

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

DIVISION OF DESIGN AND CONSTRUCTION

DELTA WATER FACILITIES
PERIPHERAL CANAL
PRELIMINARY DESIGN REPORT

DRAFT COPY

JULY 1973

Memorandum

o : Distribution List

Date : Aug. 10, 1973

File No.:

Subject : Delta Facilities
Peripheral Canal
Preliminary Design ReportFrom : C. J. Cortright
Department of Water Resources

Attached is a draft copy of the Peripheral Canal Preliminary Design Report for your review.

Described in the report is the current concept of the canal and its various structures. The concept presented is subject to change as final design proceeds.

Chapters II-J, Recreation, and II-K, Operation, are not included in this draft. Chapter III-E, Fish Facility, is necessarily a brief substitute chapter since planning work on the functional requirements of the fish facility have not been completed.

Please submit your comments by August 31, 1973, in order that they may be included in the initial instructions to the final design participants.

Attachment

Distribution List:

R. B. Jansen
J. R. Teerink
C. E. Shields
H. G. Dewey, Jr. (3)
P. A. Towner
R. R. Reynolds (3)
T. H. T. Morrow (2)
T. W. Troost (3)
D. H. Babbitt
E. C. James (2)
M. Pona
J. W. Marlette
D. H. McKillop
H. H. Eastin (3)
R. C. Gaskell

DELTA FACILITIES
PERIPHERAL CANAL
PRELIMINARY DESIGN REPORT

TABLE OF CONTENTS

PART I. INTRODUCTION

- A. Purpose
- B. Location
- C. Physical Description

PART II. GENERAL CONSIDERATIONS

- A. Agreements with Other Agencies
- B. Canal Capacity
- C. Geology and Soil Testing
- D. Hydrology *see sheet D-7*
- E. Earthwork Construction Procedures
- F. Delta Channel Revisions
 - 1. Snodgrass Slough
 - 2. Lost Slough
 - 3. Beaver, Hog, and Sycamore Sloughs
 - 4. White Slough
 - 5. Telephone Cut
 - 6. Fourteen Mile Slough
 - 7. Middle River
 - 8. Old River
- G. Ground Water and Seepage
- H. Erosion Protection
- J. Recreation
- K. Operation

TABLE OF CONTENTS - Cont'd

PART III. DESIGN

- A. Canal
- B. Intake and Trashrack Structure
- C. Sedimentation Basin
- D. Peripheral Canal Flood Gate Structure
- E. Fish Facility
- F. Stone Lake Drainage
- G. Peripheral Canal Pumping Plant
- H. Canal Siphons
 - 1. Mokelumne River
 - 2. Disappointment Slough
 - 3. San Joaquin River
 - 4. Old River
- J. Delta Slough Relocations
 - 1. Lost Slough
 - 2. Beaver, Hog, and Sycamore Sloughs
 - 3. White Slough
 - 4. Fourteenmile Slough
- K. Local Irrigation and Drainage

- L. Water Quality Turnouts
- M. Roads and Bridges
 - 1. State
 - 2. County
 - 3. Railroad
 - 4. Operations Road
- N. Utility Location and Relocation

PART IV. BASIC COST ESTIMATE

Part I

BASIS FOR DESIGN - PERIPHERAL CANAL

Part I Introduction

The Peripheral Canal is a water transfer facility across the Sacramento-San Joaquin Delta authorized by the Burns-Porter Act in 1959, Water Code Section 12934, (d), (3), within the meaning of "State Water Facilities."

A. Purpose

The Peripheral Canal will transport surplus good quality water from the Sacramento River to State and Federal pumping plants that now divert water from southern Delta channels. This will remove the impact of the present direct State and Federal pumping from the Delta, and more importantly, the potential impact of future pumping, by both agencies, which will increase substantially by 1980.

Fresh water releases will be made from the Peripheral Canal to provide positive downstream or upstream flows as necessary in eastern and southern Delta channels. These releases will improve water quality for Delta agricultural needs, protect and enhance the fisheries, repulse sea water intrusion coming in from San Francisco Bay, and improve conditions for recreation.

