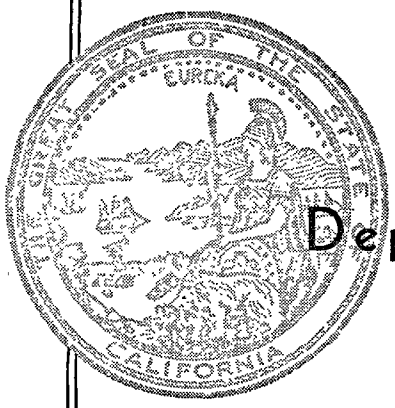

THE RESOURCES AGENCY OF CALIFORNIA

Department of Water Resources

BULLETIN No. 132-63

THE CALIFORNIA STATE WATER PROJECT IN 1963

APRIL 1963

HUGO FISHER
Administrator
The Resources Agency of California

EDMUND G. BROWN
Governor
State of California

WILLIAM E. WARNE
Director
Department of Water Resources

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THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
1120 N STREET, SACRAMENTO

April 3, 1963

Honorable Edmund G. Brown, Governor,
and Members of the Legislature
of the State of California

Gentlemen:

I have the honor to transmit herewith Bulletin No. 132-63, entitled "The California State Water Project in 1963." This report sets forth official plans for the construction, operation, financing, and management of the State Water Project. The report is for the information of the State Legislature, the California Water Resources Development Finance Committee, project water and power users, the investors, and the public.

In transmitting to you this first comprehensive report, it is my pleasure to advise that work is proceeding on schedule and in accordance with the plans.

This is intended as the first of an annual series.

Sincerely yours,

William E. Warne

Director

Enc.

STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

EDMUND G. BROWN, Governor
HUGO D. FISHER, Administrator, The Resources Agency of California
WILLIAM E. WARNE, Director, Department of Water Resources
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Principal Engineer

CHAPTER I. THE CALIFORNIA STATE WATER PROJECT IN 1963

California is in the midst of one of the largest water development programs so far undertaken. California is in the water business today for one essential reason -- the State has no alternative.

The search for solutions to California's water problems is not new. It has been in progress since the first state Legislature met in 1850. The stream gauging program was started at that time and is still going on. Such programs have provided much of the basic data required to launch later water development programs.

Local agencies in California felt the pressing water need nearly 100 years ago. Early in the twentieth century, cities such as Los Angeles and San Francisco were forced to search into far mountain valleys for new supplies.

Much of California's water supply has been developed by local water districts. California adopted the district concept of water development with the passage of the Wright Act in 1887. Through the years since then, more than 950 dams and reservoirs have been constructed in the State. The initiative of the irrigation districts alone has served to bring water to more than half of the land presently irrigated in California.

Federal agencies also have played a big part in water resources development in California. The Corps of Engineers has planned and built numerous navigation, flood control, debris control, and water storage projects in California.

The Central Valley Project, originally conceived by the State, was adopted and constructed by the Bureau of Reclamation of the United States Department of the Interior. The federal Central Valley Project is designed to supply water for irrigation and municipal purposes, to improve navigation on the Sacramento River, to provide adequate stream flows to halt sea water intrusion in the Sacramento-San Joaquin River Delta, to control floods in the Central Valley, to generate hydroelectric power, and to serve other purposes, such as providing expanded recreation facilities.

Even the imaginative and farsighted programs which have been carried out by many levels of government have not kept pace with greatly increasing water needs.

Except for a strip along the Pacific Coast north of San Francisco, California is semiarid or outright desert. California's population is now over 17,000,000 and is increasing at the rate of more than half a million each year. There is every reason to believe this increase will continue for as long as we can now foresee. Many settlements and large cities are now dependent upon water imported from afar.

The State is blessed with much potentially good land and with a climate which provides the opportunity for a wonderful agriculture and a wonderful life. Water, however, must be supplied in order to sustain them. California's agricultural production, highest of all States in crop and livestock value, comes 80 percent from irrigated land, yet the irrigated land is but eight percent of the total area of the State.

The main problem in California is that nature has not provided the right amount of water in the right places at the right times. More than 70 percent of the water of California originates in the northern third of the State, while seventy-seven percent of the water need is in the southern two-thirds. Throughout the State, the bulk of rainfall occurs in a few winter months, while the summers, when water needs are greatest, are long and dry.

The California Legislature in 1947 authorized a complete study of the State's water resources, problems and needs. This study disclosed that there is enough water in California for all needs for as long as can reasonably be foreseen. The next step was to work out a general plan for comprehensive water development throughout the State. The California Water Plan, adopted by the Legislature in 1959, was the result.

The California Water Plan was developed out of the accumulation of decades of collection of basic data and surveys of needs and requirements. Through the adoption of the plan the State made no effort to pre-empt the field of construction of water projects. The plan anticipates that local, private, and federal agencies will build those units of the comprehensive plan that fall into their programs and are of sufficient interest to them to warrant their efforts.

The comprehensive plan looks to the ultimate future. Some of the projects are a long, long way in the future, beyond the ability to see plainly all needs and all possibilities of

satisfying them. Therefore, like a camera, the plan has placed the nearer objects in much sharper focus than the farther ones. The plan is flexible and subject to continued refinement. It is especially useful as a guide to what needs to be done next. It warns against doing an expedient now if that will stand in the way of doing the important later.

By adopting this plan, the Legislature recognized that the State must assume a leading role in the coordination of its own comprehensive water development. The Legislature recognized that the State itself must finance and build essential elements of the plan that lie outside the programsof other agencies, local or federal, private or public.

Shortly following these decisions, the present comprehensive State Water Project was authorized. The project was completely out of the purview of any existing federal agency. It was beyond the capability of any local agency.

The San Luis Unit, a feature of both the State Water Project and the federal Central Valley Project, is being financed, built and operated jointly by California and the federal government. California pays 55 percent and the federal government 45 percent of the construction cost. Another feature, the Oroville Dam, is being financed in part by the Corps of Engineers, this federal participation represents the allocation to flood control, amounting to 22 percent of the costs excepting power facilities, up to a total of $85,000,000.

Where do we stand with the Project today?

California voted $1.75 billion in general obligation bonds and will add an estimated $320,000,000 of offshore oil and gas royalties to assist in financing the project. The financing program includes consideration of revenue bonds supported by power earnings of the Oroville facilities. Water users are signing contracts to repay all reimbursable costs allocated to them.

Water is already being delivered through facilities of the State Water Project. In Livermore Valley, in Northern California, water service began in June 1962 through the first reaches of the South Bay Aqueduct.

Farther north, contractors are busy on the Feather River at the site of Oroville Dam which will be the largest zoned earth and rock fill dam in the world. Relocation of highways and railroads is completed; work on two diversion tunnels is under way, and work has begun on the main embankment, which will tower 735 feet above the streambed.

Above Oroville, on the tributaries of the Feather River construction has been completed on Frenchman Dam, one of five small dams which will be used for recreational and water supply purposes in Plumas County, and the second, Antelope Valley Dam, is under way.

Construction of the San Luis Unit has begun, and the first construction contract has been awarded for the California Aqueduct, which will extend from the Delta across the Tehachapi Mountains into Southern California.

By February 26, 1963, water supply contracts had been signed with 12 districts throughout California, for a total of 2,053,000 acre-feet. This is 51 percent of the firm annual yield of the project of approximately 4,000,000 acre-feet.

Final alignments are being worked out for the aqueduct and negotiations for rights-of-way are in progress.

The financing resources include $130,000,000 for local projects under the Davis-Grunsky Act, usually in the watersheds of origin. The first of these have been financed. These projects will be constructed by local districts.

The year 1972 has been set as the date for the first delivery of project water at the extremity of the project at Perris Reservoir in Riverside County. The Department of Water Resources expects to meet the schedule. The project will be substantially used to capacity by 1990, and additional conservation works will be required prior to that date. Plans are under way to be ready with projects on the Eel or Trinity Rivers by the 1980's.

The project is much like a very large public utility and because of this analogy the term "utility" is used frequently in this report.

The utility concept was clearly discerned by Governor Edmund G. Brown. In his Water Message of January 22, 1959, to the Legislature the Governor stated:

"Many of the principles now applicable to the operation of utilities should guide us in the development of our State water resources."

Governor Brown thus introduced the objective of a self-supported public utility wholesaling water to areas of need and operating as a going concern on a long-term basis.

The utility function is new in the Department of Water Resources. To accomplish this new utility function the department has taken important administrative actions. A single entity, the "State Water Resources Development Utility" has been designated to account for the departmental activities relating to design, construction, and operation of the State Water Project. With only minor changes necessary to conform to general state accounting requirements, the utility accounting principles and policies recommended by the National Committee on Governmental Accounting have been adopted. The source and disposition of funds are being planned and controlled on a long-term basis rather than limiting the financial planning to an annual budget, although such budgets also are prepared. The separate identity of the project has been established by recording all of its existing assets and liabilities.

The purpose of this report is to delineate the official plans for the construction, operation, financing, and management of the State Water Project. The report is for the information of the State Legislature, the California Water Resources Development Finance Committee, the investors, and the public.

Many features are still in various stages of formulation, including the California Aqueduct, and the additional water conservation facilities. Certain features cannot be finally sized until all water supply contracts have been executed and options exercised. Options may be exercised as late as the fall of 1964. As sizes are determined additional features of the California Aqueduct will enter the construction stage on an orderly schedule. Water transfer works in the Delta are currently under intensive study. Independent programs, such as the San Joaquin Drain and local projects under the Davis-Grunsky Act, may continue in the formulation stage for some years. Another major problem still under study is the allocation of costs to the nonreimbursable project purposes of recreation and enhancement of fish and wildlife.

CHAPTER II. HISTORY OF THE STATE WATER PROJECT

In 1959 the Legislature enacted the California Water Resources Development Bond Act, popularly known as the Burns-Porter Act[1/], after its authors Senator Hugh Burns of Fresno, and Assemblyman Carley V. Porter of Compton. It authorizes the construction and operation of facilities to develop further the water resources of California. The State Water Project includes the following:

a. The dams and reservoirs on the upper tributaries of the Feather River at the Frenchman, Antelope Valley, Grizzly Valley, Abbey Bridge, and Dixie Refuge sites.

b. The Oroville Dam and Reservoir.

c. The North Bay Aqueduct.

d. The South Bay Aqueduct.

e. The California Aqueduct.

f. The San Luis Dam and Reservoir.

g. The Coastal Aqueduct.

h. Works in the Delta.

i. Drainage facilities in the San Joaquin Valley.

j. Water development facilities for local areas provided for under the Davis Grunsky Act.

k. Additional facilities to meet local needs and to augment supplies in the Delta.

l. Electric power facilities.

1/ This Act was placed on the ballot in the election of November 1960, as Proposition 1. It was adopted by a vote of yes, 3,008,328, no, 2,814,384.

These facilities, comprising the State Water Project, are designed to help readjust the imbalance of California's water resources and water needs. From a climatic point of view much of the State is semiarid. The north coast and northern mountains generally have sufficient precipitation to support agriculture without irrigation, but the rest of the State, especially the fertile central and coastal valleys do not. These areas must be irrigated to produce most crops.

It is significant that 70 percent of California's water supply originates in the northern third of the State. Seventy-seven percent of the water need is in the southern two-thirds. Today, however, a substantial part of the northern runoff goes to sea unused. For example, in the flood year 1955-56 the north coast area alone had a runoff exceeding 50 million acre-feet. In the same year the runoff from the Sacramento River basin totaled 35 million acre-feet. Of the combined total of 85 million acre-feet runoff most of the water flowed into the ocean unused. The lowest runoff of recent record in the same areas has been about 29 million acre-feet. A substantial portion of even this amount flowed into the ocean. This availability of large quantities of fresh water in the north is the key to California economic development now and in the years ahead as its population expands rapidly.

California's population is expected to increase from 17,000,000 to 40,000,000 by the year 2000. In the past as the population has increased water supplies for municipal, industrial

and agricultural use increased along curves parallel to the population growth. When the population was small and widely dispersed shallow wells and low cost stream diversions were the methods used to provide water for irrigation and domestic use. As the State grew the population tended to concentrate in large communities and it became necessary for the big cities to improve their water supply beyond that available from the original simple facilities. This was done by putting down deep wells to reach ground water at lower depths, constructing large capacity surface reservoirs and in the cases of Los Angeles, San Francisco and the cities of the East Bay by going to the Sierra with large-scale aqueduct systems. Later, Southern California organized a metropolitan water district to bring water from the Colorado River on the eastern boundary of the State. In the agricultural areas of the San Joaquin Valley and south of the Tehachapis, extensive development of ground water basins became routine.

For many years the Department of Water Resources and its predecessor agencies developed plans for the best use of the State's

water resources. Interim reports were issued on proposed solutions to the water distribution problems in 1923,[2] 1925,[3] 1927,[4] and 1929,[5]

In 1931, the State Engineer, Edward Hyatt,[6] made a report[7] to the Legislature on the State Water Plan. This report cost $1,000,000 and nine years had been spent in its preparation. It discussed both the physical and economic aspects of the proposed development. It included provision for an exchange of water between the north and south portions of the Central Valley, recognized the national benefits and made an estimate of the cost with a discussion of possible methods of repayment. This report found that such a development of the Central Valley would cost $160,000,000. The report also pointed out that if the project

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2/ Department of Public Works, Bulletin No. 4, "Water Resources of California: A Report to the Legislature of 1923," (January 1, 1923.)

3/ Department of Public Works, Bulletin No. 9, "Supplemental Report on Water Resources of California: A Report to the Legislature of 1925," (January 1, 1925.)

4/ Department of Public Works, Bulletin No. 12, "Summary Report on the Water Resources of California and a Coordinated Plan for their Development: A Report to the Legislature of 1927," (January 1, 1927.)

5/ Department of Public Works, Bulletin No. 20, "Report on Kennett Reservoir Development, an Analysis of Methods and Extent of Financing by Electric Power Revenue," (1929.)

6/ Edward Hyatt, Office Engineer, July 1, 1920 to August 14, 1929; State Engineer, August 14, 1929 to February 1, 1950.

7/ Department of Public Works, Bulletin No. 25, "State Water Plan, 1930," (January 1, 1931.)

were built with money bearing an interest cost of more than three percent, the annual charges would exceed annual revenues.

Federal agencies also reported on various phases of the proposed development of the Central Valley. The most important reports were those by the Corps of Engineers[8] in February 1931 and the Bissell report[9] made cooperatively by the Bureau of Reclamation and the State of California in June 1931.

The gravity of the water problem in the State led the Governor, James Rolph, Jr., in August 1931 to direct a message to the people of California calling attention to the reports and to the necessity for beginning construction. Governor Rolph endorsed the principles of the State Water Plan and federal financial assistance. The investigations and reports culminated in the passage of the Central Valley Project Act of 1933[10], intended to implement the initial features of the State Water Plan in the Central Valley.

The Act provided for dams, reservoirs, canals, pumping stations, and powerplants to convey Sacramento River water to a location on the San Joaquin River near Mendota and for San Joaquin

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8/ House Document 791, 71st Congress, Partial Report on Sacramento, San Joaquin and Kern Rivers, California (1931.)

