\$160,000
I.	Backfill and Cover Material	Ton	2,700	\$10.00	\$27,000

## V. Fish Screens

A.	Fish Screens	Ea	32	\$57,000.00	\$1,824,000
B.	Fish Monitors	Ea	8	\$30,000.00	\$240,000

## VI. Existing Siphons

A.	Modify Siphons	Ea	10	\$2,000.00	\$20,000
B.	Fish Screens	Ea	10	\$5,000.00	\$50,000

## VII. Seepage Control System

A.	Interceptor Wells (spacing 6.5 mi. @ 200')	Ea	388	\$4,000.00	\$1,552,000
B.	Monitoring Wells (spacing 6.5 mi. @ 1,000')	Ea	78	\$10,000.00	\$780,000
C.	Electrical	Ea	388	\$2,500.00	\$970,000
D.	Control System	Ea	388	\$3,000.00	\$1,164,000

## VIII. Utilities

A.	New	LS	1	\$150,000.00	\$150,000
B.	Relocated	LS	1	\$75,000.00	\$75,000

## IX. Demolition and Cleanup

A.	Remove Existing Buildings	LS	1	\$40,000.00	\$40,000
B.	Remove Existing Farm Structures	LS	1	\$40,000.00	\$40,000
C.	Remove Abandoned Farm Implements	LS	1	\$10,000.00	\$10,000
D.	Remove Existing Fuel Tanks	LS	1	\$10,000.00	\$10,000

## X. Mitigation

A.	Environmental Mitigation	LS	1	N/A	\$0
B.	Cultural Resource Mitigation	LS	1	N/A	\$0

XI. Other Costs

A. Building Permits	Ea	3	N/A	\$0
B. Streambed Alteration Permits	Ea	3	N/A	\$0
Miscellaneous @ 20%	LS	1	\$6,833,400.00	\$6,833,000
			<b>SUBTOTAL</b>	<u>\$41,000,000</u>

LOW BID COST	\$41,000,000
S/O - DESIGN @ 10%	\$4,100,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	<u>\$10,250,000</u>
<b>FIRST COST</b>	<u><b>\$55,350,000</b></u>

State of California  
 The Resources Agency of California  
 Department of Water Resources  
 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun - 94

PROJECT: Delta Wetlands Project  
 FEATURE: Webb Tract Reservoir

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Earthwork				
I. Levee Earthwork				
A. Toe Berm	CY	829,000	\$2.25	\$1,865,250
B. Crown Fill	CY	123,000	\$4.25	\$522,750
II. Rockwork				
A. Interior Slope				
1. Riprap	Ton	341,000	\$20.00	\$6,820,000
2. Geofabric	SF	3,200,000	\$0.25	\$800,000
B. Exterior Slope				
1. Riprap	Ton	43,000	\$20.00	\$860,000
III. Pump and Siphon Sumps				
A. Pump Sump Excavation	CY	49,000	\$5.00	\$245,000
B. Siphon Sump Excavation	CY	14,000	\$5.00	\$70,000
C. Riprap	Ton	24,000	\$20.00	\$480,000
IV. Levee Road Surface				
A. Import Fill	Ton	33,000	\$10.00	\$330,000
B. Geofabric	SF	1,400,000	\$0.25	\$350,000
C. Surface	SF	1,400,000	\$0.05	\$70,000
V. Interior Work				
A. New Drainage Canals	CY	50,000	\$3.50	\$175,000
B. Interior Design	LS	1	\$266,000.00	\$266,000
C. Inner-Levee Earthwork	CY	604,000	\$2.00	\$1,208,000
D. Water Control Structures	Ea	56	\$2,000.00	\$112,000
E. New Vegetation	Ac	4,600	\$500.00	\$2,300,000
F. New Ditches	LF	5,000	\$15.00	\$75,000
G. Rework Existing Ditches	LF	50,000	\$6.00	\$300,000
Pumping Stations				
I. Pump Structures				
A. Platform and Superstructure	Ea	32	\$25,000.00	\$800,000
B. Trashracks	Ea	32	\$16,500.00	\$528,000

C.	Gangway Ramps	Ea	4	\$4,000.00	\$16,000
D.	Access Ramps	Ea	1	\$5,000.00	\$5,000
E.	Piles	Ea	48	\$1,500.00	\$72,000
F.	Wave Suppression	LF	900	\$15.00	\$13,500
G.	Miscellaneous	Ea	1	\$50,000.00	\$50,000
II. Pumping Plants					
A.	Pumps	Ea	32	\$21,000.00	\$672,000
B.	Motors/ Gear Drives	Ea	32	\$24,000.00	\$768,000
C.	Weather/ Noise Housing	Ea	32	\$2,500.00	\$80,000
D.	Supports	Ea	32	\$3,750.00	\$120,000
E.	Flow Meters and Data Loggers	Ea	32	\$7,500.00	\$240,000
III. Utilities					
A.	Electrical Design	LS	1	\$75,000.00	\$75,000
B.	Power Wiring	Ea	32	\$5,000.00	\$160,000
C.	Controls	Ea	32	\$5,000.00	\$160,000
D.	Lighting and Electric	Ea	32	\$2,500.00	\$80,000
IV. Discharge Piping					
A.	Flex. HDP Pipe and Fittings, 36" Dia.	LF	8,800	\$70.00	\$616,000
B.	HDP Pipe Bands	Ea	64	\$100.00	\$6,400
C.	Rigid Steel Pipe and Fittings, 36" Dia.	LF	3,200	\$125.00	\$400,000
D.	Concrete Cross Ties for Pipe Runs	Ea	36	\$2,500.00	\$90,000
E.	Guard Pilings	Ea	64	\$1,500.00	\$96,000
F.	Siphon Breakers	Ea	32	\$2,000.00	\$64,000
G.	Expansion Chambers	Ea	32	\$5,000.00	\$160,000
H.	Backfill and Cover Material	Ton	2,700	\$10.00	\$27,000
V. Existing Pumps					
A.	Modify Existing Pumps	Ea	4	\$20,000.00	\$80,000
B.	Modify Existing Platforms	Ea	2	\$2,550.00	\$5,100
VI.	Circulation Pumps	Ea	-	N/A	\$0
Siphon Stations					
I. Siphon Structures					
A.	Platform and Superstructure	Ea	32	\$15,000.00	\$480,000
B.	Gangway Ramps	Ea	4	\$6,000.00	\$24,000
C.	Access Ramps	Ea	2	\$5,000.00	\$10,000
D.	Piles	Ea	48	\$1,500.00	\$72,000
E.	Wave Suppression	LF	1,300	\$15.00	\$19,500
II. Booster Pumping Plants					
A.	Booster Pumps and Motors	Ea	32	\$12,500.00	\$400,000
B.	Supports	Ea	32	\$2,000.00	\$64,000
C.	Portable Flowmeters	Ea	2	\$7,500.00	\$15,000

## III. Utilities

A.	Electrical Design	LS	1	\$75,000.00	\$75,000
B.	Power Wiring	Ea	32	\$5,000.00	\$160,000
C.	Controls	Ea	32	\$5,000.00	\$160,000
D.	Lighting and Electric	Ea	32	\$2,500.00	\$80,000

## IV. Siphon Piping

A.	Flex. HDP Pipe and Fittings, 36" Dia.	LF	6,400	\$70.00	\$448,000
B.	HDP Pipe Bands	Ea	65	\$100.00	\$6,500
C.	Valves	Ea	32	\$25,000.00	\$800,000
D.	Rigid Steel Pipe and Fittings, 36" Dia.	LF	3,200	\$125.00	\$400,000
E.	Hinged Flange Device	Ea	32	\$3,000.00	\$96,000
F.	Guard Pilings	Ea	64	\$1,500.00	\$96,000
G.	Siphon Breakers	Ea	32	\$2,000.00	\$64,000
H.	Expansion Chambers	Ea	32	\$5,000.00	\$160,000
I.	Backfill and Cover Material	Ton	2,700	\$10.00	\$27,000

## V. Fish Screens

A.	Fish Screens	Ea	32	\$57,000.00	\$1,824,000
B.	Fish Monitors	Ea	8	\$30,000.00	\$240,000

## VI. Existing Siphons

A.	Modify Siphons	Ea	10	\$2,000.00	\$20,000
B.	Fish Screens	Ea	10	\$5,000.00	\$50,000

## VII. Seepage Control System

A.	Interceptor Wells (spacing 6.5 mi. @ 200')	Ea	172	\$4,000.00	\$688,000
B.	Monitoring Wells (spacing 6.5 mi. @ 1,000')	Ea	34	\$10,000.00	\$340,000
C.	Electrical	Ea	172	\$2,500.00	\$430,000
D.	Control System	Ea	172	\$3,000.00	\$516,000

## VIII. Utilities

A.	New	LS	1	\$100,000.00	\$100,000
B.	Relocated	LS	1	\$75,000.00	\$75,000

## IX. Demolition and Cleanup

A.	Remove Existing Buildings	LS	1	\$40,000.00	\$40,000
B.	Remove Existing Farm Structures	LS	1	\$40,000.00	\$40,000
C.	Remove Abandoned Farm Implements	LS	1	\$10,000.00	\$10,000
D.	Remove Existing Fuel Tanks	LS	1	\$10,000.00	\$10,000

## X. Mitigation

A.	Environmental Mitigation	LS	1	N/A	\$0
B.	Cultural Resource Mitigation	LS	1	N/A	\$0

XI. Other Costs

A. Building Permits	Ea	3	N/A	\$0
B. Streambed Alteration Permits	Ea	3	N/A	\$0
Miscellaneous @ 20%	LS	1	\$6,054,600.00	\$6,055,000
			<b>SUBTOTAL</b>	<u>\$36,328,000</u>

LOW BID COST	\$36,328,000
S/O-DESIGN @ 10%	\$3,633,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	<u>\$9,082,000</u>

**FIRST COST** \$49,043,000

State of California  
 The Resources Agency of California  
 Department of Water Resources  
 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun - 94

PROJECT: Delta Wetlands Project  
 FEATURE: Holland Tract Habitat Area

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Earthwork				
I. Levee Earthwork				
A. Toe Berm	CY	100,000	\$2.50	\$250,000
B. Crown Fill	CY	30,800	\$4.50	\$138,600
II. Rockwork				
A. Interior Slope				
1. Riprap	Ton			
2. Geofabric	SF			
B. Exterior Slope				
1. Riprap	Ton			
III. Pump and Siphon Sumps				
A. Pump Sump Excavation	CY			
B. Siphon Sump Excavation	CY			
C. Riprap	Ton			
IV. Levee Road Surface				
A. Import Fill	Ton	28,200	\$10.00	\$282,000
B. Geofabric	SF			
C. Surface	SF	1,152,000	\$0.05	\$57,600
V. Interior Work				
A. New Drainage Canals	CY			
B. Interior Design	LS			
C. Inner-Levee Earthwork	CY			
D. Water Control Structures	Ea			
E. New Vegetation	Ac			
F. New Ditches	LF			
G. Rework Existing Ditches	LF			
H. Existing Ditch Crossing Removal	LS			
I. New Ditch Crossing	Ea			
VI. Habitat Area				
A. Habitat Design	LS	1	\$80,000.00	\$80,000
B. Inner Levee Earthwork	CY	150,200	\$2.00	\$300,400
C. Water Control Structures	Ea	45	\$2,000.00	\$90,000
D. New Vegetation	Ac	3,014	\$500.00	\$1,507,000