The original concept of the Peripheral Canal was that it would be a joint State-Federal facility between the State Department of Water Resources and the U. S. Bureau of Reclamation. Beginning on September 15, 1961, the first of three separate full

time interagency committees or work groups was established in connection with development of the Peripheral Canal. The objectives of these committees or work groups were basic, such as, formulate a mutually acceptable plan for the Delta development, develop a letter of understanding under which the Department and the Bureau would jointly proceed, and coordinate alignment activities between the two agencies. Representatives of the U. S. Corps of Engineers were also members of some of the committees or work groups.

Working within that framework during the period 1966 through 1972, four concepts were compared; Peripheral Canal, Delta Waterway Control, Physical Barrier, and Hydraulic Barrier. The Peripheral Canal concept was selected as the most desirable plan and the Department developed a preliminary canal location and collected extensive geographic and hydraulic information related to design considerations. Drawings were prepared showing the proposed alignment and various alterations that could be considered. These drawings were then used by representatives from the Department and the Bureau of Reclamation as the basis of discussions at five large public meetings in the Delta area. Preliminary design of some of the canal structures was also progressing at that same time.

However, no authorization was received by the U. S. Bureau of Reclamation to take an active part in the preconstruction and design work and only one interagency work group remained active after December 1965.

During a meeting of the State Assembly Committee on Water on November 9 and 10, 1972, Mr. William R. Gianelli, Director, Department of Water Resources, stated:

"The Peripheral Canal is needed now to provide high quality water to all areas of the Delta.

"The Department of Fish and Game has recommended that such a facility should be constructed as soon as possible to correct present environmental conditions adversely affecting the Delta fishery and to provide an improved environmental quality.

"It is our current estimate that the Peripheral Canal will be needed in 1980 to protect the water supply and quality functions of the State Water Project and Federal Central Valley Project aqueducts to the south and west of the Delta.

"If federal participation is not forthcoming within the required time schedule, the State must proceed with construction of a water conveyance facility in the Delta to meet the needs of the State Water Project. This facility should be a Peripheral Canal, since studies over the past ten years have shown that any other alternative would be unacceptably disruptive to the Delta environment.

"Preconstruction engineering work for this facility is in progress now by our Department. Considering the time necessary to complete such a facility by 1980, the decision to proceed with construction will probably have to be made early in 1975. As this work proceeds, there will be full

opportunity for review, particularly in the phases of the work which involve permits, selection of final alignments, and the report on environmental impact considerations."

Plate I-A-1 depicts the current schedule for the design and construction of the Peripheral Canal.

B. Location

The Peripheral Canal will be an earth canal skirting the eastern and southern edge of the Sacramento-San Joaquin Delta, 75 miles east of San Francisco. The canal will be hydraulically isolated from the Delta channels and will start on the Sacramento River near Hood about 15 miles south of Sacramento, will pass west of Stockton, and terminate at Clifton Court Forebay, about 13 miles northwesterly of Tracy, from which the water will be delivered to existing federal and state pumping plants. The reach of the canal between Hood and Stockton will be just west of the proposed route of Interstate Highway 5. See Plate No. I-A-2.

C. Physical Description

The unlined canal will be 42 miles long. The major portion will be 460 feet wide at maximum water depth of 30 feet and about 510 feet wide at operating road berm elevation. The normal sideslope will be 3 to 1 with laybacks of 8 to 1 in the waterline area for protection against wave action created by winds and motorboats used by recreationists.

While the State now intends to proceed with design and construction without Federal participation if necessary, the Canal will be conceptionally developed as a "staged joint

facility," to meet the joint needs of the State and Federal projects. With this approach, Federal participation would be feasible at any time, thus making it possible to derive the full benefits from the canal. Furthermore, the canal will be built in two phases of construction.

Phase I Construction

In addition to the canal, the first phase will include an intake structure in the Sacramento River Bank complete with a floating trash deflector, trashrack, and fish screen capable of screening adult fish. A bridge for State Route 160 will also be a part of this structure.

This will be followed by a sedimentation basin designed to carry the water at a slower average velocity than anywhere else in the canal to collect these sediment particles that may be heavy enough to drop out in the canal at average canal water velocities. A flood gate structure to protect the canal and downstream structures from high water in the Sacramento River will be at the downstream end of the sedimentation basin.

The intake structure and other features down to the proposed pumping plant site near Lambert Road will be sized to convey an additional 1,500 cfs of water for the Federal East Side Project (U. S. Bureau of Reclamation).