9/ Unpublished manuscript in files of Bureau of Reclamation, Sacramento, California, "California Water Resources (Vol. I and II)" C. A. Bissel (May 1931.)

10/ Part 3 (Commencing at Sec. 11100) of Division 6 of the Water Code.

River water delieveries from Friant Dam to the vicinity of Bakersfield. The Act also provided financing through issuance of $170,000,000 in revenue bonds.[11] After passage of the bill it was subjected to a referendum which placed it before the voters in a special election on December 19, 1933. The project won the voters' approval.

Even though the State had passed the Act and the voters sustained it by referendum, no funds were available to initiate construction because the depression then existing throughout the country made the revenue bonds unmarketable. Arrangements were subsequently made for federal financing through the Bureau of Reclamation which began construction in 1935. As a result, today the great Central Valley Project of the Bureau of Reclamation stores water at Shasta and other dams and by exchange delivers water as far south as Kern County. The federal Central Valley Project takes no water south of the Tehachapis.[12]

11/ The limitation of $170,000,000 was removed by amendment of Water Code Sec. 11700, Calif. Stats. 1951, Ch. 1441.

12/ For a more detailed account of the early history of water resource development in California see Golze' "Reclamation in the United States" (1961); "Central Valley Project Documents" Part One, H. Doc. No. 416, 84th Cong., 2d Sess. (1956); Montgomery and Clawson, "History of Legislation and Policy Formation of the Central Valley Project", mimeographed Berkeley, Calif., March 1946.

Events Following World War II

The unprecedented development of California with corresponding increases in demands for water during World War II and the years immediately following aggravated public concern over the State's water problems. To meet this public concern and to provide for the future economic growth of the State, the State's water agencies engaged in a series of studies and preparation of plans of two particular types. One type concentrated on the collection of basic data and the development of a statewide water plan. The other type was concerned with the development of a specific project to meet a specific purpose.

The Legislature in 1945 directed the State Water Resources Board to conduct an investigation of water resources of California designated the "Statewide Water Resources Investigation."[13/] Funds were provided in the 1947-48 budget[14/] for commencement of the investigation and additional funds were provided through 1955 by subsequent appropriations. These investigations were carried out by the Division of Water Resources of the Department of Public Works as a service for the State Water Resources Board.

13/ Water Resources Law of 1945, Ch. 1 (commencing at Sec. 12570) and Ch. 2 (commencing at Sec. 12639) of Part 6, Div. 6 of the Water Code.

14/ Calif. Stats. 1947, Ch. 1541.

Bulletin No. 1, "Water Resources of California"[15] was published in 1951 and contains data on precipitation, unimpaired stream runoff, flood flows and frequency, and quality of water throughout the State. In 1955 Bulletin No. 2, "Water Utilization and Requirements of California"[16] was released. It included estimates of the current use of water throughout the State for all consumptive purposes and presented forecasts of probable ultimate water requirements based in general on the capabilities of the lands for the development. The third and concluding phase of the Statewide Water Resources Investigations is reported in Bulletin No. 3, "The California Water Plan".[17]

Bulletin No. 3 presents preliminary plans for full practical development of all the water resources of the State to meet its ultimate water needs. The bulletin describes plans for local water resource development together with those works needed for the major transfers of water from the surplus areas of the north to the water-deficient areas of the south.

15/ State Water Resources Board, Bulletin No. 1, "Water Resources of California" (1951.)

16/ State Water Resources Board, Bulletin No. 2, "Water Utilization and Requirements of California" (June 1955.)

17/ Department of Water Resources, Bulletin No. 3, "The California Water Plan" (May 1957.)

The Division of Water Resources also pursued the second type of study of a project that would meet the water requirements of the State in the immediate future. In May, 1951, State Engineer A. D. Edmonston[18] presented the first complete report on the Feather River Project.[19] This report proposed a multiple-purpose dam and reservoir on the Feather River near Oroville complete with powerplant and an afterbay dam and powerplant, a Delta Cross Channel, an electric power transmission system, an aqueduct to transport water from the Delta to Santa Clara and Alameda Counties, and an aqueduct to transport water from the Delta to the San Joaquin Valley and Southern California.

The proposed project was authorized by the Legislature in 1951 for further study.[20] It was designated as "The Feather River and Sacramento-San Joaquin Delta Diversion Projects." The Division of Water Resources was directed to continue necessary investigations, surveys and studies including the preparation of plans and specifications for the construction of the authorized works and to submit them to the Water Project Authority for its approval.

18/ A. D. Edmonston, State Engineer, February 2, 1950 to November 1, 1955.

19/ State Water Resources Board, "Report on Feasibility of the Feather River Project and Sacramento San-Joaquin Delta Diversion Projects Proposed as Features of the California Water Plan," (May 1951.)

20/ Chapter 1441, Statutes of 1951, Water Code Sec. 11260.

The Division of Water Resources continued its studies and investigations and in 1955 submitted another report after approval by the Water Project Authority to the Legislature on the proposed Feather River Project.[21] This report showed that the project had engineering and financial feasibility. It recommended that the Legislature appropriate funds to start construction. It also recommended modifications of the original 1951 plan by including the addition of San Luis Reservoir on the west side of the San Joaquin Valley and by including San Benito County to be served by the aqueduct primarily proposed for Santa Clara and Alameda Counties. In August 1955 the Legislature referred the report to independent consultants, the Bechtel Corporation, for review.[22] After receipt of the Bechtel report

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21/ Division of Water Resources, "Program for Financing and Constructing the Feather River Project as the Initial Unit of the California Water Plan," (February 1955.)

22/ Bechtel Corporation, "Report on the Engineering, Economic and Financial Aspects of the Feather River Project to the Joint Committee on Water Problems California State Legislature," (December 31, 1955) The report concludes in part: "Engineering concepts as proposed by the State Engineer are considered sound with respect to the scope of the Feather River Project.

* * * * *

"The financial requirements of the project appear to be manageable in relation to probable population, income and wealth of the State, and therefore it is our considered judgment that, subject to the conditions outlined herein, it is feasible to finance the Feather River Project with general obligation bonds of the State."

the Legislature reauthorized the project to incorporate the modifications included in the State's 1955 report.[23]

In 1956 the Legislature took another important step to further the development of the State's water resources program. It provided for a reorganization of the water agencies of the State. Effective July 5, 1956, the State Department of Water Resources was created by Act of the Legislature,[24] and its first director, Harvey O. Banks,[25] appointed. The new department was created by transferring to it the functions of the Water Project Authority and the functions of the Division of Water Resources of the Department of Public Works, except those relating to the appropriation of water and the determination of water rights. The authority of the State Water Resources Board relative to the conduct of the statewide water resources investigation, special investigations and the completion of Bulletin No. 3 was transferred to the Department of Water Resources.

23/ Calif. Stats. 1957, (1956 Extra. Sess.) Ch. 54, p. 429.

24/ Calif. Stats. 1957 (1956 Ex. Sess.) Ch. 52, Water Code Secs. 120-127.

25/ Harvey O. Banks, State Engineer, November 1, 1955 to July 5, 1956; Director of Water Resources, July 5, 1956 to January 2, 1961.

In addition, the State Water Resources Board was designated the State Water Board (now the California Water Commission[26]) and was placed within the Department of Water Resources to confer with, advise, and make recommendations to the Director with respect to any matters and subjects under his jurisdiction.

In February 1957 the Legislature made the first appropriation[27] to the Department of Water Resources for actual construction of the State Water Project. Construction began in May 1957 on Oroville Dam. The first contract covered construction of Tunnels 4 and 5 on the Western Pacific Railroad relocation which was necessary to clear the dam and reservoir sites.

The 1959 Legislature reaffirmed its earlier declaration that the people of the State have a primary interest in the orderly and coordinated development, utilization, and protection of the water resources of the State, and accepted The California Water Plan,[28] with such amendments and additions as may be necessary from time to time, as the guide in achieving that end.[29]

26/ Calif. Stats. 1957 (1956 Ex. Sess.) Ch. 52, Water Code Secs. 150-164.

27/ Calif. Stats. 1957, Ch. 15, Appropriated $25,190,000 for this purpose.

28/ State Water Resources Board, Bulletin No. 1 "Water Resources of California" (1951); State Water Resources Board, Bulletin No. 2 "Water Utilization and Requirements of California" (June 1955); Department of Water Resources, Bulletin No. 3 "The California Water Plan" (May 1957.)

29/ Water Code Secs. 10004-10007.

Although units of the State Water Project had been authorized and begun in previous years, it was not until 1959 that the Legislature enacted the legislation necessary to implement fully these authorizations. Governor Brown presented a comprehensive water program to the Legislature as a major part of the program of his first administration. The most important of the measures adopted was the California Water Resources Development Bond Act, the Burns-Porter Act.30/ This Act, together with other measures, was designed to assist in the financing of the State Water Resources Development System.

The Act authorized the issuance of $1,750,000,000 in general obligation bonds to assist in the financing of the immediate construction of the State Water Facilities, a portion of the State Water Resources Development System and for the specified additional works.31/ The State Water Facilities, the first stage in the State Water Resources Development System, as described in Water Code Section 12934(d) consists of the following:

30/ Calif. Stats. 1959, Ch. 1762, Water Code Secs. 12930-12944.

31/ Water Code Sec. 12935.

"(1) A multiple purpose dam and reservoir on the Feather River in the vicinity of Oroville, Butte County, and dams and reservoirs upstream therefrom in Plumas County in the vicinity of Frenchman, Grizzly Valley, Abbey Bridge, Dixie Refuge and Antelope Valley;

"(2) An aqueduct system which will provide for the transportation of water from a point or points at or near the Sacramento-San Joaquin Delta to termini in the Counties of Marin, Alameda, Santa Clara, Santa Barbara, Los Angeles and Riverside, and for delivery of water both at such termini and at canal-side points en route, for service in Solano, Napa, Sonoma, Marin, Alameda, Contra Costa, Santa Clara, San Benito, Santa Cruz, Fresno, Tulare, Kings, Kern, Los Angeles, Ventura, San Bernardino, Riverside, Orange, San Diego, San Luis Obispo, Monterey and Santa Barbara Counties.

"Said aqueduct system shall consist of intake and diversion works, conduits, tunnels, siphons, pipelines, dams, reservoirs, and pumping facilities, and shall be composed of a North Bay aqueduct extending to a terminal reservoir in Marin County; a South Bay aqueduct extending to terminal reservoirs in the Counties of Alameda and Santa Clara; a reservoir near Los Banos in Merced County; a Pacheco Pass Tunnel aqueduct from a reservoir near Los Banos in Merced County to a terminus in Pacheco Creek in Santa Clara County; a San Joaquin Valley-Southern California aqueduct extending to termini in the vicinity of Newhall, Los Angeles County, and Perris, Riverside County, and having a capacity of not less than 2,500 cubic feet per second at all points north of the northerly boundary of the County of Los Angeles in the Tehachapi Mountains in the vicinity of Quail Lake and a capacity of not less than 10,000 cubic feet per second at all points north of the initial offstream storage reservoir; a coastal aqueduct beginning on the San Joaquin Valley-Southern California aqueduct in the vicinity of Avenal, Kings County, and extending to a terminal at the Santa Maria River;

"(3) Master levees, control structures, channel improvements, and appurtenant facilities in the Sacramento-San Joaquin Delta for water conservation, water supply in the Delta, transfer of water across the Delta, flood and salinity control, and related functions.

"(4) Facilities for removal of drainage water from the San Joaquin Valley.

"(5) Facilities for the generation and transmission of electrical energy.

"(6) Provisions for water development facilities for local areas as provided in Chapter 5 (commencing at Section 12880) of Part 6 of Division 6 of the Water Code as the same may now or hereafter be amended.

"(7) Including for the foregoing (1 through 5) the relocation of utilities and highways and acquisition of all lands, rights of way, easements, machinery, equipment, apparatus, and all appurtenances necessary or convenient therefor."

As specified by the Burns-Porter Act the State Water Resources Development System includes, in addition to the State Water Facilities, additional facilities that may be authorized by the Legislature or the Department of Water Resources to augment water supplies in the Delta and to meet local needs including flood control. These may consist of multiple-purpose dams, reservoirs, aqueducts, and appurtenant works in the watersheds of the Sacramento, Eel, Trinity, Mad, Van Duzen, and Klamath Rivers.32/

The Burns-Porter Act recognizes the continued effectiveness of the Central Valley Project Act.33/ It thus includes a number of additional powers and limitations. Some of the more

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32/ Water Code Secs. 12931 and 12938.

33/ Water Code Sec. 12931 referring to Part 3 (commencing at Sec. 11100) of Division 6 of the Water Code.

significant of these are the area of origin law,[34] authority to cooperate with the United States,[35] provisions concerning contracts for the furnishing of project services,[36] and the authority to issue revenue bonds for the construction of facilities.[37]

Another method of financing the State Water Resources Development System under the Burns-Porter Act was through its appropriation of the California Water Fund for project construction.[38] The California Water Fund was created by the 1959 Legislature,[39] and moneys in the then existing Investment Fund[40] were transferred to it. Specified portions of tideland oil revenues and revenues from oil produced in the Long Beach Harbor tidelands were also designated for deposit in the California Water Fund.[41]

34/ Water Code Secs. 11460-11463, and 11128.

35/ Water Code Sec. 11500.

36/ Water Code Secs. 11454-11455 and 11625-11671.

37/ Ch. 8 (commencing at Sec. 11700) of Part 3 of Division 6 of the Water Code; 36 Ops. Cal. Atty. Gen. 160 (1960); Calif. Assembly Journal, 845-47 (March 5, 1963).

38/ Water Code Sec. 12938.

39/ Ch. 7 (commencing at Sec. 12900) of Part 6 of Division 6 of the Water Code, Calif, Stats. 1959, Ch. 140.

40/ The investment fund was established by Ch. 29 of the 1956 Extraordinary Session of the Legislature from the State's share of Long Beach oil revenues.

41/ Water Code Sec. 12912, Public Resources Code Sec. 6816.

The State Water Facilities authorized for construction by the Burns-Porter Act include water development facilities for local areas[42] as provided in the Davis-Grunsky Act.[43] The forerunner of this act had been adopted by the Legislature in 1957.[44] The 1957 act established a policy of providing state loans and grants to public agencies, but no financing was provided, and the only way an agency could obtain such assistance was through a special appropriation by the Legislature for each project. By 1959, only one such appropriation had been made.[45]

The Burns-Porter Act authorized the issuance of bonds in the amount of $130,000,000[46] to meet expenditures under the Davis-Grunsky Act, the provisions of which were liberalized by the 1959 Legislature.[47] The 1961 Legislature made further changes[48] in the Davis-Grunsky Act as a result of experience in the early years of its administration. The principal amendments were the authorization of loans for preparation of engineering feasibility studies on proposed projects and the granting of the necessary local powers to all public agencies to contract with the State and to construct and operate the types of projects eligible for assistance under the act.

42/ Water Code Sec. 12934(d) (6).

43/ Ch. 5 (commencing at Sec. 12880) of Part 6 of Division 6 of the Water Code.

44/ Calif. Stats. 1957, Ch. 2052.