E.	Discing and Rolling	Ac	3,014	\$150.00	\$452,100
F.	Nesting and Haulout Islands	Ea	113	\$4,000.00	\$452,000
G.	Nesting Boxes, Platforms, Etc.	Ea	300	\$350.00	\$105,000
H.	Ditch Crossing	LS	1	\$3,000.00	\$3,000
I.	New Ditches	LF	2,400	\$15.00	\$36,000
J.	Rework Existing Ditches	LF	23,300	\$6.00	\$139,800
K.	Miscellaneous	LS	1	\$30,000.00	\$30,000
VII.	DSOD Levee	Mi			
Pumping Stations					
I. Pump Structures					
A.	Platform and Superstructure	Ea			
B.	Trashracks	Ea			
C.	Gangway Ramps	Ea			
D.	Access Ramps	Ea			
E.	Piles	Ea			
F.	Wave Suppression	LF			
G.	Miscellaneous	Ea			
II. Pumping Plants					
A.	Pumps	Ea			
B.	Motors/ Gear Dives	Ea			
C.	Weather/ Noise Housing	Ea			
D.	Supports	Ea			
E.	Flow Meters and Data Loggers	Ea			
III. Utilities					
A.	Electrical Design	LS			
B.	Power Wiring	Ea			
C.	Controls	Ea			
D.	Lighting and Electric	Ea			
IV. Discharge Piping					
A.	Flex. HDP Pipe and Fittings, 36" Dia.	LF			
B.	HDP Pipe Bands	Ea			
C.	Rigid Steel Pipe and Fittings, 36" Dia.	LF			
D.	Concrete Cross Ties for Pipe Runs	Ea			
E.	Guard Pilings	Ea			
F.	Siphon Breakers	Ea			
G.	Expansion Chambers	Ea			
H.	Backfill and Cover Material	Ton			
V. Existing Pumps					
A.	Modify Existing Pumps	Ea	3	\$20,000.00	\$60,000
B.	Modify Existing Platforms	Ea	3	\$2,500.00	\$7,500

VI. Circulation Pumps	Ea	3	\$25,000.00	\$75,000
Siphon Stations				
I. Siphon Structures				
A. Platform and Superstructure	Ea			
B. Gangway Ramps	Ea			
C. Access Ramps	Ea			
D. Piles	Ea			
E. Wave Suppression	LF			
II. Booster Pumping Plants				
A. Booster Pumps and Motors	Ea			
B. Supports	Ea			
C. Portable Flowmeters	Ea			
III. Utilities				
A. Electrical Design	LS			
B. Power Wiring	Ea			
C. Controls	Ea			
D. Lighting and Electric	Ea			
IV. Siphon Piping				
A. Flex. HDP Pipe and Fittings, 36" Dia.	LF			
B. HDP Pipe Bands	Ea			
C. Valves	Ea			
D. Rigid Steel Pipe and Fittings, 36" Dia.	LF			
E. Hinged Flange Device	Ea			
F. Guard Pilings	Ea			
G. Siphon Breakers	Ea			
H. Expansion Chambers	Ea			
I. Backfill and Cover Material	Ton			
V. Fish Screens				
A. Fish Screens	Ea			
B. Fish Monitors	Ea			
VI. Existing Siphons				
A. Modify Siphons	Ea	8	\$2,000.00	\$16,000
B. Fish Screens	Ea	8	\$5,000.00	\$40,000
VII. Seepage Control System				
A. Interceptor Wells (spacing 6.5 mi. @ 200')	Ea			
B. Monitoring Wells (spacing 6.5 mi. @ 1,000')	Ea			
C. Electrical	Ea			
D. Control System	Ea			

VIII. Utilities

- A. New LS
- B. Relocated LS

IX. Facilities

A. Shop Yard -2,500 sft, Metal Bldg.	Ea	1	\$30,000.00	\$30,000
B. Boat Docks	Ea	3	\$35,000.00	\$105,000
C. Living Quarters, single family	Ea	1	\$80,000.00	\$80,000
D. Office Buildings, 6 people, Metal bldg.	Ea	1	\$75,000.00	\$75,000

X. Demolition and Cleanup

- A. Remove Existing Buildings LS
- B. Remove Existing Farm Structures LS
- C. Remove Abandoned Farm Implements LS
- D. Remove Existing Fuel Tanks LS

XI. Mitigation

A. Environmental Mitigation	LS	-	N/A	\$0
B. Cultural Resource Mitigation	LS	-	N/A	\$0

XII. Other Costs

A. Building Permits	Ea	-	N/A	\$0
B. Streambed Alteration Permits	Ea	-	N/A	\$0

Miscellaneous @ 20%	LS	1	\$882,400.00	\$882,000
SUBTOTAL				\$5,294,000

LOW BID COST	\$5,294,000
S/O - DESIGN @ 10%	\$529,000
S/O - CONST. SUPERVISION & CONTINGENCIES @ 25%	\$1,324,000
<b>FIRST COST</b>	<b><u>\$7,147,000</u></b>

State of California  
 The Resources Agency of California  
 Department of Water Resources  
 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun - 94

PROJECT: Delta Wetlands Project  
 FEATURE: Bouldin Island Habitat Area

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Earthwork				
I. Levee Earthwork - Bull 192-82 Levee Work				
A. Toe Berm	CY	1,286,000	\$2.50	\$3,215,000
B. Crown Fill	CY	542,000	\$4.50	\$2,439,000
II. Rockwork				
A. Interior Slope				
1. Riprap	Ton			
2. Geofabric	SF			
B. Exterior Slope				
1. Riprap	Ton			
III. Pump and Siphon Sumps				
A. Pump Sump Excavation	CY			
B. Siphon Sump Excavation	CY			
C. Riprap	Ton			
IV. Levee Road Surface				
A. Import Fill	Ton	46,500	\$10.00	\$465,000
B. Geofabric	SF			
C. Surface	SF	1,900,000	\$0.05	\$95,000
V. Interior Work				
A. New Drainage Canals	CY			
B. Interior Design	LS			
C. Inner-Levee Earthwork	CY			
D. Water Control Structures	Ea			
E. New Vegetation	Ac			
F. New Ditches	LF			
G. Rework Existing Ditches	LF			
H. Existing Ditch Crossing Removal	LS			
I. New Ditch Crossing	Ea			
VI. Habitat Area				
A. Habitat Design	LS	1	\$250,000.00	\$250,000

B.	Inner Levee Earthwork	CY	450,000	\$2.00	\$900,000
C.	Water Control Structures	Ea	58	\$2,000.00	\$116,000
D.	New Vegetation	Ac	6,000	\$500.00	\$3,000,000
E.	Discing and Rolling	Ac	6,000	\$150.00	\$900,000
F.	Nesting and Haulout Islands	Ea	500	\$4,000.00	\$2,000,000
G.	Nesting Boxes, Platforms, Etc.	Ea	500	\$350.00	\$175,000
H.	Ditch Crossing	Ea	3	\$3,000.00	\$9,000
I.	New Ditches	LF	10,000	\$15.00	\$150,000
J.	Rework Existing Ditches	LF	49,000	\$6.00	\$294,000
K.	Miscellaneous	LS	1	\$90,000.00	\$90,000

VII. DSOD Levee Mi

Pumping Stations

I. Pump Structures

A.	Platform and Superstructure	Ea
B.	Trashracks	Ea
C.	Gangway Ramps	Ea
D.	Access Ramps	Ea
E.	Piles	Ea
F.	Wave Suppression	LF
G.	Miscellaneous	Ea

II. Pumping Plants

A.	Pumps	Ea
B.	Motors/ Gear Drives	Ea
C.	Weather/ Noise Housing	Ea
D.	Supports	Ea
E.	Flow Meters and Data Loggers	Ea

III. Utilities

A.	Electrical Design	LS
B.	Power Wiring	Ea
C.	Controls	Ea
D.	Lighting and Electric	Ea

IV. Discharge Piping

A.	Flex. HDP Pipe and Fittings, 36" Dia.	LF
B.	HDP Pipe Bands	Ea
C.	Rigid Steel Pipe and Fittings, 36" Dia.	LF
D.	Concrete Cross Ties for Pipe Runs	Ea
E.	Guard Pilings	Ea
F.	Siphon Breakers	Ea
G.	Expansion Chambers	Ea
H.	Backfill and Cover Material	Ton

V. Existing Pumps

A.	Modify Existing Pumps	Ea	5	\$20,000.00	\$100,000
B.	Modify Existing Platforms	Ea	2	\$2,500.00	\$5,000
VI.	Circulation Pumps	Ea	3	\$25,000.00	\$75,000
Siphon Stations					
I. Siphon Structures					
A.	Platform and Superstructure	Ea			
B.	Gangway Ramps	Ea			
C.	Access Ramps	Ea			
D.	Piles	Ea			
E.	Wave Suppression	LF			
II. Booster Pumping Plants					
A.	Booster Pumps and Motors	Ea			
B.	Supports	Ea			
C.	Portable Flowmeters	Ea			
III. Utilities					
A.	Electrical Design	LS			
B.	Power Wiring	Ea			
C.	Controls	Ea			
D.	Lighting and Electric	Ea			
IV. Siphon Piping					
A.	Flex. HDP Pipe and Fittings, 36" Dia.	LF			
B.	HDP Pipe Bands	Ea			
C.	Valves	Ea			
D.	Rigid Steel Pipe and Fittings, 36" Dia.	LF			
E.	Hinged Flange Device	Ea			
F.	Guard Pilings	Ea			
G.	Siphon Breakers	Ea			
H.	Expansion Chambers	Ea			
I.	Backfill and Cover Material	Ton			
V. Fish Screens					
A.	Fish Screens	Ea			
B.	Fish Monitors	Ea			
VI. Existing Siphons					
A.	Modify Siphons	Ea	12	\$2,000.00	\$24,000
B.	Fish Screens	Ea	12	\$5,000.00	\$60,000
VII. Seepage Control System					
A.	Interceptor Wells (spacing 6.5 mi. @ 200')	Ea			
B.	Monitoring Wells (spacing 6.5 mi. @ 1,000')	Ea			

C. Electrical	Ea			
D. Control System	Ea			
VIII. Utilities				
A. New	LS			
B. Relocated	LS			
IX. Facilities				
A. Shop Yard -2,500 sft, Metal Bldg.	Ea	1	\$30,000.00	\$30,000
B. Boat Docks	Ea	3	\$35,000.00	\$105,000
C. Living Quarters, single family	Ea	1	\$80,000.00	\$80,000
D. Office Buildings, 6 people, Metal bldg.	Ea	1	\$75,000.00	\$75,000
X. Demolition and Cleanup				
A. Remove Existing Buildings	LS			
B. Remove Existing Farm Structures	LS			
C. Remove Abandoned Farm Implements	LS			
D. Remove Existing Fuel Tanks	LS			
XI. Mitigation				
A. Environmental Mitigation	LS	-	N/A	\$0
B. Cultural Resource Mitigation (one historical site)	LS	1	N/A	\$0
XII. Other Costs				
A. Building Permits	Ea	-	N/A	\$0
B. Streambed Alteration Permits	Ea	-	N/A	\$0
Miscellaneous @ 20%	LS	1	\$2,930,400.00	\$2,930,000
			<b>SUBTOTAL</b>	<b>\$17,582,000</b>