The first phase of construction will also include canal detours around the sites for a future fish facility and Peripheral Canal Pumping Plant.

Water from the Morrison Creek Stream Group, a large

drainage area east and south of Sacramento, passes through Beach and Stone Lakes, over a weir-flap gate structure under Lambert Road, and thence to the Delta by the way of Snodgrass Slough. This is discussed in detail in the Corps of Engineers Review Report for Flood Control on Morrison Creek Stream Group, dated March 1972. This drainage water will be taken into the canal just upstream of the Peripheral Canal Pumping Plant. Replacement water for Snodgrass Slough will be supplied from the canal through a water quality turnout.

Canal siphons will be built at Mokelumne, San Joaquin, and Old River, and Disappointment Slough as part of the first phase to pass the canal water under these large existing waterway channels.

Ten of twelve water quality turnouts will also be constructed at specific locations to furnish fresh replacement water to several waterways. For reasons which will be discussed in Part III Chapter L, the water quality turnout to the Middle River will be the largest of this type of turnout. It will require the construction of a multiple unit pumping plant with a total capacity of over 2,000 cfs.

Canal construction will sever several Delta Sloughs. The matter of Delta Channel Revisions and Delta Slough Relocations is discussed in Part II, Chapter F, and Part III, Chapter J, respectively.

The Department of Parks and Recreation is preparing a

report which will recommend several locations where recreation facilities can be developed concurrently with canal construction. In some of these areas the canal embankment may be laid back as much as 10 to 1 slope to provide for swimming and boat launching, with other areas being prepared specifically as fishing sites. Parking facilities will be provided at each location.

Roads on both berms will be constructed concurrently with the canal construction and will be open to use by the public.

Bridges for roads and railroads intercepted by the canal will be constructed over the canal at existing locations where feasible. Otherwise a suitable relocation will be negotiated with the owner. The location or relocation of existing utilities of various types will also be negotiated with the owners.

Phase II Construction

Construction to be done in the second phase consists primarily of a fish protection facility and a low-head Peripheral Canal Pumping Plant downstream from the Lambert Road crossing.

The fish protection facility, possibly located in the downstream end of the sedimentation basin, will be designed to collect a high percentage of the smaller fish that passed through the screen in the canal intake structure and return them to the Sacramento River downstream from the canal intake.

The pumping plant will contain a number of low head pumps and will raise the elevation of the water surface in the canal by about 10 feet.

The pumping plants for the water quality turnouts into Wiskey Slough and Old River will be constructed as part of the second phase. The water release to Old River will be comparatively large and will require a multiple unit pumping plant with a total capacity of over 1,000 cfs.

Prior to the construction of the Peripheral Canal Pumping Plant, the canal will be operated as a gravity canal obtaining operating head solely from the difference in the water surface level in the Sacramento River at Hood and the water surface level at Clifton Court Forebay; the later being controlled by the Delta Pumping Plant. After construction of the Peripheral Canal Pumping Plant, the head in the canal will be controlled by operation of the pumping plant.

The design of the Peripheral Canal is discussed in Part III, Chapter A.

Details in connection with the Stone Lake drainage are discussed in Part III, Chapter F.

Canal capacities for various reaches of the canal are shown on Table 1.

Water quality turnout capacities are shown on Table 2.

Table 1
Peripheral Canal Design Capacities
By Reach

<u>Reach</u>	<u>Capacity, in cfs</u>
Hood Intake to Peripheral Canal Pumping Plant	23,300 <u>1/</u>