45/ An appropriation of $1,260,000 was made for a loan to the South Sutter Water District. Calif. Stats. 1959, Ch. 2163.

46/ Water Code Sec. 12938.

47/ Calif. Stats. 1959, Ch. 1752; This act also established a Local Projects Assistance Fund of $15,000,000, which was never utilized.

48/ Calif. Stats. 1961, Ch. 1723.

The constitutionality of the California Water Resources Development Bond Act was sustained by the California Supreme Court in Metropolitan Water District v. Marquardt.[49] This was a mandate action brought in the original jurisdiction of the State Supreme Court to test the validity of the contract between the State and the Metropolitan Water District. The Court upheld the Burns-Porter Act against the various constitutional objections levied against it and upheld all the provisions of the contract.

The Burns-Porter Act groups together in one "package" a number of physical facilities which had never been studied in combination. Immediately following the passage of the Act the department began studies to develop a coordinated financing, construction and management program. Beginning in the spring of 1960 the proposed program was given comprehensive and independent review by engineering[50] and financial[51] consultants whose separate reports were published in October 1960.

49/ 59 A.C. 171, 378 P 2d 1004, 28 Cal. Rep. 724 (February 21, 1963.)

50/ Chas. T. Main, Inc., "General Evaluation of the Proposed Program for Financing and Constructing the State Water Resources Development System of the State of California Department of Water Resources," (October 1960). The report concludes in part: "The various structures proposed for the system present no engineering problems which cannot be solved by proper design.... The conservation facilities ... would yield sufficient water to supply the 1990 demand throughout the bond repayment period. ... the project could pay back all costs if 1960 costs prevail ... and if a master district is established in the San Joaquin Valley and in certain other agricultural areas. ... The Burns-Porter Act falls slightly short of providing sufficient funds ... and makes no provision for escalation. ... Stage II is the Oroville Project, ..."

51/ Dillon, Read and Co. Inc., "Report of Financial Consultants to State of California Department of Water Resources on Financial Aspects of Program for State Water Resources Development System," (October 26, 1960). The report, relying on Chas. T. Main's construction schedule, concludes in part: "... the Program would meet our financial feasibility tests on the basis of present construction cost levels."

Important changes were made in 1961 in the organization of the department to carry out the program of the Burns-Porter Act. In February 1961 a position of Chief Engineer was filled.[52] In June 1961 Governor Brown approved a reorganization recommended by Director William E. Warne[53] which provided for decentralization of department activities. In October 1961 the Resources Agency of California was created bringing under one Administrator[54] the state's programs for conservation and use of natural resources.

Construction and planning field offices have been activated as required with offices now in operation at Oroville, Livermore, Merced, Palmdale and Patterson. An office will soon be opened in Gustine and others will follow as required.

History of Individual Facilities

Each of the facilities authorized by the Burns-Porter Act, comprising in the aggregate the State Water Facilities, frequently referred to as the State Water Project, has an individual history which in the aggregate is the history of the total project. A physical description of each is given in Chapter III.

52/ Alfred R. Golze' was appointed Chief Engineer on February 20, 1961.

53/ William E. Warne, Director of Water Resources, January 2, 1961 to present.

54/ William E. Warne was appointed the first Administrator on October 9, 1961 and served until January 7, 1963 when Administrator Hugo Fisher was appointed.

Studies of the Upper Feather River Basin

The Upper Feather River Basin studies began with an appropriation in 1954 for the Northeastern Counties Investigation. A 1955 interim report[55/] presented data on current and probable ultimate water requirements and set forth a preliminary plan for the development of the water resources of the Upper Feather River Basin. A summary of this material was included as Chapter 6 of the 1955 report on the Feather River Project.[56/] Following publication of the report and subsequent public hearings the Legislature directed that the Department of Water Resources complete the investigation of the feasibility of constructing water conservation projects in the Upper Feather River Basin. In 1957, Bulletin No 59 was released[57/] containing results of studies which showed that the Frenchman Project, the Grizzly Valley Project and the Indian Creek Recreation Project consisting of Antelope Valley, Abbey Bridge and Dixie Refuge reservoirs had engineering feasibility and were economically justified.

55/ Division of Water Resources, "Report on the Upper Feather River Service Area," (April 1955.)

56/ Division of Water Resources, "Program for Financing and Constructing the Feather River Project as the Initial Unit of the California Water Plan," (February 1955.)

57/ Department of Water Resources, Bulletin No. 59, "Investigation of Upper Feather River Basin Development Interim Report on Engineering, Economic and Financial Feasibility of Initial Units," (February 1957.)

Following the publication of Bulletin No. 59 and authorization of these projects by the Legislature,[58] studies of the development of the water resources of the Upper Feather River Basin were continued. The results of these further studies together with the results contained in the 1955 report and Bulletin No. 59 were presented in Bulletin No. 59-2[59] released in 1960.

The first appropriation for construction of the Upper Feather Facilities was made in the Budget Act of 1959.[60] Construction of Frenchman Dam, the first of the five authorized facilities, began with the award of a contract in August 1959 for $1,696,197. Construction is completed. Construction of Antelope Valley Dam began in August 1962 with the award of a contract for $2,909,774. As of the date of this report this work was 23 percent completed. Final formulation studies preliminary to the construction of Grizzly Valley Dam are in progress. Abbey Bridge and Dixie Refuge Dams will be built subsequently. All of these dams were authorized for recreational purposes and in addition Frenchman Dam has and Grizzly Valley Dam may have allocations for irrigation purposes.

58/ Calif. Stats. 1957, Ch. 2359, Water Code Sec. 11260.

59/ Department of Water Resources, Bulletin No. 59-2, "Investigation of Upper Feather River Basin Development," (October 1960.)

60/ $2,394,000 appropriated by Calif. Stats. 1959, Ch. 1300, Sec. 2, Item 387, p. 3548-3549.

Oroville Facilities

The Oroville facilities (now called the "Oroville Division") were first authorized by the Legislature[61] in 1951 as part of the Feather River Project. They were based on the State Water Resources Board report of 1951.[62] They include a multiple-purpose dam and reservoir on the Feather River near Oroville, a powerplant at the dam, and afterbay facilities. In 1955 the Division of Water Resources submitted a second report to the Legislature on the Feather River Project.[63] This report found that the Feather River Project, including the Oroville facilities, had engineering and financial feasibility and recommended that construction proceed. Funds were appropriated for construction in 1957 after the Bechtel Corporation made the independent report previously mentioned[22] to the Legislature concurring in the feasibility conclusion.

61/ Calif. Stats. 1951, Ch. 1441, Water Code Sec. 11260.

62/ State Water Resources Board, "Report on Feasibility of the Feather River Project and the Sacramento-San Joaquin Delta Diversion Projects Proposed as Features of The California Water Plan," (May 1951.)

63/ Division of Water Resources, "Program for Financing and Constructing the Feather River Project as the Initial Unit of The California Water Plan," (February 1955.)

The original application for a Federal Power Commission license to construct facilities at Oroville was dated January 31, 1952. This application was revised August 31, 1953, and further amended October 31, 1955. The Federal Power Commission issued an order to the Water Project Authority issuing license (major) on December 14, 1956, for project No. 2100 (Feather River Project, Oroville Division). This order covered the project for a concrete dam, 3,500,000 acre-foot reservoir and a power output of 440,000 kilowatts. On February 11, 1957, the Federal Power Commission rescinded this order and reissued the order to the Department of Water Resources. The department submitted an amendment to the Federal Power Commission dated October 30, 1959, which reflected changes to include an embankment type dam as opposed to the concrete type dam previously approved and added the Thermalito power features. This amendment included an increase in the power output of the project due to the addition of the Thermalito Powerplant and an increase in Oroville Powerplant. This amendment was not acted upon by the Federal Power Commission pending the submission of additional data by the department. By application dated March 1, 1962, transmitted to the Secretary of the Federal Power Commission on April 3, 1962, and filed with the Commission on April 17, 1962, the department submitted a new amendment which included the approximate final design features of the Oroville Division.

On July 11, 1962, by approving drawing exhibits L-1-b and L-11-b, the department's April 17, 1962, request for amendment was approved by the Commission. This approval extended to the earth-rock zone fill type dam now under construction, and the Thermalito Diversion Dam also under contract. The April 17, 1962, amendment listed 600,000 kilowatts dependable power at Oroville and 85,000 kilowatts dependable power at Thermalito.[64] It indicated the possible need to double this capacity in the future.

The Oroville Dam and Reservoir was reauthorized by specific reference in the Burns-Porter Act.[65]

A contract to provide for federal contribution of funds for the flood protection to be provided by Oroville Dam and Reservoir was approved by President John F. Kennedy on January 10, 1962, and signed on March 8, 1962, by the United States of America, acting through the Department of the Army, and the State of California, acting through its Department of Water Resources. The Secretary of the Army transmitted a report[66] to Congress on June 6, 1962, containing the complete record of the Federal Government's interest in and approval of the Oroville Project.

64/ Further studies have indicated the combined dependable capacity of the Oroville and Thermalito powerplants to be 698,000 kilowatts, which value is used in this report. See Chapter IX.

65/ Water Code Sec. 12934(d) (1).

66/ H. D. No. 434, 87th Cong. 2d Sess., (June 18, 1962.)

Authorization for the appropriation of a federal contribution toward the construction cost of this project was given in Section 204 of the Flood Control Act of 1958,[67] approved July 3, 1958.

The terms of the contract provide for a federal contribution equal to 22 percent of the actual construction cost of Oroville Dam and Reservoir, not to exceed $85,000,000 (estimated to be $66,000,000) less actual federal costs for engineering and administration, and less interest at 3½ percent per annum on the actual federal expenditures during the construction period.

The initial payment under this contract, $13,950,000, was received from the Corps of Engineers on November 27, 1962.

The construction contract for the Oroville Dam embankment was awarded to Oro Dam Constructors on July 30, 1962, in the amount of $120,863,333. As of the time of this report this work was 6 percent completed.

North Bay Aqueduct

The North Bay Aqueduct was originally authorized for investigation by the Abshire-Kelly Salinity Control Barrier Acts of 1953[68] and 1955.[69] Studies which resulted from the 1953 act

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67/ Title II, Public Law 85-500, 72 Stat. 297,315.

68/ Calif. Stats. 1953, Ch. 1104.

69/ Calif. Stats. 1955, Ch. 1434.

were published in a report to the Legislature.[70] One of the alternatives described in that report as the Calhoun Cut Diversion proposed the diversion of 419,000 acre-feet to the four north bay counties and was similar in alignment to the North Bay Aqueduct which is described in this report. The 1955 Act called for studies for "Purposes for Developing Complete Plans of the Means of Accomplishing Deliveries of Fresh Water to the San Francisco Bay Area" which included the counties of Solano, Napa, Sonoma and Marin. Results of this study were published in 1957 in Bulletin No. 60.[71]

Bulletin No. 60 recommended authorization of the North Bay Aqueduct for construction as a feature of The California Water Plan and the appropriation of funds for acquisition of lands, easements and rights-of-way and preparation of construction plans and specifications. The Legislature in 1957 authorized[72] the North Bay Aqueduct as a unit of The California Water Plan and appropriated $1,340,000 for further engineering

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70/ Water Project Authority, "Feasibility of Construction by the State of Barriers in the San Francisco Bay System," (March 1955.)

71/ Department of Water Resources, Bulletin No. 60, "Interim Report to the California State Legislature on the Salinity Control Barrier Investigation," (March 1957.)

72/ Calif. Stats. 1957, Ch. 2252, Water Code Sec. 11270-11271.

studies and the preparation of construction plans and specifications. The Budget Act of 1959[73] appropriated an additional $1,000,000 for the acquisition of the necessary rights-of-way.

As work proceeded with preparation of the plans and specifications, it became apparent that the water users in the four counties were not greatly interested in the project. This attitude was reflected in a hearing on the North Bay Aqueduct held on August 27, 1958 before a subcommittee of the Joint Committee on Water Problems.[74]

At a meeting held with local interests on April 28, 1960, attended by members of the Legislature, members of the County Boards of Supervisors, representatives of water agencies and agricultural interests, increase in interest was expressed. The department thereafter reanalyzed the proposed project in the light of more recent data, pricing information and repayment policy. The department released in December 1961, Bulletin No. 110[75] which summarizes the updated project and describes the possibilities for water service to the four counties concerned.

73/ Calif. Stats. 1959, Ch. 1300, Sec. 2, Item 383.5, p. 3547.

74/ Subcommittee on Economic and Financial Policies for State Water Projects, Joint Committee on Water Problems, Calif. Legislature.

75/ Department of Water Resources, Bulletin No. 110, "North Bay Aqueduct," (December 1961.)

On April 6, 1962, a hearing was held by the California Water Commission in Petaluma on the subject of the North Bay Aqueduct and was attended by representatives of agencies that could be served by the North Bay Aqueduct. On the basis of the testimony presented, the Commission concluded[76] that the North Bay Aqueduct should not be constructed at that time. The Commission also concluded that water supply contracts should be executed with local agencies prior to construction of the aqueduct. In March 1963, while interest on the part of agencies continues, no contracts for water supplies have been executed with the prospective water users. Consequently, no construction has been undertaken on the North Bay Aqueduct.

South Bay Aqueduct

The South Bay Aqueduct was authorized originally as part of the Feather River Project in 1951.[77] It was described in the State Water Resources Board report of that year[78] as a "Conduit to transport water from the Sacramento-San Joaquin Delta to Santa Clara and Alameda Counties."

76/ Letter from California Water Commission to Director of Water Resources, May 14, 1962.

77/ Calif. Stats. 1961, Ch. 1441, Water Code Sec. 11260.

78/ State Water Resources Board, "Report on Feasibility of the Feather River Project and the Sacramento-San Joaquin Delta Diversion Projects Proposed as Features of The California Water Plan," (May 1951.)

The South Bay Aqueduct also was included in the investigations authorized by the 1953[79] and 1955[80] Abshire-Kelly Salinity Control Barrier Acts. Studies which resulted from the 1953 act were published in a report of the Water Project Authority.[81] The Italian Slough Aqueduct route described in that report would have terminated at Penitencia Creek in Santa Clara County and diverted a total of 157,000 acre-feet for service in Livermore Valley and Santa Clara County.

Studies for the 1955 report on financing the Feather River Project[82] extended the aqueduct to include San Benito County as a service area, and the project was reauthorized on that basis.[83] Appropriation by the Legislature in 1956[84] of funds for engineering and exploration work, and acquisition of

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79/ Calif. Stats. 1953, Ch. 1104.

80/ Calif. Stats. 1955, Ch. 1434

81/ Water Project Authority, "Feasibility of Construction by the State of Barriers in the San Francsico Bay System," (March 1955.)

82/ Division of Water Resources, "Program for Financing and Constructing the Feather River Project as the Initial Unit of The California Water Plan," (February 1955.)

83/ Calif. Stats. 1957, (1956 Extra. Sess.) Ch. 54, p. 429.

84/ Calif. Stats. 1957, (1956 Sess.) Ch. 1, Sec. 2, Item 419.5, p. 98.

reservoir sites, included Contra Costa County in the description of the proposed project. The aqueduct was also described in Bulletin No. 60[85] which reported on the studies authorized by the 1955 Abshire-Kelly Act.