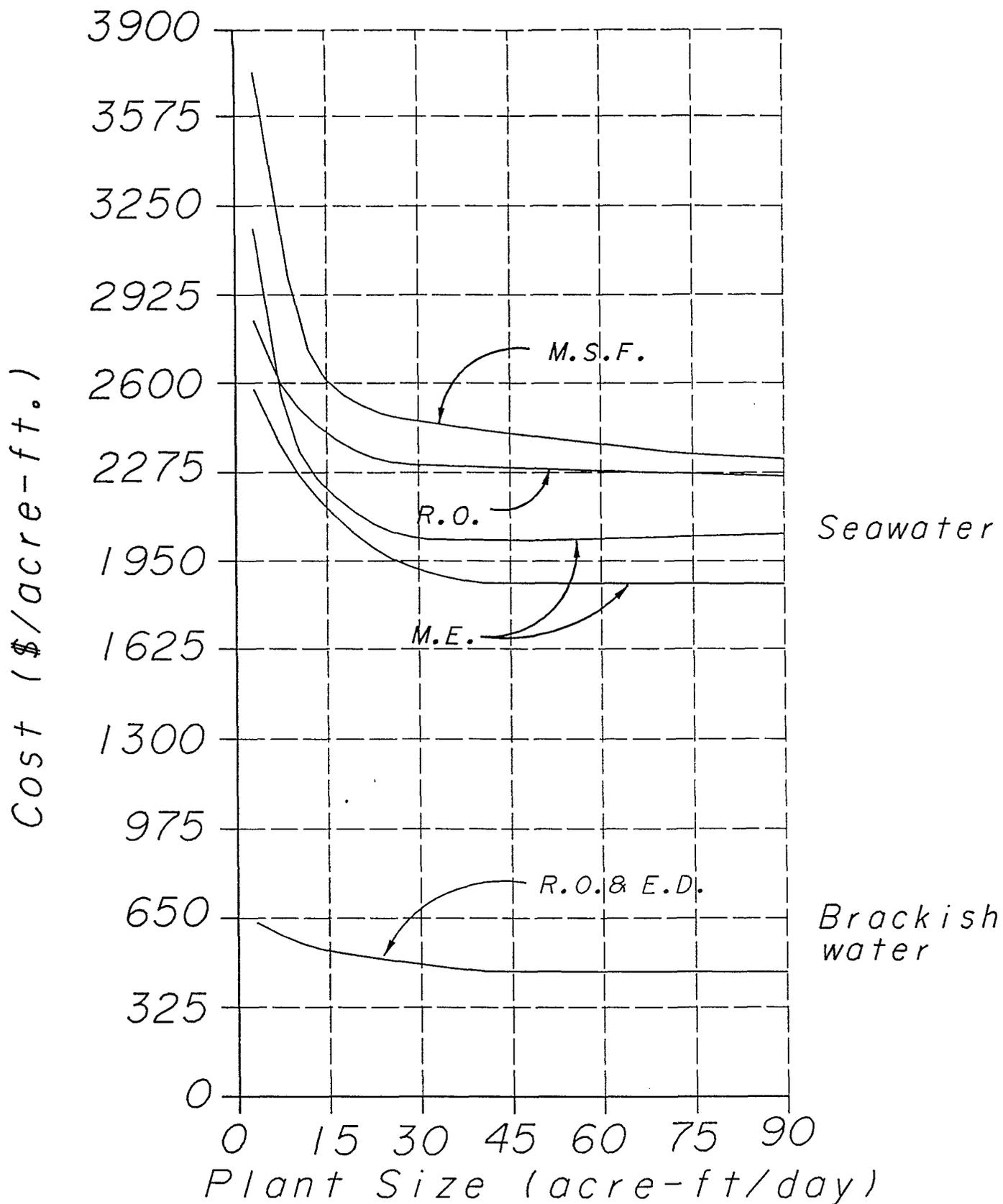
LOW BID COST	\$17,582,000
S/O-DESIGN @ 10%	\$1,758,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$4,396,000
<b>FIRST COST</b>	<b>\$23,736,000</b>

7. Desalination Plant Costs

Desalination Plant Costs

The following graph depicts the costs of desalination per 1,000 gallons of water versus plant size for various desalination processes. This information was gathered from a report prepared by the Office of Technology Assessment for the U.S. Congress entitled Using Desalination Technologies for Water Treatment, dated 1988. The costs were updated to April 1994 values.

The graph shows that the cost of desalination produced water decreases with increasing plant size for each of the various desalination processes. As the plant size increases to between 15 acre-feet and 30 acre-feet per day, a leveling off of the cost occurs. However in the opinion of some experts, a 300 acre-feet per day capacity plant may produce water that is 20 to 30 percent cheaper than a 15 acre-feet per day plant.



M.S.F. - Multi - Stage Flash (distillation)  
 R.O. - Reverse Osmosis  
 M.E. - Multiple Effect (distillation)  
 E.D. - Electrodialysis

Desalination Costs versus Plant Size

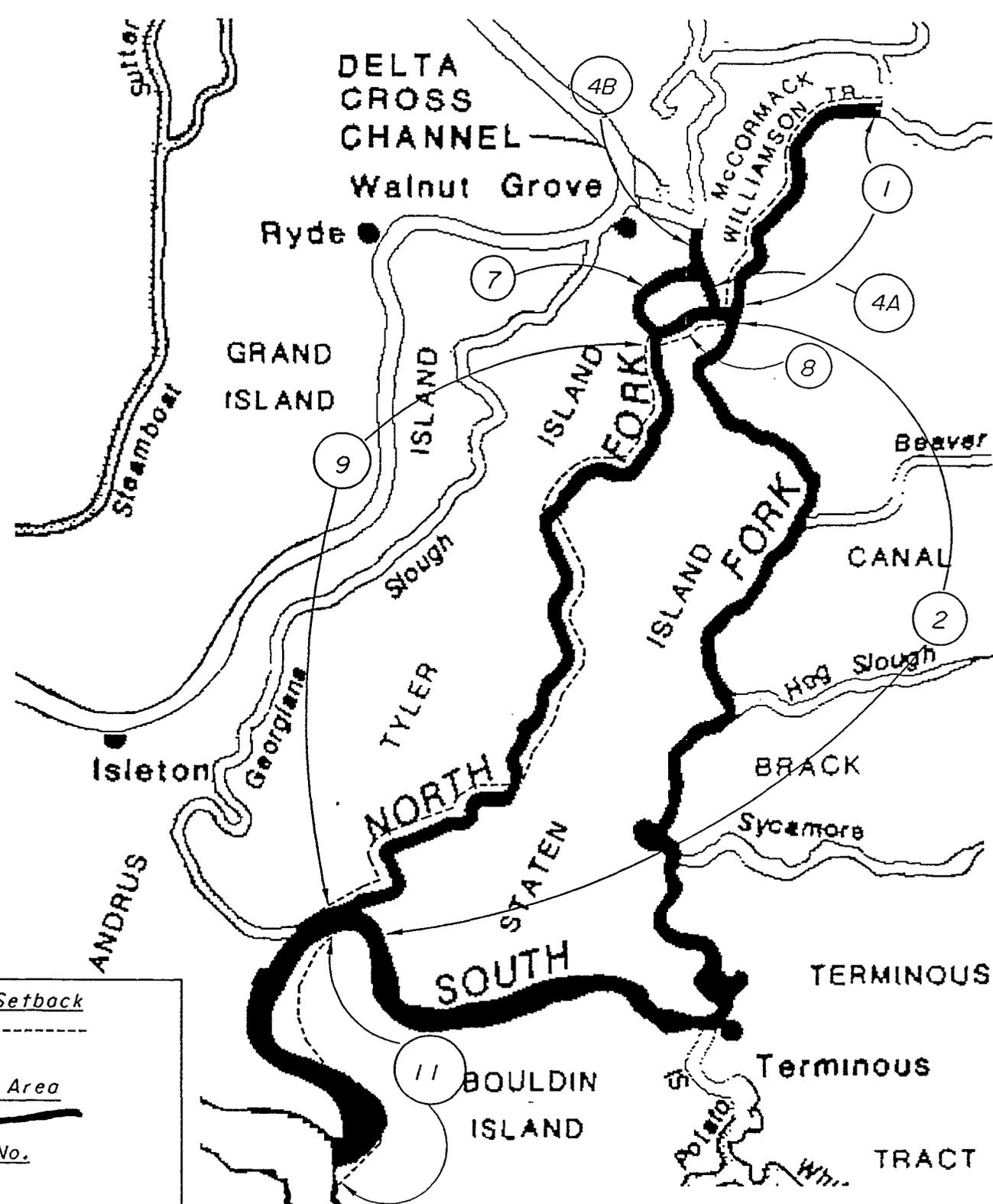
8. North Delta Preferred  
Alternative

North Delta Preferred Alternative

The North Delta preferred alternative [5B], as described in the Draft EIR/EIS report dated November 1990, was updated to reflect April 1994 cost. The alternative included the following features:

1. Dredge the main stem and South Fork Mokelumne River.
2. Enlarge the main stem and North Fork Mokelumne River with levee setbacks and channel dredging.
3. Enlarge the Delta Cross Channel gate structure.

The total cost of this alternative is estimated to be about \$356,000,000.



Levee Setback  
 -----

Dredge Area  
 —————

Reach No.  
 (1)

*NORTH DELTA*  
*Mokelumne River*  
*Proposed Dredging and Levee Setbacks*

9. Offstream Water Storage

Projects

Offstream Water Storage Projects

Cost estimates were prepared for the two offstream water storage projects designated by the staff of the Bay-Delta Oversight Council to be updated. The two projects are the 1.73 million acre feet "State-Only" alternative for the Los Banos Grandes Facilities and the First Stage of the Kern Fan Element of the Kern Water Bank.

The cost estimates included in a memorandum report entitled Los Banos Grandes Facilities, 1.73 Million Acre-Feet 'State-Only' Alternative, Volume I and dated January 1991 were updated to April 1994 cost by use of the USBR construction cost index for dam projects. The total cost for these facilities is estimated to be \$823,208,000.

Cost for the First Stage of the Kern Fan Element of the Kern Water Bank were updated from the cost in the Environmental Impact Report dated December 1990 for the above mentioned project. The update cost is about \$15,448,000 in April 1994.