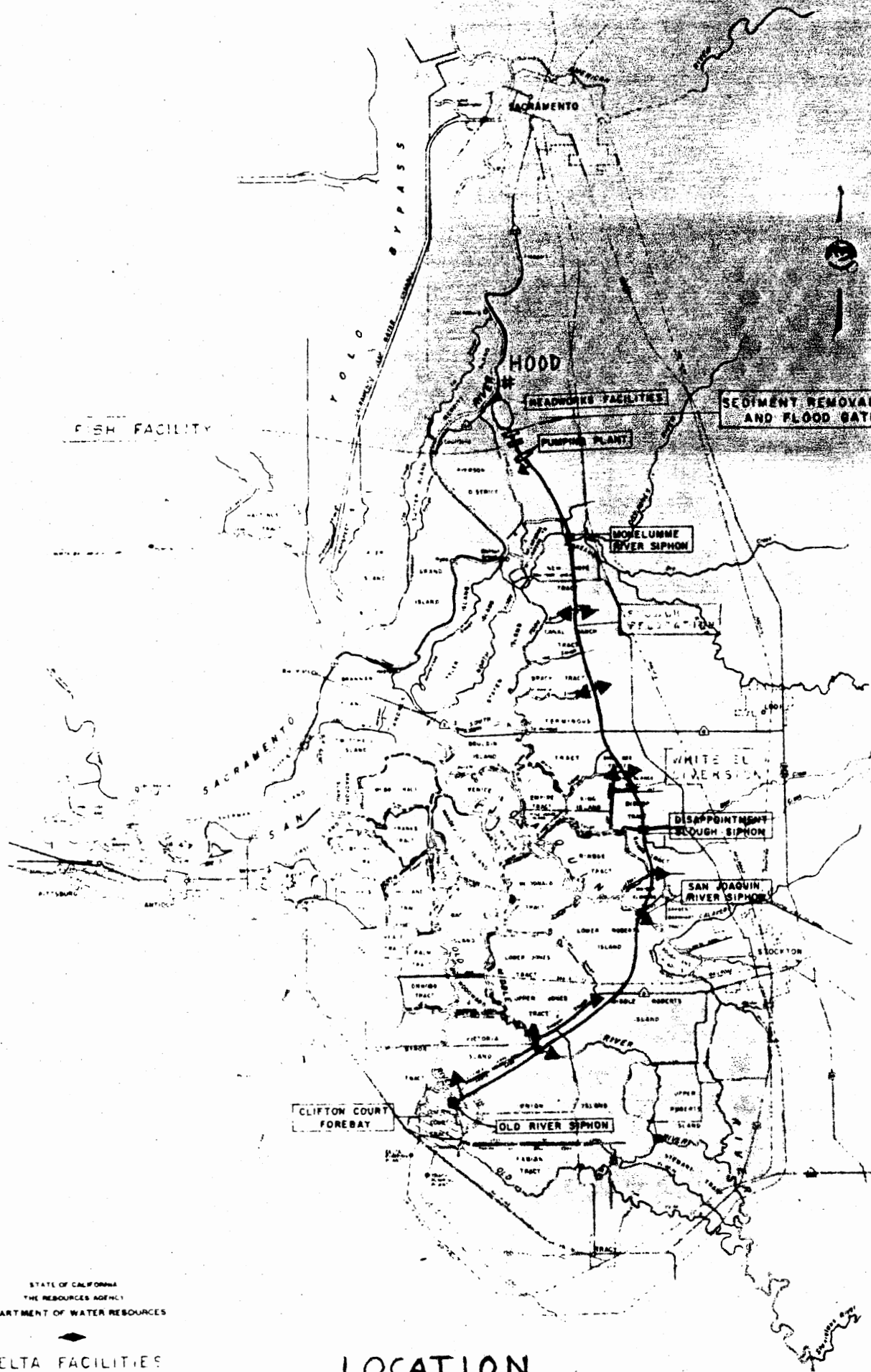
Peripheral Canal Pumping Plant to Middle River	21,800 *
Middle River to Old River	19,500
Old River to Clifton Court Forebay (Old River Siphon)	18,300
Export Pumps - SWP 10,300, CVP 6,500	16,800

1/ Includes 1,500 cfs for Hood-Clay Connection

* Canal siphons under Mokelumne River, Disappointment Slough, and San Joaquin River are in this reach of the canal.

Table 2
Water Quality Turnout Capacities

<u>Location</u>	<u>Design Capacity in cfs</u>
Snodgrass Slough (west)	400
Beaver Slough (west)	150
Beaver Slough (east)	100
Sycamore Slough (west)	150
Sycamore Slough (east)	100
White Slough (west)	600
White Slough (east)	600
Fourteenmile Slough (east)	100
San Joaquin River	600
Whiskey Slough (north)	100
Middle River (south)	2200
Old River	1200
Total	<u>6300</u>



STATE OF CALIFORNIA
 THE RESOURCES AGENCY
 DEPARTMENT OF WATER RESOURCES

DELTA FACILITIES
 PERIPHERAL CANAL

LOCATION
 PERIPHERAL CANAL

PLATE I-A-2