The Director of Water Resources by executive order,[86] dated October 14, 1958, established that the aqueduct would be known as the South Bay Aqueduct, would include a Del Valle Reservoir, and would also include a North Livermore Valley branch aqueduct and Doolan Canyon Reservoir. A similar order[87] by the Director on March 26, 1959, included the Pacheco Pass Tunnel as a feature of the Feather River Project and provided that the South Bay Aqueduct would terminate at Airpoint Reservoir.

The Bureau of Reclamation was authorized to investigate the Pacheco Pass Tunnel to Santa Clara, San Benito, Santa Cruz and Monterey counties in the act authorizing the San Luis Unit[88] of the federal Central Valley Project. This investigation is in progress and the department has made no further study of this route.

85/ Department of Water Resources, Bulletin No. 60, "Interim Report to the California State Legislature on the Salinity Control Barrier Investigation," (March 1957.)

86/ Order No. P-2 of the Director of Water Resources, October 14, 1958.

87/ Order No. P-3 of the Director of Water Resources, March 26, 1959.

88/ P.L. 86-488, 74 Stat. 156 (1960.)

The first construction appropriation for the South Bay Aqueduct was made by the Legislature in 1959[89/] in the amount of $7,320,000. The first contract for construction was awarded in November 1959.

As of March 1, 1963, three water supply contracts for delivery of water from the South Bay Aqueduct have been executed as follows: Santa Clara County Flood Control and Water Conservation District, 88,000 acre-feet; Alameda County Flood Control and Water Conservation District, Zone 7, 40,000 acre-feet; and Alameda County Water District, 42,000 acre-feet. (See page 160 Chapter X.) Delivery of water through the first completed portions of the aqueduct into Livermore Valley was commenced on May 10, 1962.

California Aqueduct

The California Aqueduct was originally authorized as one of the delta diversion projects in 1951.[90/] It was described as a "Conduit to transport water from the Sacramento-San Joaquin Delta to the San Joaquin Valley and to Southern California." The aqueduct to Southern California was contemplated as a high line route, similar to that now being constructed.

In the three years following 1951, the Legislature made available funds for engineering studies and designs in preparation for construction of the aqueduct. The Division of Water

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89/ Calif. Stats. 1959, Ch. 1300, Sec. 2, Item 384(c), p. 3548.

90/ Calif. Stats. 1951, Ch. 1441, Water Code Sec. 11260.

Resources completed another report on the project in 1955 and the project was reauthorized as modified by that report.[91] The plan for the aqueduct was similar to the present alignment. Most of the features of the California Aqueduct were included. A West Branch terminated at a proposed Castaic Reservoir. An East Branch would have conveyed flows through the Antelope-Mojave area and the San Bernardino Mountains and would have extended to San Diego County rather than terminating in Perris Reservoir as presently planned.

In the Budget Act of 1956,[92] the Legislature appropriated $200,000 for the aqueduct in the southern San Joaquin Valley and $200,000 for investigation of the routing from the Colorado River to San Diego County. In the following year an additional appropriation of $673,000 was made for continuation of aqueduct route investigations, part of which was expended on this aqueduct. Work on investigations of alternative inland aqueduct routes was actively pursued from 1957 through 1959. During this period more than 40 different inland aqueduct alignments south of Kettleman City were studied.

91/ Calif. Stats. 1957, (1956 Ex. Sess.) Ch. 54, p. 429, Water Code Sec. 11260.

92/ Calif. Stats. 1957 (1956 Sess.) Ch. 1, Sec. 2, Item 419.5, p. 98-99.

In December 1959 Bulletin No. 78[93/] was published proposing an aqueduct in close proximity of that under design. In the San Joaquin Valley, south of Kettleman City, the inland aqueduct included Buena Vista, Wheeler Ridge No. 1, Wheeler Ridge No. 2 and the Tehachapi Pumping Plants. The Tehachapi Mountains were pierced by a series of four tunnels and, south of the Tehachapi Mountains, the inland aqueduct bifurcated into two major branches - the West and East Branches, terminating at Balboa Reservoir in the San Fernando Valley and at Perris, respectively. Also included were Cottonwood Powerplant, Pearblossom Pumping Plant, Cedar Springs Reservoir, Devil Canyon power development and a West Branch power development.

Since 1959, further refinements of design have resulted in some changes. None of these changes has modified the overall plan. Changes that have been made and changes that likely will be made in the future result from engineering analyses, geologic exploration, water supply contractual commitments, and detailed consideration of operational requirements.

No appropriations were made for construction of the California Aqueduct prior to 1959. The first construction contract for $750,117 was awarded on January 14, 1963.

93/ Department of Water Resources, Bulletin No. 78, "Investigation of Alternative Aqueduct Systems to Serve Southern California," (December 1959.)

San Diego County, because of meager local water resources and rapidly increasing water requirements, has depended heavily upon importations of water from the Colorado River through the Colorado River and San Diego Aqueducts.

As mentioned above, the Legislature appropriated $200,000 in the Budget Act of 1956 for investigation of an additional aqueduct in San Diego County, because the first San Diego Aqueduct extending from the Colorado River Aqueduct to the San Vicente Reservoir was inadequate in the light of growing needs. The study was completed in 1957.[94/] The route of the additional aqueduct is westerly of the existing aqueduct to a terminus south of the City of San Diego. The second San Diego Aqueduct as proposed in the bulletin was designed so that water could be served from the East Branch through it to Riverside and San Diego Counties.

In advance of the construction of the California Aqueduct the Metropolitan Water District of Southern California and the San Diego County Water Authority constructed the second aqueduct substantially as recommended in Bulletin No. 61. Construction was completed in 1960.

94/ Department of Water Resources Bulletin No. 61, "Feather River Project Investigation of Alternative Aqueduct Routes to San Diego County," (March 1, 1957.)

As of March 1, 1963, seven water supply contracts for delivery of water from the California Aqueduct have been executed as follows: Metropolitan Water District of Southern California, 1,500,000 acre-feet; San Bernardino Valley Municipal Water District, 90,000 acre-feet; Antelope Valley-East Kern Water Agency, 120,000 acre-feet; Desert Water Agency, 33,000 acre-feet; San Gabriel Valley Municipal Water District, 25,000 acre-feet; San Gorgonio Pass Water Agency, 15,000 acre-feet; and Palmdale Irrigation District, 15,000 acre-feet. (See page 160.)

San Luis Unit

The San Luis features (now called the "San Luis Unit", a part of the California Aqueduct) were first included in the Feather River Project as a result of studies leading to the 1955 report[95] to the Legislature. It was proposed that an offstream reservoir with a capacity of 2,100,000 acre-feet be constructed near Los Banos to conserve runoff when available in the Delta. This reservoir was necessary to develop the project yield. The Burns-Porter Act included the San Luis features as facilities of the State Water Project.[96]

The Bureau of Reclamation also had the San Luis Reservoir under investigation as off-stream storage for water from the Delta for use on lands in western Merced, Fresno and Kings

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95/ Division of Water Resources, "Program for Financing and Constructing the Feather River Project as the Initial Unit of The California Water Plan," (February 1955.)

96/ Water Code Sec. 12934(d) (2).

counties. This water was proposed to be conveyed to the reservoir through the Delta-Mendota Canal when excess capacity in that canal was available. A 1955 report[97] of the Bureau of Reclamation proposed a 1,000,000 acre-foot reservoir at the San Luis site so designed that the dam could be enlarged to 2,000,000 acre-feet.

Comments on the federal report by the State[98] concluded that the San Luis Reservoir was an essential feature of the Feather River Project and recommended that the San Luis Unit proposed by the Bureau should be integrated with the Feather River Project and should be authorized by the Congress for immediate construction by the Bureau, and for operation by the State of California.

The San Luis Act[99] authorized the Secretary of the Interior to construct the San Luis Unit of the Central Valley Project, and to enter into an agreement with the State of California with respect to its construction and operation. The San Luis Unit, in addition to the San Luis Reservoir, included the 106-mile San Luis Canal with 7,000 second-feet of capacity for the California Aqueduct at its terminus near Kettleman City.

97/ Department of the Interior, Bureau of Reclamation, "San Luis Unit-Central Valley Project, California," (December 17, 1956.)

98/ Letter, Director, Department of Water Resources to Bureau of Reclamation, March 9, 1956.

99/ Act of June 3, 1960, Pub. L. 86-488, 74 Stat. 156.

In accordance with provisions of the San Luis Act, an agreement[100/] was signed between the State and the United States on December 30, 1961, for the construction and operation of the joint-use facilities of the San Luis Unit.

The first construction contract was awarded by the Bureau of Reclamation on August 7, 1962, for highway relocation work at the San Luis damsite. On August 18, 1962, President John F. Kennedy participated in the ground-breaking ceremonies.

Coastal Aqueduct

In the studies of methods of transporting water to Southern California, various aqueduct routings were investigated including some that might follow the coast, as well as inland routes.

Additional studies of the Coastal Aqueduct (now called "Coastal Division") were authorized by the Legislature in the Budget Act of 1956, when $500,000 were appropriated to study alternative coastal aqueduct routes. With these funds, and additional moneys appropriated in 1957, numerous route alignments were studied including some west of the coastal range, some traversing the Carrizo Plain, and some penetrating the mountain ranges with long tunnels. In all, more than 54 alternative

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100/ "Agreement between the United States of America and the Department of Water Resources of the State of California for the construction and operation of the joint-use facilities of the San Luis Unit." (December 30, 1961.) The contract was reviewed and held valid in Metropolitan Water District v. Marquardt, 59 A.C. 171,378 P. 2d 1004, 28 Cal. Rep. 724 (1963.)

aqueduct routes were investigated, of which 27 were selected for further study. These studies are reported in Bulletin No. 78.[101/] The terminus of the Coastal Division will be the Santa Maria River, near the San Luis Obispo-Santa Barbara County line, about 131 miles from the head of the aqueduct near Avenal.

Water supply contracts have been signed with San Luis Obispo County Flood Control and Water Conservation District and the Santa Barbara County Flood Control and Water Conservation District for construction of the Coastal Aqueduct in the year 1975. The quantities of water are 25,000 acre-feet, and 60,000 acre-feet, respectively. (See page 160.)

Delta Facilities

Numerous plans have been proposed during the past 100 years for conserving fresh water and controlling sea water intrusion into the channels of the Sacramento and San Joaquin River Delta. More recent proposals since World War II have included additional purposes of transportation of water across the Delta, flood protection, recreation, fish and wildlife enhancement and other functions. Most of the early studies and surveys involved some type of barrier that would separate the fresh water in the Delta from the saline water in the San Francisco Bay.

101/ Department of Water Resources, Bulletin No. 78, "Investigation of Alternative Aqueduct Systems to Serve Southern California," (December 1959.)

As a result of the 1953 Abshire-Kelly Salinity Control Barrier Act,[102] seven alternative plans for barriers in the San Francisco Bay and Delta were investigated by the Division of Water Resources for the Water Project Authority and reported to the Legislature in 1955.[103] This report also contained a report of a board of consultants[104] retained by the Water Project Authority. The board's report included a plan based upon concepts proposed by Mr. Cornelius Biemond[105] who had also been retained by the Water Project Authority. The board of consultants concluded that barriers in the San Francisco Bay System would not be functionally feasible due to the uncertainty of the quality of water in a barrier pool. The report of the board of consultants recommended further study be given to a system of works in the Delta in accordance with the plan recommended by Mr. Biemond which was similar in concept to the Junction Point Barrier Plan recommended by the Division of Water Resources. The Division of Water Resources also recommended further study of the Chipps Island Barrier Plan.

102/ Calif. Stats. 1953, Ch. 1104.

103/ Water Project Authority "Feasibility of Construction by the State of Barriers in the San Francisco Bay System," (March 1955.)

104/ Board of Consultants for Alternative Barrier Plans: Members were Raymond A. Hill, Chairman, Phillip C. Rutledge, Charles E. Deleuw, Hans Kramer, and Malcolm Pirnie.

105/ Cornelius Biemond, Consulting Engineer, Amsterdam, The Netherlands.

The 1955 Abshire-Kelly Salinity Control Barrier Act[106] authorized additional study of these two plans and investigations to develop plans for water supply in the San Francisco Bay area, and to provide salinity control and flood protection in the Delta.

In March 1957, the department issued Bulletin No. 60[107] which included a comparison of the two barrier plans. This report recommended additional investigation be made of a system of fresh water channels, levees and control structures in preference to plans for barriers only. This recommended system was a modification of the Junction Point Barrier Plan and was referred to as the Biemond Plan.

By adoption of the Abshire-Kelly Salinity Control Barrier Act of 1957[108] the Legislature concurred in the department's recommendation to limit further study of salinity control barriers to the Biemond Plan as described in Bulletin No. 60. A board of consultants[109] employed by the department reviewed the conclusion of that bulletin and found the Biemond Plan to be a feasible and essential feature of a coordinated water plan.

106/ Calif. Stats. 1955, Ch. 1434.

107/ Department of Water Resources, Bulletin No. 60, "Interim Report to the California State Legislature on the Salinity Control Barrier Investigation," (March 1957.)

108/ Calif. Stats. 1957, Ch. 2092.

109/ Board of Consultants to Review Bulletin No. 60. Members were Hans Kramer, Chairman (succeeded by Samuel B. Morris), Ray K. Linsley, and O. J. Porter.

Several laws[110] were enacted in 1959 which were of importance to the Delta Water Facilities. The department was directed to undertake studies to determine water requirements of lands in the Delta and to develop plans for supplying these needs. The legislation adopted a general policy regarding the Delta and described the boundaries to which this policy applies. The Burns-Porter Act included the Delta Water Facilities as a part of the State Water Facilities.

The department issued a preliminary edition of Bulletin No. 76[111] which reported on four possible plans for the protection of fresh water in the Delta. These plans also include such other project functions as flood control, vehicular transportation, navigation, recreation, and fish and wildlife enhancement. Hearings on this bulletin have been held by the California Water Commission and are continuing.

The Bureau of Reclamation and the Corps of Engineers are studying the Delta area. The department is coordinating its activities in the Delta with those of the federal agencies through an interagency task committee.

110/ Calif. Stats. 1959, Chs. 1765, 1766, and 2038.

111/ Department of Water Resources, Preliminary Edition, Bulletin No. 76, "Delta Water Facilities," (December 1960.)

San Joaquin Drainage Facilities

The expansion of irrigated area in the San Joaquin Valley since World War II has resulted in the occurrence of poor quality drainage water in various portions of the valley. Planning of projects to import additional quantities of water to the San Joaquin Valley has required provision for adequate outflow of drainage water from the area. The importance of protecting the quality of the water supply of the valley under conditions of future development was recognized in Bulletin No. 3[112/] which described facilities for the conveyance of waste waters from the valley to tidewater in the Delta.

In 1956 the Joint Committee on Water Problems held hearings concerning the problems resulting from inadequate drainage in the San Joaquin Valley and in March 1957 reported[113/] on these problems. Following the report of the committee, the 1957 Budget Act[114/] appropriated funds to initiate a comprehensive investigation of drainage problems and plans for their solution.