State of California  
 The Resources Agency of California  
 Department of Water Resources  
 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun - 94

PROJECT: 1.73 MAF Los Banos Grandes Dam Project  
 FEATURE: Summary of Estimated Costs (in thousands of dollars)

FACILITY	LOW BID PRICE	S/O - DESIGN	S/O - SUPER.	TOTAL
<b>DAMS</b>				
Main Dam	\$66,620	\$6,662	\$16,655	\$89,937
Salt Creek Saddle Dam	\$84,466	\$8,447	\$21,117	\$114,030
Harper Lane Saddle Dam	\$3,264	\$326	\$816	\$4,406
San Carlos Saddle Dam	\$1,551	\$155	\$388	\$2,094
Los Banos Detention Dam	\$1,586	\$159	\$397	\$2,142
				<u>\$212,609</u>
<b>SPILLWAYS</b>				
Main Dam and Emergency Outlet Works	\$16,350	\$1,635	\$4,088	\$22,073
Detention Dam - Right Abutment	\$11,150	\$1,115	\$2,788	\$15,053
				<u>\$37,126</u>
<b>OUTLET WORKS</b>				
Main Dam	\$77,056	\$7,706	\$19,264	\$104,026
Detention Dam	\$25,293	\$2,529	\$6,323	\$34,145
Salt Creek Saddle Dam	\$1,607	\$161	\$402	\$2,170
				<u>\$140,341</u>
<b>PUMPING-GENERATING FACILITIES</b>				
Plant No. 1 - Civil, Mechanical, Electrical	\$49,300	\$13,310	-	\$62,610
- Bowl Excavation	\$2,230	\$223	\$558	\$3,011
- Penstocks	\$7,036	\$704	\$1,759	\$9,499
- Conveyance Channel	\$18,227	\$1,823	\$4,557	\$24,607
Plant No. 2 - Civil, Mechanical, Electrical	\$109,400	\$29,530	-	\$138,930
- Bowl Excavation	\$5,345	\$535	\$1,336	\$7,216
- Penstocks	\$8,560	\$856	\$2,140	\$11,556
- Conveyance Channel	\$6,503	\$650	\$1,626	\$8,779
				<u>\$266,208</u>
<b>ROADS</b>				
Access, Recreation, Relocation	\$35,541	\$94,509	\$8,958	\$139,008

MISCELLANEOUS

Clearing and Support	\$16,205	\$1,621	\$4,051	\$21,877
Utility Relocations	\$6,039	-	-	\$6,039
				<u>\$27,916</u>

TOTAL LOW BID PRICE	\$553,329
TOTAL S/O - DESIGN @ 10%	\$172,656
TOTAL S/O - CONST. SUPERVISION & CONTINGENCIES @ 25%	<u>\$97,223</u>
<b>TOTAL FIRST COST</b>	<b><u>\$823,208</u></b>

State of California  
 The Resources Agency of California  
 Department of Water Resources  
 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun - 94

PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Los Banos Grandes Dam

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$1,590,000.00	\$1,590,000
Care of Water	LS	1	\$320,000.00	\$320,000
Clear & Grub	Ac	54	\$692.00	\$37,000
Strip Borrow Areas	CY	1,300,000	\$1.05	\$1,365,000
Foundation Excavation	CY	917,700	\$3.00	\$2,753,000
Borrow Impervious Material	CY	3,734,000	\$3.20	\$11,949,000
Place Impervious Fill	CY	3,394,700	\$0.70	\$2,376,000
Borrow Pervious Material	CY	3,821,500	\$4.40	\$16,815,000
Place Pervious Fill	CY	3,474,000	\$0.70	\$2,432,000
Furnish and Place Filter Zone	CY	612,500	\$5.70	\$3,491,000
Furnish and Place Drain Zone	CY	253,000	\$5.70	\$1,442,000
Furnish and Place Soil Cement	CY	74,800	\$29.30	\$2,192,000
Borrow Random Material	CY	3,232,100	\$2.90	\$9,373,000
Place Random Fill	CY	2,938,300	\$0.70	\$2,057,000
Drill Grout Holes	LF	71,000	\$17.05	\$1,211,000
Grout Setups	Ea	480	\$45.80	\$22,000
Grout	CF	36,000	\$20.75	\$747,000
Aggregate Base	Ton	2,500	\$17.05	\$43,000
Asphalt Concrete	Ton	500	\$57.50	\$29,000
Instrumentation	LS	1	\$320,000.00	\$320,000
Miscellaneous @ 10%	LS	1	\$6,056,400.00	\$6,056,000
			<b>SUBTOTAL</b>	<b>\$66,620,000</b>

LOW BID PRICE	\$66,620,000
S/O-DESIGN @ 10%	\$6,662,000
S/O-CONST.SUPERVISION & CONTINGENCIES @ 25%	\$16,655,000
<b>FIRST COST</b>	<b>\$89,937,000</b>

State of California  
 The Resources Agency of California  
 Department of Water Resources  
 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun - 94

PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Salt Creek Auxiliary Dam

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$2,057,000.00	\$2,057,000
Care of Water	LS	1	\$107,000.00	\$107,000
Clear & Grub	Ac	100	\$457.95	\$46,000
Strip Borrow Areas	CY	1,920,000	\$1.05	\$2,016,000
Foundation Excavation	CY	1,774,600	\$2.65	\$4,703,000
Borrow Impervious Material	CY	3,623,200	\$2.55	\$9,239,000
Place Impervious Fill	CY	3,293,800	\$0.70	\$2,306,000
Borrow Pervious Material	CY	6,209,700	\$5.10	\$31,669,000
Place Pervious Fill	CY	5,645,200	\$0.70	\$3,952,000
Furnish and Place Filter Zone	CY	654,700	\$9.05	\$5,925,000
Furnish and Place Drain Zone	CY	412,200	\$9.05	\$3,730,000
Furnish and Place Soil Cement	CY	183,700	\$29.80	\$5,474,000
Furnish and Place Random Zone	CY	1,629,000	\$2.90	\$4,724,000
Drill Grout Holes	LF	25,000	\$17.05	\$426,000
Grout Setups	Ea	500	\$45.80	\$23,000
Grout	CF	3,000	\$23.45	\$70,000
Instrumentation	LS	1	\$320,000.00	\$320,000
Miscellaneous	LS	1	\$7,678,700.00	\$7,679,000
			SUBTOTAL	\$84,466,000
			LOW BID PRICE	\$84,466,000
			S/O-DESIGN @ 10%	\$8,447,000
			S/O-CONST.SUPERVISION & CONTINGENCIES @ 25%	\$21,117,000
			FIRST COST	<u>\$114,030,000</u>

State of California  
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 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun - 94

PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Harper Lane Saddle Dam

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$144,000.00	\$144,000
Care of Water	LS	1	\$80,000.00	\$80,000
Clear & Grub	Ac	12	\$426.00	\$5,000
Strip Borrow Areas	CY	30,000	\$1.05	\$32,000
Foundation Excavation	CY	105,000	\$2.90	\$305,000
Borrow Impervious Material	CY	134,000	\$3.20	\$429,000
Place Impervious Fill	CY	122,000	\$1.05	\$128,000
Borrow Shell Zone	CY	86,000	\$4.50	\$387,000
Place Shell Zone	CY	78,000	\$1.05	\$82,000
Furnish and Place Filter Zone	CY	81,000	\$8.50	\$689,000
Furnish and Place Drain Zone	CY	25,000	\$8.50	\$213,000
Furnish and Place Bedding	CY	4,350	\$10.65	\$46,000
Furnish and Place Riprap	CY	8,700	\$26.65	\$232,000
Drill Grout Holes	LF	4,200	\$17.05	\$72,000
Grout Setups	Ea	120	\$45.25	\$5,000
Grout	CF	1,400	\$23.45	\$33,000
Instrumentation	LS	1	\$85,000.00	\$85,000
Miscellaneous @ 10%	LS	1	\$296,700.00	\$297,000
SUBTOTAL				\$3,264,000

LOW BID PRICE	\$3,264,000
S/O-DESIGN @ 10%	\$326,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$816,000
<b>FIKST COST</b>	<b>\$4,406,000</b>

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Conceptual Cost Estimate  
 Date: Jun - 94

PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: San Carlos Saddle Dam

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
<b>DAM</b>				
Mobilization	LS	1	\$64,000.00	\$64,000
Foundation Excavation	CY	35,500	\$3.30	\$117,000
Borrow Impervious Material	CY	62,000	\$3.40	\$211,000
Place Impervious Fill	CY	56,350	\$1.05	\$59,000
Borrow Pervious Material	CY	20,300	\$5.85	\$119,000
Place Pervious Zone	CY	18,400	\$1.05	\$19,000
Furnish and Place Filter Zone	CY	27,200	\$10.10	\$275,000
Furnish and Place Drain Zone	CY	8,650	\$10.10	\$87,000
Furnish and Place Soil Cement	CY	6,600	\$29.80	\$197,000
Strip Borrow Areas	CY	20,000	\$1.05	\$21,000
Drill Grout Holes	LF	3,000	\$17.55	\$53,000
Grout Setups	Ea	80	\$47.95	\$4,000
Grout	CF	1,400	\$26.65	\$37,000
Instrumentation	LS	1	\$26,625.00	\$27,000
			<b>SUBTOTAL</b>	<b>\$1,290,000</b>
<b>DIKE</b>				
Foundation Excavation	CY	10,500	\$3.30	\$35,000
Place Random Fill	CY	18,700	\$1.70	\$32,000
Furnish and Place Soil Cement	CY	1,800	\$29.60	\$53,000
			<b>SUBTOTAL</b>	<b>\$120,000</b>
Miscellaneous @ 10%	LS	1	\$141,000.00	\$141,000
			<b>LOW BID PRICE</b>	<b>\$1,551,000</b>
			<b>S/O-DESIGN @ 10%</b>	<b>\$155,000</b>
			<b>S/O-CONST. SUPERVISION &amp; CONTINGENCIES @ 25%</b>	<b>\$388,000</b>
			<b>FIRST COST</b>	<b>\$2,094,000</b>

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PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Los Banos Detention Dam

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$42,600.00	\$43,000
Excavate and Stockpile Existing Riprap	CY	20,300	\$5.75	\$117,000
Excavate and Stockpile Existing Shell	CY	52,300	\$2.85	\$149,000
Furnish and Setup Screening Plant	LS	1	\$118,000.00	\$118,000
Process Existing Shell	CY	52,300	\$1.70	\$89,000
Place and Compact Processed Shell	CY	26,300	\$2.85	\$75,000
Excavate in Borrow Areas	CY	126,000	\$2.85	\$359,000
Process Excavated Borrow	CY	63,000	\$1.70	\$107,000
Place and Compact Process Borrow	CY	25,200	\$2.85	\$72,000
Place Stockpiled Riprap	CY	17,200	\$3.40	\$58,000
Furnish and Place Riprap	CY	3,900	\$31.95	\$125,000
Resurvey and Replace Monuments	LS	1	\$5,400.00	\$5,000
Dispose of Wasted Material	CY	112,000	\$1.12	\$125,000
Miscellaneous @ 10%	LS	1	\$144,200.00	\$144,000
			<b>SUBTOTAL</b>	<b>\$1,586,000</b>

LOW BID PRICE	\$1,586,000
S/O-DESIGN @ 10%	\$159,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$397,000
<b>FIRST COST</b>	<b>\$2,142,000</b>

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PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Spillway and Emergency Outlet Works

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$447,000.00	\$447,000
Open Cut Excavation	CY	420,000	\$3.20	\$1,344,000
Tunnel Excavation	CY	19,900	\$111.85	\$2,226,000
Shaft Excavation	CY	1,630	\$127.80	\$208,000
Concrete Tunnel Lining	CY	8,120	\$319.50	\$2,594,000
Steel Supports	Lb	459,000	\$3.19	\$1,464,000
Timber Logging	MBF	120	\$1,700.00	\$204,000
Consolidation Grout	CF	7,000	\$63.90	\$447,000
Structural Concrete	CY	5,080	\$426.00	\$2,164,000
Four 7'x10' Slide Gates	Lb	587,000	\$3.50	\$2,055,000
Reinforcing Steel (Tunnel)	Lb	158,750	\$0.85	\$135,000
Miscellaneous Metalwork	Lb	250,000	\$3.50	\$875,000
Random Fill	CY	11,500	\$1.70	\$20,000
Filter Material	CY	2,000	\$53.25	\$107,000
Gravel Backfill	CY	700	\$42.60	\$30,000
Cobbles	CY	2,800	\$42.60	\$119,000
Asphalt Concrete	Ton	75	\$63.90	\$5,000
Aggregate Base	Ton	220	\$21.30	\$5,000
Control System & Generator	LS	1	\$15,000.00	\$15,000
Bulkhead Gate	Lb	80,000	\$5.00	\$400,000
Miscellaneous @ 10%	LS	1	\$1,486,400.00	\$1,486,000
			<b>SUBTOTAL</b>	<b>\$16,350,000</b>

LOW BID PRICE	\$16,350,000
S/O-DESIGN @ 10 %	\$1,635,000
S/O-CONST.SUPERVISION & CONTINGENCIES @ 25%	\$4,088,000
<b>FIRST COST</b>	<b>\$22,073,000</b>

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Conceptual Cost Estimate  
 Date: Jun - 94

PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Los Banos Detention Dam, Right Abutment Spillway

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$395,000.00	\$395,000
Excavation - Common (60%)	CY	214,800	\$4.40	\$945,000
Excavation - Rock (40%)	CY	143,210	\$16.60	\$2,377,000
Structural Concrete - Includes Setup	CY	11,990	\$332.30	\$3,984,000
Mass Concrete	CY	1,770	\$276.90	\$490,000
Structural Steel	Lb	1,298,000	\$0.55	\$714,000
Backfill	CY	11,700	\$7.70	\$90,000
Riprap	Ton	9,680	\$13.30	\$129,000
Bedding	CY	2,870	\$13.30	\$38,000
Foundation Grouting	LF	4,000	\$110.75	\$443,000
Spillway Bridge	LS	1	\$426,000.00	\$426,000
Road Relocation	LS	1	\$105,000.00	\$105,000
Miscellaneous @ 10%	LS	1	\$1,013,600.00	\$1,014,000
			<b>SUBTOTAL</b>	<b>\$11,150,000</b>

LOW BID PRICE	\$11,150,000
S/O-DESIGN @ 10%	\$1,115,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$2,788,000
<b>FIRST COST</b>	<b>\$15,053,000</b>

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 Date: Jun - 94

PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Main Dam Inlet/Outlet Works

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
<b>Stream Diversion Inlet</b>				
Excavation	CY	2,280	\$11.25	\$26,000
Structural Concrete	CY	292	\$315.00	\$92,000
Foundation Anchors	LF	570	\$22.50	\$13,000
Portal Crown Bars	LF	1,560	\$56.00	\$87,000
10' x 10' Bulkhead Gate and Frame	Lb	40,000	\$5.00	\$200,000
Mobilization	LS	1	\$12,800.00	\$13,000
			<b>SUBTOTAL</b>	<b>\$431,000</b>
<b>Stream Diversion Outlet</b>				
Excavation	CY	38,000	\$5.55	\$211,000
Concrete Culvert and Gate	CY	1,400	\$315.00	\$441,000
Structural Backfill	CY	2,400	\$17.60	\$42,000
Mobilization	LS	1	\$26,625.00	\$27,000
			<b>SUBTOTAL</b>	<b>\$721,000</b>
<b>Intake Tower</b>				
Excavation	CY	660,000	\$5.60	\$3,696,000
Base Concrete	CF	22,400	\$250.00	\$5,600,000
Structural Concrete	CY	17,400	\$315.00	\$5,481,000
Structure Anchors	LF	8,000	\$22.50	\$180,000
Embedded Metal Work	Lb	420,000	\$5.00	\$2,100,000
2 - 15' x 31' Bulkhead Gates	Lb	244,000	\$5.00	\$1,220,000
3- 11' x 26' Roller Gates	Lb	161,000	\$5.00	\$805,000
Hoists, Stems etc. for roller gates	Lb	200,000	\$5.25	\$1,050,000
Trashracks	Lb	340,000	\$5.25	\$1,785,000
Control Systems	LS	1	\$130,000.00	\$130,000
Portal Crown Bars	LF	2,200	\$56.00	\$123,000
Mobilization	LS	1	\$785,000.00	\$785,000
			<b>SUBTOTAL</b>	<b>\$22,955,000</b>
<b>Stream Diversion Approach Tunnel</b>				
<b>10' Tunnel</b>				
Excavation	CY	3,060	\$112.00	\$343,000
Concrete Lining	CY	1,160	\$280.00	\$325,000
Grout	CY	70	\$75.00	\$5,000
Steel Ribs	Lb	77,600	\$1.15	\$89,000
Lagging	MBF	25	\$1,685.00	\$42,000

Rebar in Lining	Lb	46,000	\$0.72	\$33,000
Mobilization	LS	1	\$33,000.00	\$33,000
			SUBTOTAL	<u>\$870,000</u>
20' Inlet/Outlet Tunnel				
1st Stage Excavation	CY	52,740	\$112.00	\$5,907,000
2nd Stage Excavation	CY	5,580	\$138.50	\$773,000
1st Stage Concrete Lining	CY	19,400	\$280.00	\$5,432,000
2nd Stage Concrete Lining	CY	1,880	\$315.00	\$592,000
Tunnel Plug Concrete	CY	300	\$250.00	\$75,000
Grout	CY	580	\$75.00	\$44,000
Steel Ribs	Lb	1,609,000	\$1.12	\$1,802,000
Lagging	MBF	188	\$1,685.00	\$317,000
Rebar in Tunnel Lining	Lb	853,000	\$0.72	\$614,000
Rock Bolting	LF	2,300	\$56.00	\$129,000
Portal Excavation	CY	10,400	\$112.00	\$1,165,000
Portal Crown Bars	LF	3,200	\$56.00	\$179,000
Outlet Portal Shield Concrete	CY	1,100	\$315.00	\$347,000
Outlet Portal Liners & Stiffners	LF	780	\$22.50	\$18,000
Steel Tunnel Liners & Stiffners	Lb	9,760,000	\$1.68	\$16,397,000
Mobilization	LS	1	\$1,352,550.00	\$1,353,000
			SUBTOTAL	<u>\$35,144,000</u>
Plant Retaining Wall				
Structural Concrete	CY	3,150	\$385.00	\$1,213,000
Foundation Anchors	LF	7,750	\$23.50	\$182,000
Mobilization	LS	1	\$56,500.00	\$57,000
			SUBTOTAL	<u>\$1,452,000</u>
Intake Tower Bridge				
Pier Foundation Excavation	CY	840	\$168.00	\$141,000
Pier Foundation Concrete	CY	840	\$265.00	\$223,000
Pier and Abutment Concrete	CY	1,480	\$336.00	\$497,000
Bridge and Deck Concrete	CY	270	\$392.00	\$106,000
Structural Steel	Lb	110,000	\$2.50	\$275,000
Miscellaneous Metal Work	Lb	22,800	\$5.00	\$114,000
Mobilization	LS	1	\$52,000.00	\$52,000
			SUBTOTAL	<u>\$1,408,000</u>
Intake Tower Access Road				
Excavation	CY	34,600	\$5.60	\$194,000
Embankment	CY	58,000	\$2.25	\$131,000
Riprap	CY	5,400	\$22.50	\$122,000
Filter Fabric	SF	81,000	\$1.17	\$95,000
Aggregate Base	Ton	1,650	\$18.00	\$30,000
Asphalt Concrete	Ton	450	\$45.00	\$20,000

Drainage	LS	1	\$17,000.00	\$17,000
Mobilization	LS	1	\$23,500.00	\$24,000
			SUBTOTAL	<u>\$633,000</u>

P.G. Plant Bypass System

Mobilization	LS	1	\$242,600.00	\$243,000
Excavation	CY	860	\$13.50	\$12,000
Special Backfill	CY	1,200	\$17.00	\$20,000
Pipe, Couplers & Reducers	Lb	886,000	\$1.44	\$1,276,000
Anchor Block Concrete	CY	6,600	\$224.00	\$1,478,000
Encasement Concrete	CY	2,100	\$277.00	\$582,000
Butterfly Valve Vault Concrete	CY	680	\$310.00	\$211,000
Control Building Base Concrete	CY	1,860	\$224.00	\$417,000
Control Building Concrete	CY	1,100	\$310.00	\$341,000
Support Pier Excavation	CY	120	\$170.00	\$20,000
Support Pier Concrete	CY	240	\$335.00	\$80,000
Miscellaneous Metal Work	Lb	70,000	\$5.00	\$350,000
2 - 84" Butterfly Valves & Operators	Lb	70,000	\$4.50	\$315,000
2 - 84" F.C.D. Valves & Operators	Lb	134,000	\$4.50	\$603,000
12" Butterfly Valve & Operators	Lb	3,000	\$4.50	\$14,000
8" Butterfly Valve & Operators	Lb	6,000	\$4.50	\$27,000
Control System	LS	1	\$224,000.00	\$224,000
Emergency Generator	LS	1	\$224,000.00	\$224,000
			SUBTOTAL	<u>\$6,437,000</u>

Miscellaneous @ 10%	LS	1	\$7,005,100.00	\$7,005,000
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LOW BID PRICE	\$77,056,000
S/O-DESIGN @ 10%	\$7,706,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	<u>\$19,264,000</u>

<b>FIRST COST</b>	<b><u>\$104,026,000</u></b>
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State of California  
 The Resources Agency of California  
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 DIVISION OF DESIGN AND CONSTRUCTION

Conceptual Cost Estimate  
 Date: Jun-94

PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Detention Dam Inlet/Outlet Works