112/ Department of Water Resources, Bulletin No. 3, "The California Water Plan," (May 1957.)

113/ Tenth Partial Report of the Joint Committee on Water Problems California Legislature, "Drainage Problems of the San Joaquin Valley of California," (March 1957.)

114/ Calif. Stats. 1957, Ch. 600, Sec. 2, Item 263(b), p. 1745.

The Burns-Porter Act included drainage facilities as a part of the State Water Project. Studies have been continuing to determine areas that will require drainage and methods of disposing of poor quality drainage water.

Local Projects

The need for a program of state financial assistance for construction of local water projects was recognized by the Legislature in 1957 when it adopted the Grunsky Act.[115/] This act established a policy providing state loans and grants to public agencies but no financing was provided. Agencies could obtain financial assistance for each project only through a special appropriation by the Legislature. By 1959, only one such appropriation had been made.

In 1959, the Legislature passed the Davis-Grunsky Act[116/] which amended and clarified the 1957 act and established a Local Projects Assistance Fund of $15,000,000 for loans and grants under the program. The Burns-Porter Act of 1959 provided that projects authorized under the Davis-Grunsky Act would be a part of the State Water Facilities and funds in the amount of $130,000,000 were authorized for that purpose. The Local Projects Assistant Fund reverted to the California Water Fund upon ratification of the Burns-Porter Act in accordance with provisions in the Davis-Grunsky Act.

115/ Calif. Stats. 1957 Ch. 2052.

116/ Calif. Stats. 1959 Ch. 1752.

A number of applications were received between 1959 and 1961 for assistance under the act. Review of these applications by the department indicated revisions to the Davis-Grunsky Act would be desirable. In 1961, the Legislature amended[117/] the Davis-Grunsky Act. These amendments authorize loans for preparation of engineering feasibility studies on proposed projects, and grant to all public agencies the necessary legal powers to contract with the State and to construct and operate the types of projects eligible for assistance under the Davis-Grunsky Act.

As of March 1, 1963, sixty-six preliminary applications and twenty formal applications have been submitted by local agencies throughout the State. Formal applications are for over $21,000,000 in state funds including $18,000,000 in grants, and $3,000,000 in loans. Grants in the amount of $6,000,000, and $3,000,000 in loans have been approved. Over $800,000 have been disbursed under contracts for the approved projects.

The projects that have been approved as of March 1, 1963 are listed beginning on page 83.

Additional Facilities

Planning for the State Water Project recognized that with continued development in the area tributary to the Sacramento-San Joaquin Delta, the yield of the project would be gradually

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117/ Calif. Stats. 1961 Ch. 1723.

diminished. Bulletin No. 3,[118/] presented plans for the development of streams on the north coast of California to meet the needs of that area and to provide additional water to augment supplies in the Delta. The Burns-Porter Act made provision for facilities to augment water supplies in the Delta by including "additional facilities" in the State Water Resources Development System. Studies of additional facilities have continued since passage of the act. A progress report[119/] presented tentative plans for future development and sequence of construction on the north coastal streams. In this report a development on the Middle Fork of the Eel River has been assumed to be the additional project conservation facility. This project is decribed beginning on page 80.

118/ Department of Water Resources, Bulletin No. 3, "The California Water Plan," (May 1957.)

119/ Department of Water Resources, "Progress Report on North Coastal Area Investigation," (May 1961.)

CHAPTER III. DESCRIPTION OF WORKS

This chapter describes briefly the individual features of the State Water Project as presently planned for construction. A number of features are subject to change as planning and design studies are completed and as additional water service contracts are negotiated. The project features described in this chapter are the basis for the cost estimates presented in Chapter XI. A general location map is shown on Plate I.

Feather River Facilities

The Feather River Facilities consist of the Upper Feather Division and the Oroville Division.

Upper Feather Division

The features included in this division are the Frenchman, Grizzly Valley, Antelope Valley, Dixie Refuge, and Abbey Bridge Reservoirs. All are located in Plumas County, as shown on Plate I.

Frenchman Dam is an earthfill structure, 128 feet high, with an ungated, concrete-lined spillway, located on Little Last Chance Creek about 30 miles northeast of Portola. The reservoir, with a capacity of 51,000 acre-feet, regulates the water of Little Last Chance Creek for downstream irrigation use, and forms the basis for enhancement of an outdoor recreation area. Surface area of the reservoir is 1,500 acres, and the shoreline is 21 miles. Construction of the dam is complete, and storage of water began in the fall of 1961.

Antelope Valley Dam, now under construction, will be an earthfill structure 105 feet high. The reservoir will store 21,600 acre-feet of water to be used entirely for recreation and for fish and wildlife purposes. The reservoir will have a surface area of 890 acres and a shoreline of 15 miles. The damsite is located on Indian Creek about 25 miles northeast of Crescent Mills. The dam is scheduled for completion in the fall of 1963.

Grizzly Valley Dam will impound a reservoir with a storage capacity of about 80,000 acre-feet to be used entirely for recreation and for fish and wildlife purposes. The reservoir will have a surface area of about 4,000 acres and a shoreline of 35 miles. The damsite is located on Big Grizzly Creek about 10 miles north of Portola.

Dixie Refuge Dam will impound a reservoir with a storage capacity of about 16,000 acre-feet to be used for recreation and for fish and wildlife purposes. The reservoir will have a surface area of about 800 acres, and a shoreline of 10 miles. The damsite is located on Last Chance Creek about 30 miles east of Crescent Mills.

Abbey Bridge Dam will impound a reservoir with a storage capacity of about 11,000 acre-feet for recreation and for fish and wildlife purposes. The reservoir will have a surface area of about 540 acres, and a shoreline of 11 miles. The damsite is located on Red Clover Creek about 24 miles east of Crescent Mills.

Oroville Division

The Oroville Division includes the following major units: Oroville Dam and Reservoir, Oroville Powerplant, Thermalito Diversion Dam, Thermalito Powercanal, Thermalito Forebay, Thermalito Powerplant, Thermalito Afterbay, and the Feather River Hatchery. Features of the Oroville Division are shown on Plate II.

Oroville Dam will be located immediately upstream from the U. S. Highway 40 crossing of the Feather River, about 4 miles northeast of the City of Oroville. The dam will be an embankment structure with impervious rolled fill core and graded gravel shell, approximately 735 feet in height with a crest length, including the spillway, of 6,800 feet. The reservoir will have a surface area of 15,500 acres, a shoreline of 167 miles, and a storage capacity of 3,484,000 acre-feet at normal pool elevation of 900 feet. A gated spillway will be located in a saddle on the right abutment. The spillway, incorporating the flood control outlet structure, will consist of 380 feet of overpour spillway controlled by radial gates, and five low-level flood control outlets 27 feet wide by 34 feet high.

Two auxiliary earthfill dams will be located at low points on the rim of the reservoir. The Bidwell Canyon Dam, on the south rim of the reservoir will have a crest length of 1,500 feet and a maximum height of 35 feet above natural ground.

Parish Camp Dam, located on the northwest rim of the reservoir, will have a crest length of 200 feet and a maximum height of 15 feet above natural ground.

Construction of the river diversion tunnels and the Interim Fish Hatchery Facilities is well underway, and placement of the fill for the main dam embankment is scheduled to start early in 1963.

Oroville Powerplant will be an underground plant located in the left abutment of the dam. Two circular penstock tunnels, leading from intakes on the left abutment of the dam at an elevation of approximately 605 feet, immediately adjacent to the upstream toe, will convey water to the powerplant. After passing through the turbines, the water will be conveyed through two tailrace tunnels discharging into the present river channel at the downstream toe of the dam.

Oroville Powerplant will be designed for pumped storage operation, as described in Chapter VIII. Space will be provided in the powerplant for installation of 6 units with a total net generating capacity of 600,000 kilowatts.

The Thermalito Diversion Dam, located immediately northeast of Oroville, will maintain tail water at the Oroville Powerplant and will divert water to the Thermalito Canal serving the Thermalito Powerplant. The diversion dam will be a concrete gravity structure 133 feet high and 1,280 feet long. The dam will have a gated spillway controlled by fourteen 40 x 23-foot radial gates located in the central part of the

dam. The outlet works will provide for a downstream release of 400 second-feet for preservation of fishlife in the Feather River. The reservoir will have a surface area of 330 acres, a storage capacity of 13,500 acre-feet, and a shoreline of 10 miles.

The Thermalito Canal will convey water from Thermalito Diversion Dam to Thermalito Forebay and will have a capacity sufficient to handle the discharge of Oroville Powerplant. The canal will be concrete-lined and will be designed to permit flow in either direction to allow the return of water stored in Thermalito Afterbay to Oroville Powerplant during the pumped storage cycle.

The Thermalito Forebay will have a gross capacity of 11,400 acre-feet impounded by an earthfill dam 65 feet high. The forebay dam will provide head for the Thermalito Powerplant and the forebay will function essentially as an extension of the Thermalito Canal. Surface area of the forebay will be about 775 acres, and the shoreline will be about 9 miles long.

The Thermalito Powerplant will contain one turbine unit and two reversible pump turbines, with a total generating capacity of 98,000 kilowatts. This plant will operate on essentially the same schedule as the Oroville Powerplant and will pass the same flows. An unlined tailrace channel will connect the powerplant with the Thermalito Afterbay.

The Thermalito Afterbay will be impounded by an earthfill dam 30 feet high and about six miles long. It will

have an ultimate storage capacity of 57,500 acre-feet, and an active storage capacity of 35,000 acre-feet initially and 45,000 acre-feet ultimately. The water surface area will be about 4,500 acres, and the shoreline will be about 28 miles long. Outlet structures will serve the existing Western Canal and the Sutter-Butte Canal. Discharge to the original channel of the Feather River will be regulated at the river return outlet.

The Feather River Hatchery will be located on the right bank of the river a short distance below the Thermalito Diversion Dam. Fish will be diverted to the hatchery by means of a concrete dam and a fish ladder. The primary purpose of the hatchery will be to maintain the existing salmon and steelhead runs by serving as a substitute for the spawning areas disturbed by project construction. The hatchery will have a capacity for about 20,000,000 eggs. The interim facilities are under construction with completion scheduled in the fall of 1963.

Twenty-seven miles of railroad line have been relocated from the Feather River Canyon. The new alignment is 22.94 miles in length and includes 5 tunnels and 3 major bridges. The new roadbed has a maximum grade of one percent, with four degrees and 30 minutes maximum curvature. There will be four sidings with a total of 4.6 miles of passing track and three work tracks totaling 0.8 mile in length. All tunnels have a height of approximately 24 feet and a width of 18 feet.

The relocation of U. S. Highway 40A from the Feather River Canyon involved construction of about 20 miles of new highway. The section from Oroville to Wicks Corner includes 6.8 miles of highway and a bridge over the Feather River at Oroville. The 13.3 mile section from Wicks Corner to Jarbo Gap includes the West Branch Feather River Bridge, which is a double deck bridge for use by the railroad and for U. S. Highway 40A. This bridge is 2,732 feet long with a maximum height above the streambed of 480 feet and a maximum span of 576 feet. This construction is completed.

North Bay Aqueduct

The North Bay Aqueduct will include those features necessary to convey water about 60 miles from Lindsey Slough in Solano County to the vicinity of Novato in Marin County. The aqueduct is divided into the Calhoun, Cordelia, Sonoma, and Novato Divisions. Locations of the features are shown on Plate III.

The Calhoun Division will include those units required for conveyance of water from Lindsey Slough to Cordelia Pumping Plant. Principal features will include about 24 miles of canal and the Calhoun Pumping Plant. An improved, unlined Calhoun Cut will convey water about 3.2 miles from Lindsey Slough to Calhoun Pumping Plant. The pumping plant will lift water from elevation zero to elevation 20 feet, and will have a capacity of about 380 second-feet. The aqueduct from Calhoun Pumping Plant will

consist of an unlined canal with a siphon crossing at Denverton Creek and will extend to the Cordelia Pumping Plant.

The Cordelia Division will include those facilities required to convey water through Jamison Canyon as far west as Huichica Creek at the Napa-Sonoma County line. Principal features include Cordelia Pumping Plant and about 16 miles of canal, siphons, and pipelines. Cordelia Pumping Plant will lift water to elevation about 300 feet at the head of Jamison Canyon. The plant will have a total capacity of 290 second-feet. Water will be conveyed through Jamison Canyon in pipeline and concrete-lined canal to the Napa River which will be crossed with a siphon.

The Sonoma Division will include those facilities necessary to convey water from the Napa-Sonoma County line to the vicinity of the Sonoma-Marin County line. Principal features are about 18 miles of canal and siphons with capacities of 160 second-feet, decreasing to 110 second-feet.

The Novato Division will include the siphon and pipeline necessary to convey water the remaining distance of about 4 miles to the terminus of the aqueduct near Novato in Marin County.

South Bay Aqueduct

The South Bay Aqueduct will include those facilities necessary to divert water from the California Aqueduct at Bethany Forebay and convey it through Livermore Valley and on to Airpoint Reservoir near Milpitas in Santa Clara County. The overall length of the aqueduct will be 39 miles. The aqueduct is divided into the Livermore, Doolan, Alameda, Del Valle, Niles, and Santa Clara Divisions. Of these, Doolan Division is considered only as a possible future addition to the aqueduct, and no water deliveries or costs for the Doolan Division are included in this report. The features of the South Bay Aqueduct are shown on Plate III.

Livermore Division

This division comprises those facilities necessary to convey water from the California Aqueduct to Patterson Reservoir located at the eastern end of Livermore Valley. Principal features include the Interim Intake Canal and Pumping Plant, South Bay Pumping Plant, Brushy Creek Pipeline, Dyer Canal, Altamont Pipeline, Livermore Valley Canal, and Patterson Reservoir. Bethany Forebay, a feature of the California Aqueduce, also serves as a forebay for the South Bay Pumping Plant. Prior to construction of the California Aqueduct, the South Bay Aqueduct is being supplied with water from the Delta-Mendota Canal of the Bureau of Reclamation.

Bethany Forebay to Doolan-Livermore Junction. Water is presently being supplied to Bethany Forebay by the Interim Intake Canal and the Interim Pumping Plant. The Interim Intake Canal is a temporary, unlined canal two miles long with a capacity of 150 second-feet which conveys water from the Delta-Mendota Canal to the Interim Pumping Plant. The latter is an outdoor, temporary plant which will have five pump units with a total capacity of 150 second-feet to lift water from the Interim Canal into Bethany Forebay, a 900 acre-foot reservoir. At the present time two 25 second-foot pumping units have been installed in the Interim Pumping Plant and are in operation.

Water supplied to Bethany Forebay by either the Interim Pumping Plant or by the California Aqueduct will be lifted by the South Bay Pumping Plant about 600 feet to a surge tank at the head of Brushy Creek Pipeline by the South Bay Pumping Plant. Ultimately, the pumping plant will include four pumping units with capacities of 30 second-feet each and three units with capacities of 60 second-feet each. The pumping plant, including two pumping units with a total capacity of 45 second-feet, has been constructed and is in operation.