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
<b>Intake Tower</b>				
Excavation	CY	41,600	\$7.00	\$291,000
Base Concrete	CY	3,400	\$250.00	\$850,000
Structural Concrete	CY	5,280	\$315.00	\$1,663,000
Embedded Metal Work	Lb	250,000	\$5.00	\$1,250,000
2 - 15' x 31' Bulkhead Gates	Lb	210,000	\$5.00	\$1,050,000
3 - 11' x 26' Roller Gates	Lb	140,000	\$5.00	\$700,000
Hoists, Stems etc., for Roller Gates	Lb	130,000	\$5.25	\$683,000
Trashracks	Lb	160,000	\$5.25	\$840,000
Foundation Anchors	LF	2,400	\$22.50	\$54,000
Control System	LS	1	\$138,450.00	\$138,000
Mobilization	LS	1	\$235,000.00	\$235,000
			<b>SUBTOTAL</b>	<b>\$7,754,000</b>
<b>Intake Tower Bridge</b>				
Pier Foundation Excavation	CY	110	\$170.00	\$19,000
Pier Foundation Concrete	CY	110	\$265.00	\$29,000
Pier and Abutment Concrete	CY	160	\$335.00	\$54,000
Bridge and Deck Concrete	CY	130	\$395.00	\$51,000
Structural Steel	Lb	33,000	\$2.25	\$74,000
Miscellaneous Metal Work	Lb	7,000	\$3.35	\$23,000
Mobilization	LS	1	\$10,650.00	\$11,000
			<b>SUBTOTAL</b>	<b>\$261,000</b>
<b>20' Inlet-Outlet Tunnel</b>				
Excavation	CY	20,400	\$112.00	\$2,285,000
Concrete Lining	CY	7,500	\$279.00	\$2,093,000
Grout	CY	5,400	\$75.00	\$405,000
Steel Ribs	Lb	586,000	\$1.12	\$656,000
Lagging	MBF	65	\$1,685.00	\$110,000
Reinforcing Bars	Lb	300,000	\$0.72	\$216,000
Steel Tunnel Liner	Lb	990,000	\$1.68	\$1,663,000
Portal Excavation	CY	5,800	\$8.95	\$52,000
Portal Crown Bars	LF	2,500	\$22.50	\$56,000
Mobilization	LS	1	\$302,000.00	\$302,000
			<b>SUBTOTAL</b>	<b>\$7,838,000</b>
<b>Intake Tower Access Road</b>				
Excavation	CY	17,000	\$5.60	\$95,000
Aggregate Base	Ton	300	\$17.90	\$5,000
Asphalt	Ton	100	\$44.75	\$4,000

Miscellaneous	LS	1	\$4,260.00	\$4,000
Mobilization	LS	1	\$4,260.00	\$4,000
			SUBTOTAL	<u>\$112,000</u>
P.G. Plant Bypass System				
Excavation	CY	5,200	\$13.35	\$69,000
Special Backfill	CY	3,800	\$17.05	\$65,000
Pipe, Couplers & Reducers	Lb	530,000	\$1.50	\$795,000
Encasement Concrete	CY	2,200	\$283.00	\$623,000
Anchor Block Concrete	CY	100	\$225.00	\$23,000
Vault and Building Base Concrete	CY	1,010	\$225.00	\$227,000
Valve Vault Concrete	CY	400	\$315.00	\$126,000
Building and Bridge Concrete	CY	480	\$315.00	\$151,000
Pier Foundation Concrete	CY	120	\$170.00	\$20,000
Support Pier Concrete	CY	200	\$335.50	\$67,000
Miscellaneous Metal Work	CY	36,000	\$5.00	\$180,000
2 - 108" Butterfly Valves & Operators	Lb	90,000	\$4.50	\$405,000
2 - 108" F.C.D. Valves & Operators	Lb	168,000	\$4.50	\$756,000
Controls & Emergency Generator	LS	1	\$225,000.00	\$225,000
Mobilization	LS	1	\$120,000.00	\$120,000
			SUBTOTAL	<u>\$3,852,000</u>
Cofferdam (1/7/91)				
Foundation Excavation	CY	50,000	\$3.35	\$168,000
Excavate and Haul Borrow	CY	550,000	\$2.30	\$1,265,000
Access Road Fill	CY	12,000	\$2.25	\$27,000
Aggregate Base	Ton	600	\$22.50	\$14,000
Remove and Dispose of Fill	CY	480,000	\$3.35	\$1,608,000
Mobilization	LS	1	\$117,000.00	\$117,000
			SUBTOTAL	<u>\$3,199,000</u>
Miscellaneous @ 10%	LS	1	\$2,276,600.00	\$2,277,000

LOW BID PRICE	\$25,293,000
S/O-DESIGN @ 10 %	\$2,529,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	<u>\$6,323,000</u>
<b>FIRST COST</b>	<b><u>\$34,145,000</u></b>

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 Date: Jun - 94

PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Salt Creek Saddle Dam - Outlet Works

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$54,000.00	\$54,000
Care of Water	LS	1	\$6,400.00	\$6,000
Excavation	CY	10,600	\$11.20	\$119,000
Specially Compacted Backfill	CY	9,200	\$13.85	\$127,000
Reinforced Concrete	CY	1,040	\$347.00	\$361,000
Miscellaneous Metal Work	Lb	22,000	\$5.00	\$110,000
36" Butterfly Valve	LS	1	\$53,250.00	\$53,000
30" F.C.D. Valve and Controls	LS	1	\$235,000.00	\$235,000
Steel Pipe Liner	Lb	195,000	\$1.70	\$332,000
Control and Vent Lines	LS	1	\$64,000.00	\$64,000
Miscellaneous @ 10%	LS	1	\$146,100.00	\$146,000
			<b>SUBTOTAL</b>	<b>\$1,607,000</b>

LOW BID COST	\$1,607,000
S/O-DESIGN @ 10%	\$161,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$402,000
<b>FIRST COST</b>	<b>\$2,170,000</b>

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Conceptual Cost Estimate  
 Date: Jun -94

PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Pumping - Generating Plant No. 1 - Bowl Excavation

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$85,200.00	\$85,000
Excavation	CY	340,000	\$4.50	\$1,530,000
Backfill	CY	116,000	\$3.00	\$348,000
Care of Water	LS	1	\$63,900.00	\$64,000
Miscellaneous @ 10%	LS	1	\$202,700.00	\$203,000
			SUBTOTAL	\$2,230,000

LOW BID PRICE	\$2,230,000
S/O-DESIGN @ 10%	\$223,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$558,000
<b>FIRST COST</b>	<b>\$3,011,000</b>

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Conceptual Cost Estimate  
 Date: Jun -94

PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Pumping - Generating Plant No. 1 - Penstocks

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$225,000.00	\$225,000
Excavation	CY	101,000	\$7.90	\$798,000
Special Backfill	CY	8,000	\$17.00	\$136,000
Encasement Concrete	CY	8,800	\$280.00	\$2,464,000
Anchor Block Concrete	CY	1,900	\$225.00	\$428,000
Penstock and Fittings	Lb	916,000	\$2.00	\$1,832,000
Radiograph Wells	LS	1	\$288,000.00	\$288,000
Cathodic Protection	LS	1	\$225,000.00	\$225,000
Miscellaneous @ 10%	LS	1	\$639,600.00	\$640,000
			<b>SUBTOTAL</b>	<b>\$7,036,000</b>

LOW BID PRICE	\$7,036,000
S/O-DESIGN @ 10%	\$704,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$1,759,000
<b>FIRST COST</b>	<b>\$9,499,000</b>

State of California  
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 Date: Jun -94

PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Conveyance Channel No. 1

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$798,750.00	\$799,000
Clear and Grub	Ac	75	\$535.00	\$40,000
Excavation	CY	1,425,000	\$2.70	\$3,848,000
Compacted Embankment	CY	520,000	\$1.10	\$572,000
Cattle Crossing 240' x 20'	LS	1	\$213,000.00	\$213,000
Chainlink Fence	LF	15,000	\$16.00	\$240,000
			SUBTOTAL	\$5,712,000
I-5 Detour				
Compacted Fill	CY	200,000	\$1.10	\$220,000
Excavation	CY	50,000	\$3.20	\$160,000
Aggregate Base	Ton	9,500	\$17.05	\$162,000
Asphalt Concrete	Ton	5,000	\$42.60	\$213,000
I-5 Bridge 240' x 100'	LS	1	\$1,600,000.00	\$1,600,000
			SUBTOTAL	\$2,355,000
Intake Channel No. 1				
Non-reinforced Concrete Lining	CY	9,117	\$160.00	\$1,459,000
Structural Concrete	CY	1,650	\$425.00	\$701,000
3 - 12' x 20' Radial Gates	Ea	3	\$106,500.00	\$320,000
6 - 12' x 20' Stoplogs	Ea	6	\$21,300.00	\$128,000
Guardrail (DMGR)	LF	400	\$32.00	\$13,000
Trashrack	LS	1	\$37,300.00	\$37,000
2 - Lane Bridge 225' x 30'	LS	1	\$440,000.00	\$440,000
Electrical Work	LS	1	\$160,000.00	\$160,000
			SUBTOTAL	\$3,258,000
Overflow Weir at Confluence				
Structural Concrete	CY	6,112	\$425.00	\$2,598,000
Light Rebar Concrete	CY	2,659	\$375.00	\$997,000
Concrete Bridge 200' x 30'	LS	1	\$394,000.00	\$394,000
			SUBTOTAL	\$3,989,000
Pumping-Generating Plant Trans.				
Structural Concrete	CY	2,585	\$425.00	\$1,099,000

Road Relocation

Aggregate Base	Ton	8,000	\$17.00	\$136,000
Asphalt Concrete	Ton	500	\$42.60	\$21,000
			<b>SUBTOTAL</b>	<u>\$157,000</u>

Miscellaneous @ 10%	LS	1	\$1,657,000.00	\$1,657,000
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LOW BID COST	\$18,227,000
S/O- DESIGN @ 10%	\$1,823,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	<u>\$4,557,000</u>

<b>FIRST COST</b>	<u><b>\$24,607,000</b></u>
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Conceptual Cost Estimate  
 Date: Jun - 94

PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Pumping - Generating Plant No. 2 - Bowl Excavation

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$186,500.00	\$187,000
Clear	Ac	6	\$1,100.00	\$7,000
Care of Water	LS	1	\$160,000.00	\$160,000
Overburden Excavation	CY	48,000	\$3.50	\$168,000
Formation Excavation	CY	662,000	\$5.60	\$3,707,000
Backfill	CY	210,000	\$3.00	\$630,000
Miscellaneous @ 10%	LS	1	\$485,900.00	\$486,000
			<b>SUBTOTAL</b>	<b>\$5,345,000</b>

LOW BID COST	\$5,345,000
S/O-DESIGN @ 10%	\$535,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$1,336,000
<b>FIRST COST</b>	<b>\$7,216,000</b>

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 Date: Jun - 94

PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Main Dam Inlet - Outlet Works Penstocks

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Excavation	CY	8,100	\$13.45	\$109,000
Special Backfill	CY	4,800	\$16.80	\$81,000
Penstocks, Branches & Couplings	Lb	1,620,000	\$2.00	\$3,240,000
Anchor Block Concrete	CY	10,080	\$225.00	\$2,268,000
Encasement Concrete	CY	2,340	\$277.00	\$648,000
Radiograph Welds	LS	1	\$639,000.00	\$639,000
Cathodic Protection	LS	1	\$532,500.00	\$533,000
Mobilization	LS	1	\$264,000.00	\$264,000
Miscellaneous @ 10%	LS	1	\$778,200.00	\$778,000
			<b>SUBTOTAL</b>	<b>\$8,560,000</b>

LOW BID COST	\$8,560,000
S/O-DESIGN @ 10%	\$856,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$2,140,000
<b>FIRST COST</b>	<b>\$11,556,000</b>

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PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Intake Channel No. 2

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$224,000.00	\$224,000
Care of Water	LS	1	\$128,000.00	\$128,000
Road Excavation	CY	20,000	\$2.85	\$57,000
Alluvial Excavation	CY	300,000	\$3.45	\$1,035,000
Formation Excavation	CY	880,000	\$4.55	\$4,004,000
Road Embankment	CY	148,000	\$1.10	\$163,000
Aggregate Base	Ton	6,000	\$18.10	\$109,000
Rock Slope Protection	CY	8,000	\$17.60	\$141,000
Clearing	Ac	48	\$1,065.00	\$51,000
Miscellaneous @ 10%	LS	1	\$591,200.00	\$591,000
			<b>SUBTOTAL</b>	<b>\$6,503,000</b>

LOW BID COST	\$6,503,000
S/O-DESIGN @ 10%	\$650,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$1,626,000
<b>FIRST COST</b>	<b>\$8,779,000</b>

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PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Access Roads to Toe of Main Dam

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$241,000.00	\$241,000
Barbed Wire Fence	LF	60,000	\$5.00	\$300,000
Road Excavation	CY	490,000	\$4.60	\$2,254,000
Road Embankment	CY	430,000	\$2.00	\$860,000
Aggregate Base	Ton	34,000	\$18.50	\$629,000
Liquid Asphalt	Ton	110	\$345.00	\$38,000
Asphalt Concrete	Ton	11,900	\$46.00	\$547,000
Striping	LF	40,000	\$0.25	\$10,000
Site Preparation	Ac	80	\$575.00	\$46,000
Concrete Headwalls	CY	200	\$690.00	\$138,000
18 in. CMP	LF	1,500	\$41.50	\$62,000
42 in. CMP	LF	400	\$80.50	\$32,000
48 in. CMP	LF	200	\$92.00	\$18,000
54 in. CMP	LF	100	\$115.00	\$12,000
84 in. CMP	LF	100	\$207.00	\$21,000
Riprap	CY	100	\$46.00	\$5,000
Miscellaneous @ 10 %	LS	1	\$521,300.00	\$521,000
			<b>SUBTOTAL</b>	<b>\$5,734,000</b>

LOW BID PRICE	\$5,734,000
S/O-DESIGN @ 10%	\$573,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$1,434,000
<b>FIRST COST</b>	<b>\$7,741,000</b>

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 Date: Jun - 94

PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Access Road (Salt Creek Dam Access Road Seg.) - Reach 4

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$37,000.00	\$37,000
Excavation				
Common	CY	30,000	\$3.00	\$90,000
Ripable	CY	130,000	\$3.50	\$455,000
Embankment				
Compacted Fill	CY	145,000	\$1.40	\$203,000
Haul to Waste	CY	15,000	\$3.00	\$45,000
Aggregate Base	Ton	8,675	\$16.00	\$139,000
Asphalt Concrete	Ton	2,419	\$63.90	\$155,000
Prime Coat	Ton	25	\$372.75	\$9,000
Seal Coat	Ton	224	\$213.00	\$48,000
Miscellaneous @ 10%	LS	1	\$118,100.00	\$118,000
			<b>SUBTOTAL</b>	<b>\$1,299,000</b>

LOW BID PRICE	\$1,299,000
S/O-DESIGN @ 10%	\$130,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$325,000
<b>FIRST COST</b>	<b>\$1,754,000</b>

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PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Secondary Access Road on South Side of Main Dam Crest - Reach 3A

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$21,300.00	\$21,000
Barbed Wire Fence	LF	6,000	\$2.65	\$16,000
Road Excavation	CY	112,000	\$4.55	\$510,000
Road Embankment	CY	102,000	\$1.05	\$107,000
Aggregate Base	Ton	2,400	\$18.65	\$45,000
Concrete Headwalls	CY	45	\$640.00	\$29,000
18 in. CMP	LF	400	\$42.60	\$17,000
24 in. CMP	LF	100	\$53.25	\$5,000
42 in. CMP	LF	120	\$90.55	\$11,000
102 in. CMP	LF	200	\$234.30	\$47,000
Riprap	CY	125	\$42.60	\$5,000
Miscellaneous @ 10%	LS	1	\$81,300.00	\$81,000
			<b>SUBTOTAL</b>	<b>\$894,000</b>

LOW BID PRICE	\$894,000
S/O-DESIGN @ 10%	\$134,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$224,000
<b>FIRST COST</b>	<b>\$1,252,000</b>

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PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Main Dam Crest Access - Reach 3

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$21,300.00	\$21,000
Excavation				
Blasting	CY	3,750	\$6.90	\$26,000
Ripable	CY	52,500	\$3.20	\$168,000
Common	CY	18,750	\$2.65	\$50,000
Embankment				
Compacted	CY	52,000	\$1.05	\$55,000
Common Fill	CY	23,000	\$0.55	\$13,000
Aggregate Base	Ton	5,100	\$17.05	\$87,000
Asphalt Concrete	Ton	1,585	\$58.60	\$93,000
Prime Coat	Ton	16	\$372.75	\$6,000
Seal Coat	Ton	16	\$213.00	\$3,000
Miscellaneous @ 10 %	LS	1	\$52,200.00	\$52,000
			<b>SUBTOTAL</b>	<b>\$574,000</b>

LOW BID PRICE	\$574,000
S/O-DESIGN @ 10%	\$57,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$144,000
<b>FIRST COST</b>	<b>\$775,000</b>

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PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Access Road Cent'g. Billie Wrt. Rd. Seg. - Reach 2

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$178,000.00	\$178,000
Excavation				
Common	CY	350,000	\$2.65	\$928,000
Ripable	CY	850,000	\$3.20	\$2,720,000
Embankment				
Compacted Fill	CY	1,000,000	\$1.05	\$1,050,000
Haul to Waste	CY	200,000	\$2.65	\$530,000
Aggregate Base	Ton	27,725	\$16.00	\$444,000
Asphalt Concrete	Ton	7,776	\$63.90	\$497,000
Prime Coat	Ton	72	\$372.75	\$27,000
Seal Coat	Ton	720	\$213.00	\$153,000
Concrete Bridge	LS	1	\$107,000.00	\$107,000
Miscellaneous @ 10%	LS	1	\$6,634,000.00	\$6,634,000
			<b>SUBTOTAL</b>	<b>\$13,268,000</b>

LOW BID PRICE	\$13,268,000
S/O-DESIGN @ 10%	\$1,327,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$3,317,000
<b>FIRST COST</b>	<b>\$17,912,000</b>

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PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Jasper Sears Road Upgrade - Reach 1

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$37,000.00	\$37,000
Excavation	CY	5,700	\$3.00	\$17,000
Compacted Sub-base	CY	17,000	\$12.80	\$218,000
Aggregate Base	Ton	10,700	\$16.00	\$171,000
Asphalt Concrete	Ton	5,500	\$63.90	\$351,000
Liquid Asphalt	Ton	51	\$372.75	\$19,000
Seal Coat	Ton	50	\$213.00	\$11,000
Miscellaneous @ 10%	LS	1	\$82,400.00	\$82,000
			<b>SUBTOTAL</b>	<b>\$906,000</b>

LOW BID PRICE	\$906,000
S/O-DESIGN @ 10%	\$91,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$227,000
<b>FIRST COST</b>	<b>\$1,224,000</b>

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 Date: Jun - 94

PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Recreation Access Road From San Luis Dam

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Rocky Terrain	Mi	0.80	\$1,280,000.00	\$1,024,000
Rolling Terrain	Mi	2.20	\$528,000.00	\$1,162,000
Miscellaneous @ 10%	LS	1.00	\$218,600.00	\$219,000
			SUBTOTAL	\$2,186,000

LOW BID COST	\$2,186,000
S/O-DESIGN @ 10%	\$219,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$547,000
SUBTOTAL	\$2,952,000
RIGHT OF WAY	\$70,000
<b>FIRST COST</b>	<b>\$3,022,000</b>

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 Date: Jun - 94

PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Access Roads to Salt Creek Saddle Dam

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$76,000.00	\$76,000
Barbed Wire Fence	LF	21,000	\$5.00	\$105,000
Road Excavation	CY	150,000	\$4.60	\$690,000
Road Embankment	CY	75,000	\$2.00	\$150,000
Aggregate Base	TON	12,000	\$18.50	\$222,000
Liquid Asphalt	TON	40	\$345.00	\$14,000
Asphalt Concrete	TON	3,950	\$46.00	\$182,000
Striping	LF	20,000	\$0.25	\$5,000
Site Preparation	AC	30	\$575.00	\$17,000
Concrete Headwalls	CY	200	\$690.00	\$138,000
18 in. CMP	LF	600	\$41.50	\$25,000
24 in. CMP	LF	100	\$46.00	\$5,000
76 in. CMP	LF	100	\$184.00	\$18,000
84 in. CMP	LF	220	\$207.00	\$46,000
Riprap	CY	50	\$46.00	\$2,000
Miscellaneous @ 10%	LS	1	\$169,500.00	\$170,000
			<b>SUBTOTAL</b>	<b>\$1,865,000</b>

LOW BID COST	\$1,865,000
S/O-DESIGN @ 10%	\$187,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$466,000
<b>TOTAL COST</b>	<b>\$2,518,000</b>

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PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Chileno Creek Recreation Road

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$106,500.00	\$107,000
Excavation	CY	175,000	\$3.20	\$560,000
Compacted Fill	CY	155,000	\$1.06	\$164,000
Aggregate Base	Ton	18,000	\$16.00	\$288,000
Asphalt Concrete	Ton	7,300	\$64.00	\$467,000
Prime Coat	Ton	60	\$375.00	\$23,000
Seal Coat	Ton	60	\$215.00	\$13,000
Bridge 33' x 80'	LS	1	\$213,000.00	\$213,000
Miscellaneous @ 10%	LS	1	\$183,500.00	\$184,000
			<b>SUBTOTAL</b>	<b>\$2,019,000</b>

LOW BID PRICE	\$2,019,000
S/O-DESIGN @ 10%	\$202,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$505,000
<b>FIRST COST</b>	<b>\$2,726,000</b>

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PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: Billie Wright Road Relocation

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$106,500.00	\$107,000
Site Preparation	Ac	120	\$535.00	\$64,000
Barbed Wire Fence	LF	50,000	\$5.00	\$250,000
Excavation	CY	740,000	\$3.20	\$2,368,000
Embankment	CY	670,000	\$2.00	\$1,340,000
Aggregate Base	Ton	43,000	\$16.00	\$688,000
Asphalt Concrete	Ton	18,000	\$53.25	\$959,000
Prime Coat	Ton	140	\$375.00	\$53,000
Seal Coat	Ton	130	\$215.00	\$28,000
Stripping	LF	100,000	\$0.21	\$21,000
Bridge	LS	1	\$85,000.00	\$85,000
Drainage Structures, etc.	LS	1	\$215,000.00	\$215,000
Miscellaneous	LS	1	\$617,800.00	\$618,000
			<b>SUBTOTAL</b>	<b>\$6,796,000</b>