The aqueduct from the surge tank to Doolan-Livermore Junction will consist of Brushy Creek Pipeline, a double barrel concrete pipeline 2.5 miles long with a capacity of 300 second-feet, and Dyer Canal, a concrete-lined canal 2 miles long with

the same capacity. The first stage pipeline with a capacity of 120 second-feet and the canal are constructed and in operation. Water deliveries are being made from this reach to the Alameda County Water District and to the Alameda County Flood Control and Water Conservation District.

Doolan-Livermore Junction through Patterson Reservoir. This reach consists of about 0.3 mile of concrete pipeline and tunnel; Livermore Valley Canal, a concrete-lined canal 2 miles long; and Patterson Reservoir, a small regulatory reservoir with a capacity of 100 acre-feet. The capacity of the conveyance features is 300 second-feet. All units have been constructed and are in operation. Water deliveries are being made from this reach to the Alameda County Flood Control and Water Conservation District.

Alameda Division

This division includes the conveyance facilities from Patterson Reservoir to the junction with the Del Valle Branch Pipeline, which will connect the aqueduct with Del Valle Reservoir. This division will include seven miles of concrete-lined canal and 2.3 miles of pipeline, both with a capacity of 300 second-feet. The canal is under construction and is scheduled for completion by mid-1963.

Del Valle Division

This division will include Del Valle Branch Pipeline, Del Valle Pumping Plant, and Del Valle Dam and Reservoir.

Del Valle Branch through Del Valle Reservoir. Del Valle Branch Pipeline will convey water a distance of about 2 miles from the South Bay Aqueduct to Del Valle Reservoir for regulatory storage. Releases from the reservoir to meet delivery demands will also be made through the pipeline. Del Valle Pumping Plant will be required at certain reservoir stages to pump aqueduct-supplied water into storage and to make releases from storage. Both the pumping plant and the pipeline will have a capacity of 120 second-feet.

Del Valle Dam will be an earthfill structure 200 feet high with a crest length of 900 feet. Del Valle Reservoir will provide 35,000 acre-feet of flood control storage and 29,000 acre-feet of regulatory storage. Total storage will be 74,000 acre-feet at normal pool elevation of 742 feet. At this elevation the reservoir will have a water surface area of 750 acres and a shoreline length of 16 miles. A portion of the costs of the dam and reservoir will be financed by the federal government in the interest of flood control.

Niles Division

The Niles Division will extend westerly from the Del Valle Branch Pipeline to the Alameda Bayside Turnout, a distance of about 10-1/2 miles. The division includes Del Valle Siphon and Pipeline, La Costa Tunnel, Sunol Pipeline, Mission Tunnel, and Mission Pipeline.

Del Valle Branch to South Livermore Turnout. This reach will consist of a 0.6 mile long section of Del Valle Siphon and Pipeline, a reinforced concrete pipeline with a capacity of 363 second-feet.

South Livermore Turnout to Vallecitos Turnout. This reach will include a 0.7 mile long section of Del Valle Siphon and Pipeline; La Costa Tunnel, a concrete-lined structure one mile long; and a 1.7 mile section of Sunol Pipeline. The capacity of the reach will be 305 second-feet.

Vallecitos Turnout to Alameda-Bayside Turnout. This reach will include a 5.3 mile long section of Sunol Pipeline; Mission Tunnel, a concrete-lined tunnel about 0.6 mile long; and Mission Pipeline, a concrete pipeline 0.5 mile long. Capacity of the reach will be 255 second-feet.

Santa Clara Division

This division includes Santa Clara Pipeline and the South Bay Aqueduct terminal facilities.

Alameda-Bayside Turnout through terminal facilities. Santa Clara Pipeline will be a concrete pipeline with a capacity of 186 second-feet extending from Alameda-Bayside Turnout about 8.8 miles to Calaveras Road Turnout. Terminal facilities of the South Bay Aqueduct are under study in cooperation with the Santa Clara County Flood Control and Water Conservation District.

Cost estimates presented in Chapter XI are based on a terminal reservoir at the Airpoint site with a capacity of 3,500 acre-feet.

Delta Facilities

Advance planning for the Delta Facilities is currently underway, with formulation of a definite plan expected by 1965.

The Typical Alternative Delta Water Project, described in Bulletin 76[1/], one of several alternative plans under study, is used in this report for cost estimating purposes.

Under this plan, the Delta Facilities would be a multipurpose project to: accomplish the transfer of water across the Delta to the Delta Pumping Plant at the head of the California Aqueduct; salvage water which would otherwise be required for the repulsion of ocean salinity; protect the Sacramento-San Joaquin Delta from the damage resulting from salinity intrusion, flooding, and seepage; provide transportation, recreation, and navigation benefits; and insure adequate supplies of fresh water for use within the Delta itself.

The following physical works are included in the plan:

1. Control structure, barge lock and fishway on the Sacramento River at Ryde;
2. Control structure on Steamboat Slough at its confluence with Sutter Slough;
3. Enlargement of intake works on Cross-Delta Canal at Walnut Grove;

1/ Department of Water Resources, Preliminary Edition, Bulletin No. 76, "Delta Water Facilities," (December 1960).

4. Control structure on Holland Cut near Franks Tract;
5. Control structure at head of Paradise Cut at the San Joaquin River;
6. Master levees along about 71 miles of project channels;
7. Channel improvements and enclosures on interior channels;
8. Irrigation and drainage water facilities;
9. About 157 miles of relocated and improved roads;
10. Small craft locks and small boat transfer facilities;
11. Public recreation areas and developments; and
12. A diversion of Bear Creek into the Calaveras River.

California Aqueduct

The California Aqueduct extends 444 miles from the Delta to Perris Reservoir in Southern California. The California Aqueduct, with its several components having a total length of 562 miles, is divided into eight divisions; the North San Joaquin, San Luis, South San Joaquin, Tehachapi, Antelope, West Branch, East Branch, and Coastal Divisions. Each division is further subdivided by reaches. Locations of the features are shown on Sheets 1 through 6 of Plate IV.

North San Joaquin Division

The North San Joaquin Division includes those units required for the conveyance of water from Italian Slough in the Sacramento-San Joaquin Delta to San Luis Forebay. Principal

features of the division include about 66 miles of intake channel and lined canal, the Delta Pumping Plant, and the Bethany Forebay.

An unlined intake channel about 3 miles long will convey water from Italian Slough to the Delta Pumping Plant, where it will be lifted from sea level to an elevation of about 244 feet. From the pump discharge lines, a concrete-lined canal with a capacity of 10,300 second-feet will convey water 1.5 miles to Bethany Forebay.

Bethany Forebay was designed to serve initially as the forebay for the South Bay Pumping Plant of the South Bay Aqueduct and is now serving that purpose. The reservoir will be enlarged when required to serve the additional function of aqueduct in lieu of canal through the reservoir area. Under this condition, the maximum operating water surface elevation of the reservoir will be about 243 feet. At this elevation the reservoir will have a capacity of about 4,100 acre-feet, a water surface area of about 130 acres, and a shoreline length of about 4 miles. The aqueduct from Bethany Forebay to San Luis Forebay will be a concrete-lined canal having a capacity of 10,000 second-feet and a length of approximately 62 miles.

San Luis Division

The San Luis Division includes the state-federal joint-use facilities located between San Luis Forebay and Kettleman City. Included are the San Luis Forebay, San Luis

Pumping-Generating Plant, San Luis Dam and Reservoir, Mile 18 Pumping Plant, and 106 miles of aqueduct from the Forebay to Kettleman City. The San Luis joint-use facilities are being designed and constructed by the Bureau of Reclamation. San Luis Dam will be an earthfill structure 320 feet high, with a crest length of 18,300 feet. The reservoir will have a gross storage capacity of 2,100,000 acre-feet under normal operating conditions, with a corresponding maximum water surface elevation of 544 feet. At this elevation the reservoir will have a surface area of 13,300 acres and a shoreline length of about 41 miles. The minimum operating level will be at elevation 326 feet. The inactive storage capacity at this elevation will be 80,000 acre-feet and the reservoir surface area will be 1,100 acres.

The eight units of the San Luis Pumping-Generating Plant will have a total pumping capability of about 11,000 second-feet to lift water from San Luis Forebay through a maximum design head of about 290 feet into San Luis Reservoir. When water stored in the reservoir is required to meet delivery demands, it will be released through the plant to generate electric power. Under maximum head and flow conditions, the plant will have a generating capability of 380,000 kilowatts.

San Luis Forebay and the first reach of the San Luis Canal will have a combined active storage of 20,000 acre-feet and, together, will serve as the forebay for Mile 18 Pumping Plant. Under normal operating conditions, the water surface

will fluctuate between elevation 217 and 225 feet. At water surface elevation 225 feet, San Luis Forebay will have a gross storage capacity of 42,000 acre-feet, a water surface area of 1,790 acres, and a shoreline length of 9 miles. The aqueduct to Mile 18 Pumping Plant will be a concrete-lined canal approximately 17.3 miles long, with a capacity of 13,100 second-feet.

Mile 18 Pumping Plant will raise the water about 120 feet to elevation 338 feet. The canal from this point to Panoche Creek will be concrete-lined, 23.7 miles in length and with a capacity of 13,100 second-feet. From Panoche Creek to Kettleman City there will be 65 miles of concrete-lined canal with a capacity decreasing from 11,800 second-feet to 8,350 second-feet.

South San Joaquin Division

The South San Joaquin Division includes those units required for the conveyance of water from Kettleman City to the Tehachapi Pumping Plant. In addition to about 120 miles of concrete-lined canal, this reach includes Buena Vista Pumping Plant, Wheeler Ridge Pumping Plant I, and Wheeler Ridge Pumping Plant II. From Kettleman City to Buena Vista Pumping Plant there will be about 79 miles of concrete-lined canal with a capacity decreasing from about 6,800 second-feet to 3,800 second-feet. There are areas of shallow subsidence in this reach which will require preconsolidation.

The pumping lift at the Buena Vista Pumping Plant will be about 220 feet. The plant will have a capacity of about 3,500 second-feet. The canal from the pumping plant will follow a route near the 500 foot elevation contour from Buena Vista Hills to the base of Wheeler Ridge, passing through areas of deep subsidence, mud flows, and shallow subsidence. The latter will require preconsolidation by ponding before construction of the permanent facilities.

The pumping lift at the Wheeler Ridge Pumping Plant I will be about 280 feet. The plant will have a capacity of about 2,800 second-feet. The canal from the pumping plant will follow the 780 foot elevation contour along the base of Wheeler Ridge to a gap at the eastern end of the ridge. This reach will be entirely in an area of shallow subsidence, which will require preconsolidation by ponding prior to construction of the permanent facilities. The pumping lift at the Wheeler Ridge Pumping Plant II will be about 468 feet. The plant will have a capacity of about 2,800 second-feet. The canal from the plant will follow a route near the 1,240 foot elevation contour from Wheeler Ridge to the Tehachapi Mountains east of Pastoria Creek. Shallow subsidence from Wheeler Ridge to U. S. Highway 99 in this reach will necessitate preconsolidation by ponding prior to construction of permanent facilities.

Tehachapi Division

This division consists of a single reach 11 miles long, including the Tehachapi Pumping Plant and the aqueduct crossing of the Tehachapi Mountains to the surge tank located at the south portal of the Tehachapi Tunnels.

The Tehachapi Pumping Plant will be located at the north base of the Tehachapi Mountains at the mouth of Pastoria Creek. The pumps will lift the water to an elevation of 3,165 feet. The pumping units will have a total capacity of 2,742 second-feet.

The aqueduct crossing the Tehachapi Mountains will consist of about 0.2 miles of concrete-lined approach channel, four concrete-lined tunnels of horseshoe section aggregating 5.8 miles in length, and four siphons with a total length of 3.4 miles. The capacity of the aqueduct will be 2,742 second-feet.

Antelope Division

This division includes those portions of the aqueduct system from the south portal of the Tehachapi Tunnels to the junction of the East and West Branches near Fairmont Reservoir. Principal features included are Cottonwood Powerplant and about 19 miles of canal. Overall length of this division is about 22 miles.

The Cottonwood Powerplant will have a static head of about 210 feet. When operating at the design discharge of about 2,700 second-feet, the powerplant will generate a total of 30,000 kilowatts. The aqueduct from the Cottonwood Powerplant to the junction of the East and West Branches will consist of about 19 miles of concrete-lined canal with a capacity of about 2,700 second-feet.

East Branch Division

The East Branch of the aqueduct will extend about 116 miles from the junction of the East and West Branches to Perris Reservoir in Riverside County. Principal features of the division are Cedar Springs Reservoir, Perris Reservoir, about 79 miles of canal, 33 miles of siphon, four miles of tunnel, one pumping plant, and two powerplants.

The aqueduct from the junction of the East and West branches to the Pearblossom Pumping Plant will consist of about 87 miles of concrete-lined canal and siphons, all with a capacity of about 1,500 second-feet.

Pearblossom Pumping Plant will lift water about 535 feet to an elevation of about 3,470 feet. From the pumping plant the aqueduct will cross the Mojave River by siphon and will discharge into Cedar Springs Reservoir. Cedar Springs Dam will be located on the west fork of the Mojave River at the north base of the San Bernardino Mountains. It will be an earthfill structure 280 feet high and will impound about

200,000 acre-feet of water. The reservoir will have a water surface area of 1,630 acres and a shoreline length of 18 miles.

The aqueduct from Cedar Springs Reservoir to the Devil Canyon power development will consist of about 4 miles of pressure tunnel with a capacity of about 1,400 second-feet. Devil Canyon Powerplant No. 1 will be located below the South Portal of the San Bernardino Tunnel at the fork of Devil Canyon and will develop about 1,115 feet of static head. When operating at the design capacity of about 1,250 second-feet, the plant will generate 97,000 kilowatts.

Devil Canyon Powerplant No. 2 will be located below Devil Canyon Powerplant No. 1 at the south base of the San Bernardino Mountains and will develop about 645 feet of static head. When operating at the design capacity of about 1,100 second-feet, the plant will generate 51,000 kilowatts.

The reach from Devil Canyon Powerplant No. 2 to Perris Reservoir will consist of 27 miles of reinforced-concrete pipeline and siphon with a design capacity of about 730 second-feet. Perris Reservoir will be located in a wide valley surrounded by the Bernasconi Hills of Riverside County, adjacent to the Colorado River Aqueduct. An earthfill dam with a crest length of 11,450 feet and a height of 120 feet will impound about 100,000 acre-feet of water. The reservoir will have a water surface area of 2,080 acres and a shoreline length of 6 miles.

West Branch Division

This division includes those portions of the aqueduct system from the junction with the East Branch to Castaic Reservoir, a terminal reservoir near Newhall. The design capacity throughout the division is about 1,200 second-feet. Principal features in the division include the West Branch Pumping Plant, 15 miles of aqueduct, Elizabeth Powerplant No. 1, Elizabeth Powerplant No. 2, Elizabeth Powerplant No. 3, and Castaic Dam and Reservoir[2/]. Overall length of the West Branch is about 16 miles.

From the junction with the East Branch to Castaic Reservoir there will be 15 miles of aqueduct consisting of tunnels and siphons, one pumping plant, and three powerplants.