LOW BID PRICE	\$6,796,000
S/O - DESIGN @ 10%	\$680,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$1,699,000
<b>FIRST COST</b>	<b>\$9,175,000</b>

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 Date: Jun - 94

PROJECT: 1.73 MAF Los Banos Grandes Reservoir  
 FEATURE: General Reservoir Costs

ITEM	UNIT	QUANTITY	UNIT COST	ITEM COST
Mobilization	LS	1	\$575,000.00	\$575,000
Clearing Reservoir	Ac	900	\$958.50	\$863,000
Remove Buildings	Ea	16	\$2,662.50	\$43,000
Relocate Buildings	Ea	3	\$10,650.00	\$32,000
Electrical Power Line	Mi	10	\$28,755.00	\$288,000
Telephone Line	Mi	10	\$9,585.00	\$96,000
Employee Housing	Ea	55	\$53,250.00	\$2,929,000
Construction Facilities	LS	1	\$5,858,000.00	\$5,858,000
Visitor Facilities	LS	1	\$1,171,500.00	\$1,172,000
Local Impact Funds	LS	1	\$2,876,000.00	\$2,876,000
Miscellaneous @ 10 %	LS	1	\$1,473,200.00	\$1,473,000
			<b>SUBTOTAL</b>	<b>\$16,205,000</b>

LOW BID PRICE	\$16,205,000
S/O-DESIGN @ 10%	\$1,621,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	\$4,051,000
<b>FIRST COST</b>	<b>\$21,877,000</b>

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PROJECT: Kern Water Bank First Stage Facilities  
 FEATURE: Cost Summary

ITEM	COST
<b>Recharge Facilities</b>	
Tumbleweed Farms Ponds	\$743,000
Stockdale Highway Ponds	\$186,000
Main Canal Ponds	\$821,000
Sunset Ranch Ponds	\$689,000
Enos Lane Test Pond	\$157,000
South River Ponds	\$559,000
New Main Canal Intake Channel	\$208,000
Rever Turnout No. 1 Measuring Weir	\$48,000
SUBTOTAL	<u>\$3,411,000</u>
<b>Extraction Facilities</b>	
Tumbleweed Farms Ponds	\$228,000
Stockdale Highway Ponds	\$284,000
Main Canal Ponds	\$448,000
Sunset Ranch Ponds	\$322,000
Misc. Cross Valley Canal Connections	\$91,000
Misc. Alejandro Canal Connections	\$398,000
North River Extraction System	\$297,000
Buena Vista Lakes Pumpback Facilities	\$677,000
Improvements to Wells	\$865,000
New Wells	\$353,000
SUBTOTAL	<u>\$3,963,000</u>
<b>Roads</b>	
Recharge Pond Monitoring System	\$2,116,000
Allocated Share of Regional Monitoring Network	\$376,000
SUBTOTAL	<u>\$537,000</u>
Miscellaneous @ 10%	\$1,040,000
LOW BID COST	\$11,443,000
S/O-DESIGN @ 10%	\$1,144,000
S/O-CONST. SUPERVISION & CONTINGENCIES @ 25%	<u>\$2,861,000</u>
<b>FIRST COST</b>	<u><b>\$15,448,000</b></u>

10. Flood Control Storage  
Projects

Flood Control Storage Projects

On May 23, 1988 the U.S. Army Corps of Engineers was requested to conduct a reconnaissance study of the Sacramento-San Joaquin Counties eastside streams. The purpose of the study was to consider the possibility of long-range upstream flood control improvements for the Walnut Grove-Thornton area in the northern Sacramento-San Joaquin Delta.

Based on this request the USACE issued a reconnaissance report entitled Mokelumne River and Tributaries, California, dated June 1991.

The reconnaissance study: (1) identified the level of flood protection provided by existing projects, (2) evaluated the need for additional flood protection in the study area, (3) identified potential alternatives for providing flood protection, (4) determined if there is a Federal interest in at least one flood control alternative, and (5) decided whether planning should proceed into a feasibility phase based on preliminary appraisal of Federal interest, costs, and benefits, and environmental impacts of the potential alternatives.

Three flood control alternatives were considered for final analysis. These alternatives were: a multipurpose dam and reservoir at the Latrobe site on the Cosumnes River, a single purpose flood control dam at the Middle Bar site on the Mokelumne River, and ring levees around the town of Thornton on New Hope Tract.

In our study we have updated the project cost for the three alternatives to the April 1994 price level using the USBR cost index.

Multipurpose Dam at Latrobe

A 300,000 acre-foot multipurpose rockfill dam was evaluated at Latrobe. It would consist of a main dam, dikes, spillway, and gated outlet works. The required flood control reservation space would occupy 220,000 acre-feet and the water conservation space would occupy 80,000 acre-feet. The outlet works would control objective releases to a nondamaging flow of 6,000 cfs. The firm yield would be approximately 105,000 acre-feet per year. The gross pool would be at 461.0 feet above mean sea level and the dam would be 294 feet high and 917 feet long. A summary of features are as follows:

Type:	Earth-fill
Total Storage Capacity:	300,000 acre-feet
Flood Control Storage:	220,000 acre-feet
Water Conservation Storage:	80,000 acre-feet
Outlet Works:	Gated, objective release 6,000 cfs

Single Purpose Dam at Middle Bar

A 154,000 acre-foot flood control dam was evaluated at Middle Bar. The dam would be a roller compacted concrete gravity structure that would function as a "dry dam". The dam would provide 9,000 acre-feet of sedimentation storage. The additional flood control storage provided would control releases downstream of Camanche Dam to a nondamaging flow of 5,000 cfs. Gross pool would be at 786.0 feet above mean sea level and the ungated outlet would have a capacity of 22,000 cfs. A summary of features are as follows:

Type:	Roller-compacted concrete
Total Storage Capacity:	154,000 acre-feet
Flood Control Storage:	146,000 acre-feet
Outlet Works:	Ungated, objective release 2,000 cfs, Objective release below Camanche Dam 5,000 cfs

Thornton Ring Levees

Four different ring levee alternatives that would provide a 100-year level of flood protection for Thornton were evaluated. Each alternative, one through four, was developed to protect an incrementally larger area around Thornton. The ring levees would include: an upgrade of varying lengths of existing levee embankments on the lower Mokelumne, 15 foot high internal levees, pumps, and flood gates across Interstate 5 underpasses.

Project Costs

Project costs include construction costs, land easements, right of way and relocations are shown below. These cost estimates have been updated to reflect the April 1994 price levels. Mitigation costs have not been included.

Latrobe Multipurpose Dam

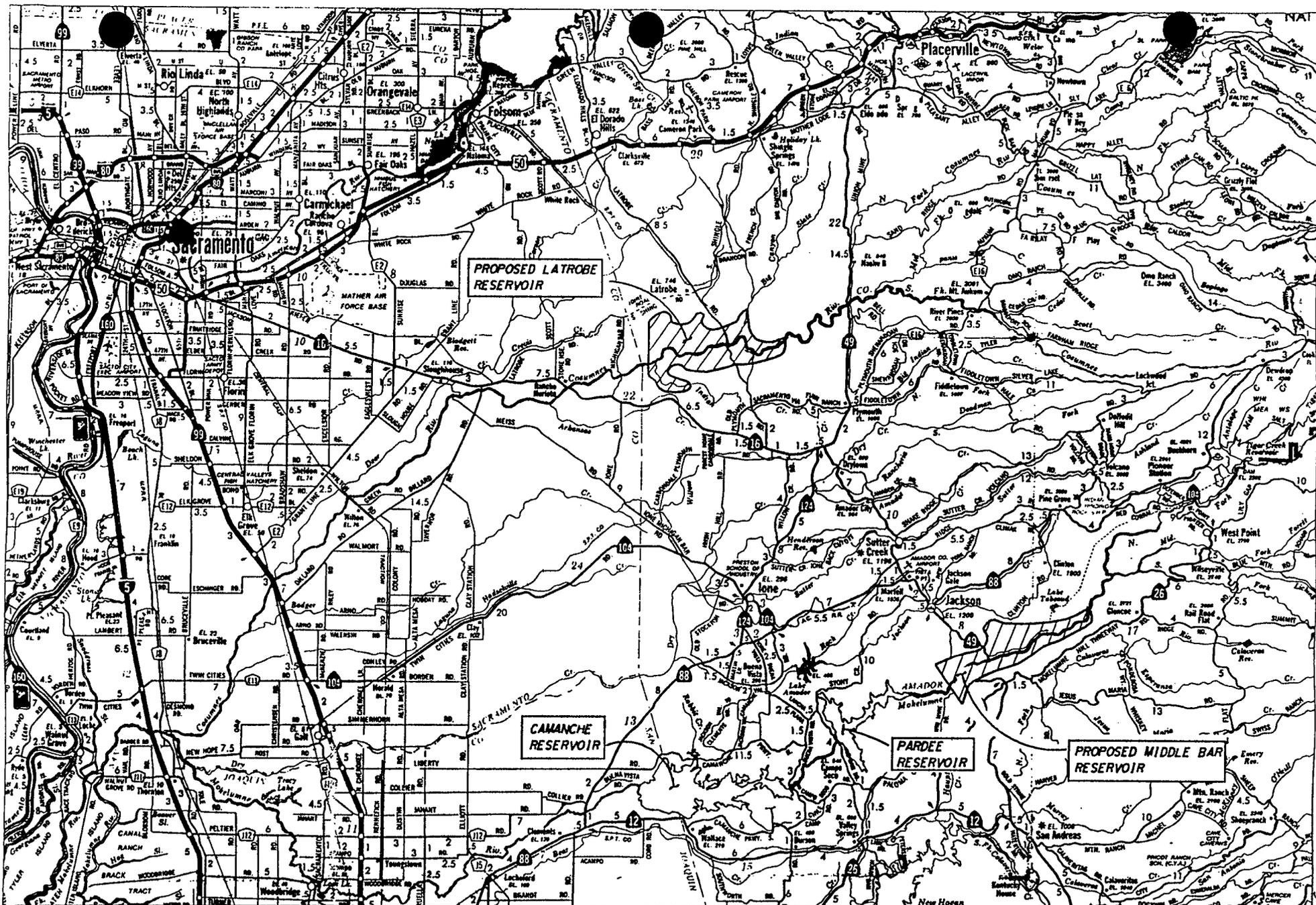
The first cost of a 300,000 acre-foot multipurpose dam is estimated at \$124,000,000. This cost would include flood control and water supply, but does not include hydropower.

Middle Bar Single Purpose Dam

The first cost of Middle Bar Dam is estimated at \$155,000,000. Mitigation costs were not developed and have not been included.

Conclusion

The USACE concluded in the report that there is no economically justified alternative for flood control in the study area that encompasses the basins of the Mokelumne River, Cosumnes River, Dry Creek, Laguna Creek and Deer Creek. However a multipurpose Latrobe Dam configuration shows an overall benefit-to-cost ratio of 1.15, but the flood control increment was not economically justified.



PROPOSED RESERVOIR SITES  
 MOKELUMNE RIVER AND TRIBUTARIES