The West Branch Pumping Plant will be located at the junction of the East and West Branches near the existing Fairmont Reservoir, will have a capacity of about 1,200 second-feet, and will lift the water about 270 feet to an elevation of about 3,225 feet. From this point the aqueduct in this reach will be aligned southward through Portal Ridge and along Elizabeth Canyon. The conveyance features will include two concrete-lined tunnels and three reinforced concrete siphons.

2/ In this report a West Branch alignment in Elizabeth Canyon is assumed. Negotiations with the Metropolitan Water District of Southern California are underway to establish the final alignment. An Elizabeth Canyon route and a Piru Creek route are being studied. Future analyses will be based upon the route that is finally selected.

Elizabeth Powerplant No. 1, developing a head of about 670 feet, will be located at Fish Creek, roughly one-third of the distance from Lake Hughes to Castaic Reservoir. When operating at the design capacity the plant will generate 58,000 kilowatts.

Elizabeth Powerplant No. 2, developing a head of about 410 feet, will be located at Warm Springs Canyon, about two-thirds of the way down Elizabeth Lake Canyon toward Castaic Reservoir. When operating at the design capacity the plant will generate 36,000 kilowatts.

Elizabeth Powerplant No. 3, developing a head of about 700 feet, will be located at the upper end of the Elizabeth Lake Canyon arm of Castaic Reservoir. When operating at the design capacity the plant will generate 61,000 kilowatts.

Castaic Dam will be an earthfill structure located on Castaic Creek below the junction of Elizabeth Lake Canyon. The dam will be 212 feet high, will have a crest length of 2,850 feet, and will create a reservoir with a capacity of about 100,000 acre-feet. The reservoir will have a water surface area of 1,260 acres and a shoreline length of 23 miles.

Coastal Division

This division includes those portions of the aqueduct system from the junction with the California Aqueduct near Avenal Gap in the San Joaquin Valley to a terminal structure at the Santa Maria River near the San Luis Obispo-Santa Barbara County line. Overall length of the Coastal Division will be about

103 miles. Principal features include Avenal Pumping Plant, Pyramid Pumping Plant, Sawtooth Pumping Plant, Temblor Pumping Plant, San Luis Obispo Powerplant, about 45 miles of canal, 3 miles of siphon, and 55 miles of pipeline.

Avenal Pumping Plant will be located in the Avenal Gap area of Kings County and will lift water from the main aqueduct through a head of about 210 feet to an elevation of about 520 feet. Water will be conveyed from the California Aqueduct to the pumping plant through 3 miles of intake channel. The channel and the pumping plant will have a capacity of about 500 second-feet. From the pumping plant to San Luis Obispo there will be about 65 miles of aqueduct, 3 pumping plants, and one powerplant.

Pyramid Pumping Plant will be located in Kern County about one mile southwest of the Devil's Den Oil Field, will have a design capacity of about 120 second-feet, and will lift the water through a static head of about 340 feet to an elevation of 860 feet.

Sawtooth Pumping Plant will be located at the northern base of Sawtooth Ridge in Kern County and will lift the water through a static head of about 370 feet to elevation about 1,230 feet.

Temblor Pumping Plant located at the base of the Temblor Range in Kern County, will accomplish the final lift of water out of the San Joaquin Valley. The pumping plant will lift water through a static head of about 750 feet to elevation about

1,970 feet. From this plant the water will be conveyed to San Luis Obispo Powerplant which will be located about 4 miles southeast of the City of San Luis Obispo. When operating at the design capacity the plant will generate 8,000 kilowatts.

From San Luis Obispo to the Santa Maria Terminus the aqueduct will consist of about 24 miles of concrete-lined canal and about 10 miles of pipeline. The capacity will reduce from about 105 second-feet to about 90 second-feet. As presently planned, the Coastal Division will have no terminal reservoir. The aqueduct will terminate at the Santa Maria River.

Middle Fork Eel River Facilities

For purposes of this report, a development on the Middle Fork of the Eel River has been assumed to be the additional project conservation facility required to firm up the water supply in the Delta to offset anticipated depletions in inflow. This project, under the analysis presented in this report, would not provide yield to meet demands for water beyond that contracted for from the initial facilities. Formulation of a final, definite plan will be made when the investigations now in progress are completed. These facilities would develop surplus water of the Middle Fork of the Eel River in Mendocino County and convey the water by a gravity diversion to the Glenn Reservoir Complex, located along the eastern slope of the Coast Range in the Sacramento Valley. The Glenn Reservoir Complex will reregulate the north coastal water for release to

the Delta. The project chosen as a basis for cost estimates for this report includes Spencer Dam and Reservoir, Spencer-Thomes Tunnel, and two reservoirs of the Glenn Reservoir Complex, namely Paskenta Dam and Reservoir and Newville Dam and Reservoir.

Spencer Dam and Reservoir

Spencer Reservoir, with a storage capacity of about 530,000 acre-feet at a normal water surface elevation of 1,655 feet, would be formed by the construction of an earthfill dam 335 feet high with a crest length of 2,000 feet at the Spencer site on the Middle Fork of the Eel River, and an earthfill dam 260 feet high with a crest length of 2,600 feet at the Franciscan site on Short Creek, a tributary of the Middle Fork of the Eel River. The reservoir would have a water surface area of 5,200 acres and a shoreline length of 50 miles at normal water surface elevation.

Spencer-Thomes Tunnel

The Spencer-Thomes Tunnel would be 20 miles in length from Spencer Reservoir to its outlet portal on Thomes Creek, a tributary of the Sacramento River. The tunnel would have a 10-foot diameter circular section with a maximum capacity of about 1,000 second-feet.

Glenn Reservoir Complex

An initial stage of the Glenn Reservoir Complex will be required to regulate water diverted by Spencer Reservoir to produce a project yield of 800,000 acre-feet annually. This

initial development would consist of Paskenta Dam and Reservoir on Thomes Creek and Newville Dam and Reservoir in Tehama and Glenn Counties, respectively.

Paskenta Dam would be an earthfill structure 200 feet high with a crest length of 1,350 feet. Paskenta Reservoir would have a capacity of 80,000 acre-feet at normal pool elevation of 970 feet, a water surface area of 1,300 acres, and a shoreline length of 15 miles.

Newville Dam would be an earthfill structure 390 feet high with a crest length of 4,500 feet. The reservoir would have a capacity of 3,000,000 acre-feet at normal pool elevation of 970 feet, a water surface area of 16,000 acres, and a shoreline length of 40 miles.

San Joaquin Drainage Facilities

The San Joaquin Drainage Facilities would be the first stage of a master drainage project to meet anticipated future needs. Of the several alternatives under consideration in the advance planning investigations currently being conducted, the facility chosen as the basis of cost estimates for this report would have capacity to meet the drainage requirements of the federal San Luis Unit and of the remaining portion of the Tulare Lake Basin.

The project used for cost purposes in this report would include a canal with compacted earth lining beginning at a point some 15 miles south of Bakersfield and discharging in the Delta

approximately 285 miles to the north. The capacity would increase from 35 second-feet at the beginning to 650 second-feet at a regulatory reservoir, with an active storage capacity of 120,000 acre-feet, located near Sand Ridge in Kings County, just north of the Kern County line. Capacity would increase to 820 second-feet at two pumping plants, located a few miles north of the reservoir. These plants would lift the drainage water about 35 feet to the crest of the Kings River alluvial fan. A 200 second-foot drainage requirement in the federal San Luis service area, plus additional requirements from other service areas along the route, would increase the capacity to a maximum of 1,160 second-feet at a point near Hills Ferry, some 65 miles south of the Delta.

Local Projects

Local projects in the State Water Facilities are those projects receiving grants or loans from the state under the provisions of the Davis-Grunsky Act. Loans may be made for projects developing water for domestic, municipal, agricultural, or industrial purposes, and for domestic water distribution systems under certain conditions. Grants may be made for recreational benefits of projects or for enhancement of fish and wildlife resources. The exact nature of the facilities to be built under the program is dependent upon the future requests for aid received from local agencies and cannot be more definitely defined at this time. However, applications for loans or grants

which have been approved to date give some indication of the scope of the program. Approved applications as of March 1, 1963, are:

1. A $300,000 recreation grant to Humboldt Bay Municipal Water District for its Ruth Dam and Reservoir project on the Mad River.

2. A $300,000 recreation grant to Georgetown Divide Public Utility District for its Stumpy Meadows Project in El Dorado County.

3. Recreation grants to Alameda County Flood Control and Water Conservation District as follows:

$150,750 for San Lorenzo Project

$184,250 for Cull Creek Project.

4. A $149,300 recreation grant to the City of Santa Cruz for its Newell Creek Project.

5. A $3,820,000 recreation grant to Monterey County Flood Control and Water Conservation District for its San Antonio Project.

6. Recreation grants to Sacramento Municipal Utility District as follows:

$300,000 for Loon Lake Project

$275,000 for Gerle Creek Project

$300,000 for Icehouse Project

$300,000 for Union Valley Project

7. A $75,000 loan to Sierra County Waterworks District for construction of a domestic distribution system to serve the community of Calpine.

8. A $1,550,000 supplemental loan to South Sutter Water District for its Camp Far West Project, an irrigation project in Sutter County. In addition, the State Legislature, by special act in 1959, authorized another loan of $1,260,000 to this district.

9. A $4,000 loan to Shasta Community Services District for a feasibility report on a municipal distribution system in the town of Shasta and vicinity, in Shasta County.

10. A $2,500 loan to the Groveland Community Services District for a feasibility report ~~on a~~ municipal water supply system for the town of Groveland in Tuolumne County.

CHAPTER IV. CONSTRUCTION SCHEDULE

The schedule for construction of the State Water Project is presented on a broad, overall basis covering major features and is shown graphically on Figure 1. Certain of the starting and completion dates in this schedule can be varied. Others of the dates are fixed; these are the dates tied to the commitments to deliver water under the water supply contracts.

Of the upper Feather Division, Frenchman Dam was completed in October 1961; Antelope Valley Dam was placed under construction in August, 1962, and will be completed in the fall of 1964. Grizzly Valley, Abbey Bridge, and Dixie Refuge, will be constructed so that as one is completed, another will be begun. Completion of the last is scheduled for the fall of 1969.

At Oroville, relocation of the Western Pacific Railroad and Highway U.S. 40A has been completed. Work is on schedule on the Oroville Dam embankment. The initial construction of the Oroville Powerplant is about to be started and design is proceeding on the Thermalito facilities. Some flood control will be provided by Oroville Dam as early as 1964-65; power generation will start about July 1967, and the Oroville facilities will be completed in 1968.

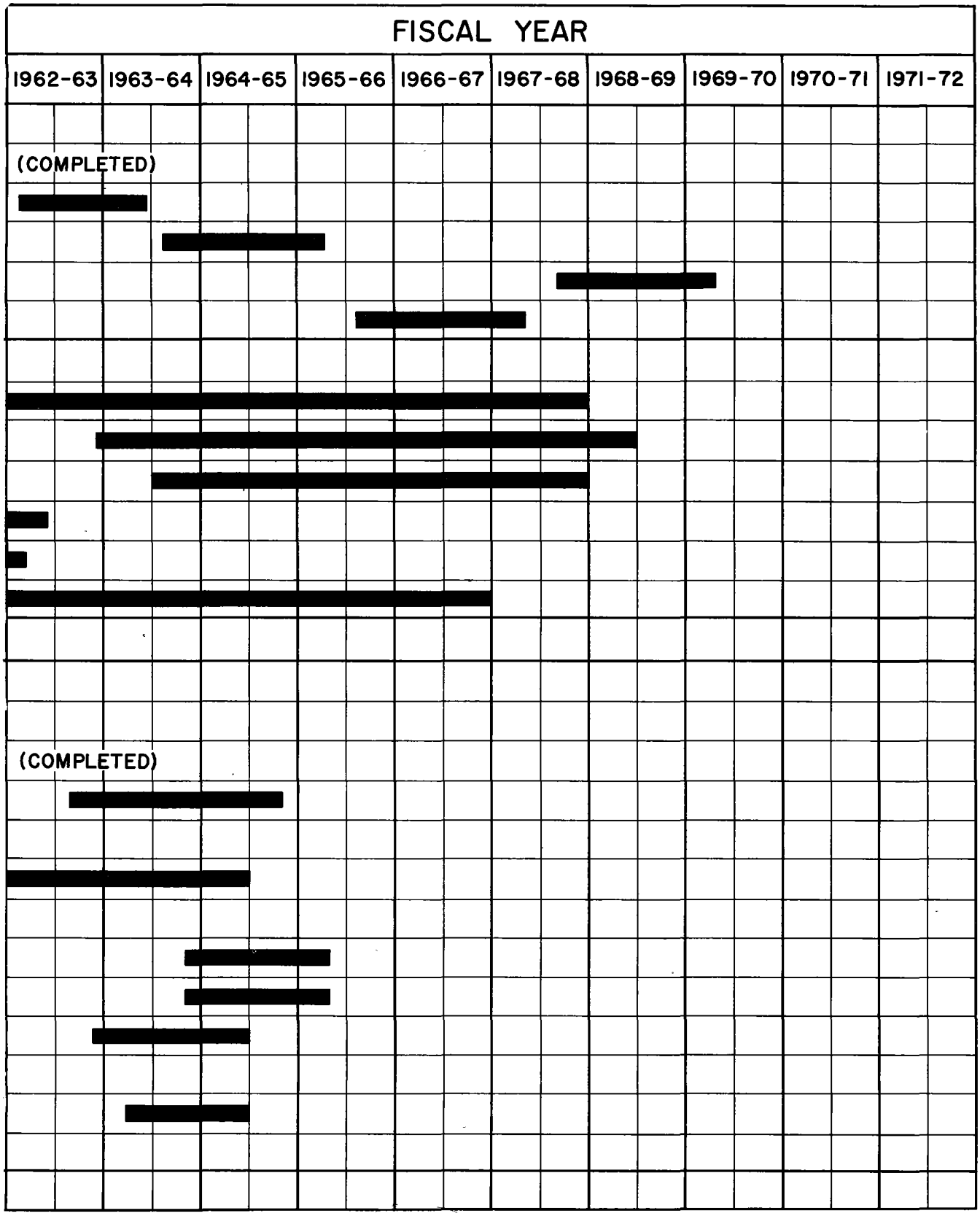
CONSTRUCTION SCHEDULE,

FEATURE OR FACILITY
UPPER FEATHER DIVISION
FRENCHMAN DAM AND RESERVOIR
ANTELOPE VALLEY DAM AND RESERVOIR
GRIZZLY VALLEY DAM AND RESERVOIR
DIXIE REFUGE DAM AND RESERVOIR
ABBEY BRIDGE DAM AND RESERVOIR
OROVILLE DIVISION
OROVILLE DAM AND RESERVOIR
OROVILLE POWER PLANT
THERMALITO FEATURES
WESTERN PACIFIC RAILROAD RELOCATION
U.S. 40 A RELOCATION
OTHER RELOCATIONS
NORTH BAY AQUEDUCT [1]
SOUTH BAY AQUEDUCT
LIVERMORE DIVISION
FIRST STAGE
SECOND STAGE
DOOLAN DIVISION [1]
ALAMEDA DIVISION
DEL VALLE DIVISION
PUMPING PLANT AND PIPELINE
DEL VALLE DAM AND RESERVOIR
NILES DIVISION
SANTA CLARA DIVISION
AQUEDUCT
DELTA FACILITIES [1]

[1] CONSTRUCTION SCHEDULE NOT YET ESTABLISHED.

STATE WATER PROJECT

FIGURE I



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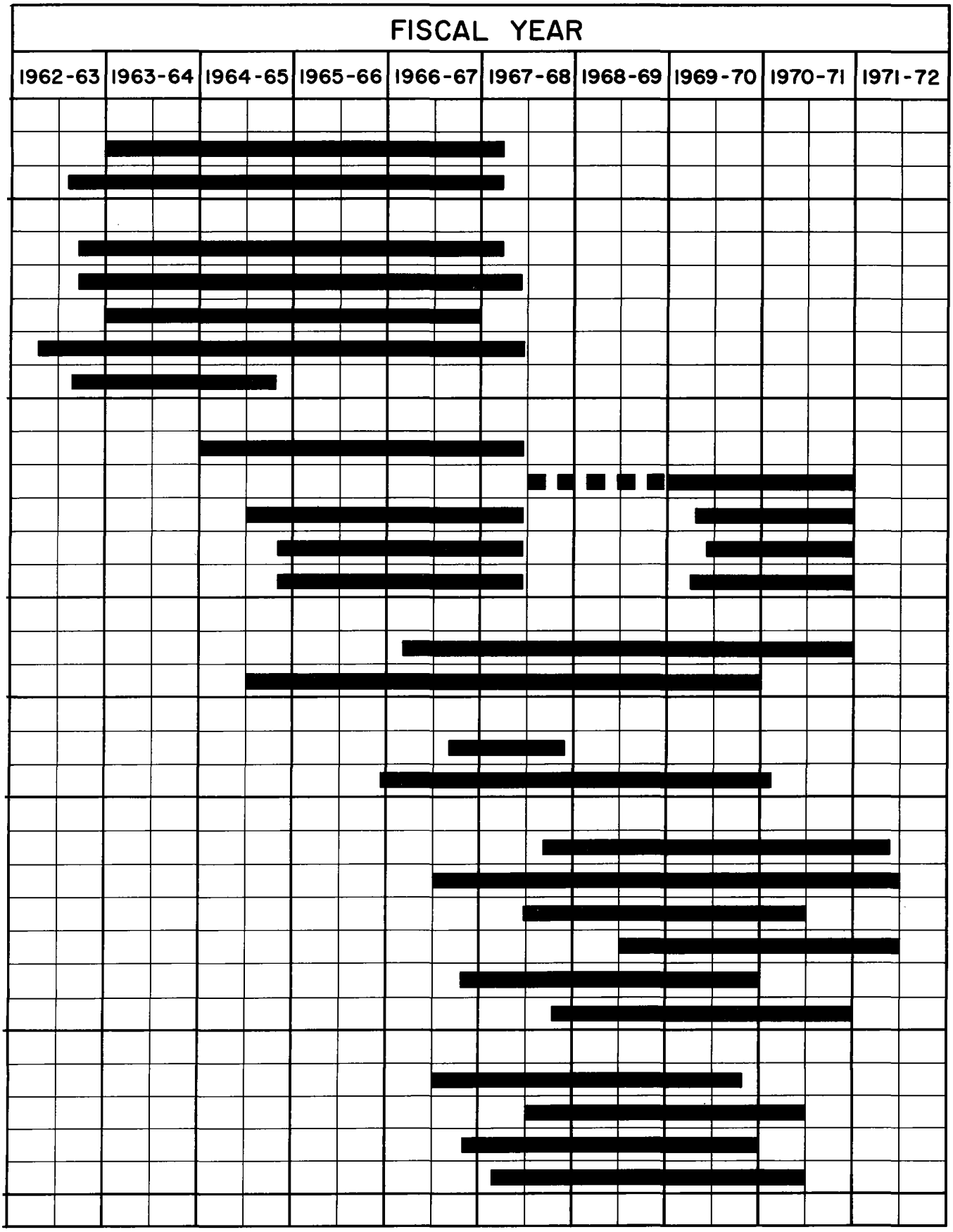
CONSTRUCTION SCHEDULE,

FEATURE OR FACILITY
NORTH SAN JOAQUIN DIVISION
DELTA PUMPING PLANT
AQUEDUCT, DELTA TO SAN LUIS FOREBAY
SAN LUIS DIVISION
SAN LUIS DAM AND RESERVOIR
SAN LUIS PUMPING-GENERATING
MILE 18 PUMPING PLANT
AQUEDUCT, SAN LUIS TO KETTLEMAN CITY
SAN LUIS RELOCATIONS
SOUTH SAN JOAQUIN DIVISION
AQUEDUCT, KETTLEMAN CITY TO TUPMAN ROAD
AQUEDUCT, TUPMAN ROAD TO TEHACHAPI PUMPING PLANT
BUENA VISTA PUMPING PLANT
WHEELER RIDGE PUMPING PLANT NO. I
WHEELER RIDGE PUMPING PLANT NO. II
TEHACHAPI DIVISION
TEHACHAPI PUMPING PLANT
AQUEDUCT
ANTELOPE DIVISION
AQUEDUCT
COTTONWOOD POWER PLANT
EAST BRANCH DIVISION
AQUEDUCT TO CEDAR SPRINGS DAM
AQUEDUCT, CEDAR SPRINGS DAM TO PERRIS DAM
CEDAR SPRING DAM AND RESERVOIR
PERRIS DAM AND RESERVOIR
PEARBLOSSOM PUMPING PLANT
DEVIL CANYON POWER PLANTS I AND 2
WEST BRANCH DIVISION
AQUEDUCT
CASTAIC DAM AND RESERVOIR
WEST BRANCH PUMPING PLANT
ELIZABETH LAKE CANYON, POWER PLANTS NOS. 1, 2 AND 3
COASTAL DIVISION [1]

[1] CONSTRUCTION SCHEDULE NOT YET ESTABLISHED.

STATE WATER PROJECT

FIGURE I (Continued)



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Activities in the Delta are in the planning stage and no definite construction schedule has been established at this time.

The South Bay Aqueduct is already delivering water to water supply contractors. First stage facilities have been completed through Patterson Reservoir, and by August 1963, all main line conveyance facilities will be under construction and are scheduled to be completed in December 1964. Additional pumping facilities at the South Bay Pumping Plant and the second barrel of the Brushy Creek pipeline will be operational in the spring of 1965. Del Valle Dam and Reservoir will be completed in December 1965. The South Bay Aqueduct presently obtains its water from the Bureau of Reclamation's Delta-Mendota Canal, but water from the North San Joaquin Division of the California Aqueduct will become available in 1967.

Construction of the California Aqueduct, reaching about 444 miles from the Delta to the terminal reservoirs on the East Branch at Perris and on the West Branch at Castaic, has begun. Work on the North San Joaquin Division consists of the construction of cuts and fills; in January 1964 the first 12 mile section of aqueduct will be started.

The San Luis Division is being constructed by the Bureau of Reclamation. The Bureau of Reclamation let the first contract for furnishing the pump turbines for the San Luis Pumping-Generating Plant on November 20, 1962. Contracts were also awarded for preconsolidation of a segment of the San Luis Canal and for San Luis Dam, San Luis Forebay, the San Luis Pumping-Generating Plant, and the relocation of State Highway 152. Additional contracts to be awarded in the immediate future will result in all facilities as far south as Mile 18 Pumping Plant being under construction. The joint-use facilities are to be completed in 1968.

CHAPTER V. WATER SUPPLY

California's water resources are sufficient to meet its needs. The major portion of California's natural water supply, however, occurs in the northern part of the State during the winter season and in widely varying quantities from year to year. On the other hand, the major portion of the water requirement occurs in Central and Southern California during the summer season. Therefore, the solution to the State's water supply problems must involve the construction of large regulatory storage reservoirs in the north and conveyance facilities to deliver the conserved water to the central and southern areas of the State. Not only, therefore was it necessary to work out the plan for Oroville Dam and the California Aqueduct, but also a plan for marshalling the State's waters and economic resources. In order to do this the department adopted the Delta Pooling Concept.

Delta Pooling Program

The department will operate the project in accordance with the Delta Pooling Concept. The Delta Pooling Program recognizes the Sacramento-San Joaquin Delta as the central collection point for all surplus waters from the Sacramento and San Joaquin Valleys. All state project demands in Central and Southern California, as well as a substantial measure of the Federal Central Valley Project demands, will be met by exporting water from the Delta. These export requirements will be provided by diverting

surplus waters now wasting to the ocean during the winter and spring months, such surpluses to be firmed up by major storage developments in the Sacramento Valley and by San Luis Reservoir. Water imported from the North Coast also will be added in the future.

Estimated mean seasonal natural runoff[1] of the Central Valley area tributary to the Delta is given in the following tabulation:

Area	Acre-feet
Sacramento River Basin	22,390,000
San Joaquin River Basin	6,386,000[2]
Delta Tributary Area	1,547,000
Total	30,323,000

In the operation of the State Water Project, Oroville and San Luis Reservoirs will be operated in conjunction with surplus flows in the Delta to develop an initial firm annual yield for delivery of 4,000,000 acre-feet. The present surplus flows in the Delta will be diminished in the future, because of further development of water in the area tributary to the Delta, particularly in the Sacramento River Basin. Therefore, additional future

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1/ State Water Resources Board, Bulletin No. 1, "Water Resources of California," (1951).

2/ Runoff to the Tulare Lake Basin is excluded because outflow from that basin occurs only at times of extreme flood when large surpluses of water in the Delta are wasting to the ocean.

water supplies must be made available in the Delta, both to offset the effect of depletions resulting from increased upstream development, and to meet export demands.

The Delta Pooling Program involves the utilities' system approach in the marketing of water in the service areas of the State Water Project. The Delta Water Charge is one of the principal components of the cost of project water to the contracting agencies. It will represent the cost of all facilities necessary to develop the project yield. The Delta Water Charge will vary to reflect the cumulative investment in facilities to maintain the yield of the project for export at any given time. All water users will pay the Delta Water Rate as a part of their service.

Delta Depletions

The watershed tributary to the Delta is a vast basin with widely varying climate and terrain. The inflow to the Delta reflects the cumulative effect of all hydrologic phenomena and economic development occurring within this basin. Changes in conditions, such as increasing water use for urban or agricultural purposes, necessarily will be reflected in the pattern, quantity, and quality of the inflow to the Delta.

Since water exported from the Delta will include both regulated and unregulated flows, the maximum quantity which may be diverted at any particular time will be partially dependent upon the degree of urban and agricultural development within the basin. In order to predict the quantity of water available for

export in the future it is necessary to estimate the extent of future development within the basin[3], and the effects of this development upon the inflow to the Delta.

The determination of future consumptive use of water requirements in the watershed tributary to the Delta was made on the basis of anticipated markets for crops grown in the area, analysis of informed local opinion concerning future agricultural development, and population forecasts. Estimates of increase in water use above 1960 conditions are given in Chapter VII.

Operation Studies

Operation studies to evaluate the present and future surplus flows in the Delta and the water supply available for the State Water Project have been based on the historical inflows to the Delta[4].

Historically, inflow to the Delta has varied widely, generally being large during the winter and spring months of

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3/ Runoff to the Tulare Lake Basin is excluded because outflow from that basin occurs only at times of extreme flood when large surpluses of water in the Delta are wasting to the ocean.

4/ Relevant data were taken from two principal sources: (1) "1957 Joint Hydrology Study, Sacramento River and Sacramento-San Joaquin Delta," prepared by the United States Bureau of Reclamation and the Department of Water Resources as a cooperative effort; and (2) reports of the Department of Water Resources and its predecessors entitled "Sacramento-San Joaquin Water Supervision," published annually from 1924 until 1955, and replaced beginning in 1956 with "Bulletin No. 23-56, Surface Water Flow for 1956" and subsequent reports of that series through Bulletin No. 23-60.

maximum precipitation and snowmelt, and relatively small in the late summer and early fall months of waning mountain and foothill runoff and maximum use in the tributary areas. Moreover, the historical inflow to the Delta has fluctuated in a rough cyclic pattern, involving several consecutive years when runoff was either far below or far above average runoff. For example, the seven-year period from 1928 through 1934 which was grossly deficient in runoff, represents the most severe drought period in the recorded history of the Central Valley. The ensuing period from 1935 through 1944, including the heavy flood years of 1938 and 1941, was greatly above average.

The chronological occurrence of these extended wet and dry periods is of extreme importance in determining the water supply available for export by State Water Projects. In order to evaluate the firm yield, that is, the minimum amount of water that could be made available for use every year by the State Water Project, it was necessary to select an operational period covering the 1928-34 drought period. At the same time, the operational period must include a sufficient number of the wet years preceding and following the critical drought period to ensure that the storage reservoirs would be full both at the beginning and at the end of the operational period. The operational period selected covers the 20 runoff years from 1921-22 through 1940-41. This period meets the foregoing criteria and, in addition, includes the two driest years of record, namely, 1923-24 and 1930-31.

The operation studies were based upon the fundamental assumption that future hydrologic conditions will be no more severe than those of the recorded past. It is recognized that critical drought periods in the future may possibly be more extended than those upon which the yields of the State Water Project have been predicated.

Present Inflows to the Delta

Determination of inflows to the Delta under present conditions of development was necessary to form a basis for predicting the surplus flows under future conditions of development in the watershed. Present conditions, as used herein, include the effects of full operation of most water development facilities in the Sacramento and San Joaquin Valleys presently in operation or under construction except in the Tulare Lake Basin.5/ Demands to be met by existing projects were the largest measured annual diversion during the latest five years of record available at the time of the study, on a monthly schedule based on the average of monthly diversions during that period.

The Central Valley Project was assumed to be operated to meet demands, namely diversions along the Sacramento River; navigation requirements; salinity repulsion; consumptive requirements in the Delta; present export requirements from the Delta;

5/ Since completion of the studies described herein, operation of the Corning Canal Unit of the Central Valley Project and the American River Development of the Sacramento Municipal Utility District have begun. The effect of these facilities upon the operation studies would be negligible.

and necessary fishery releases. In addition, sufficient power was assumed to be generated to meet the Central Valley Project pumping requirements and power sales contracts. Shasta and Folsom Reservoirs were operated in accordance with established flood control operational criteria.

Operation of the present water development facilities over the historical water supply period provides the basis for determination of the flows that would enter the Delta under the conditions assumed. Some of these inflows are needed to meet present water requirements in and from the Delta while the remainder wastes into San Francisco Bay. The inflows include uncontrolled stream flow, project spills, and other project releases in excess of the demands mentioned in the preceding paragraph.

Surplus Water in the Delta

The future availability of surplus waters in the Delta was determined from analyses using the data on present inflow to the Delta and estimates of future consumptive use of water in the tributary watershed and within the Delta itself.

A graphical method of analysis was used to account for the additional surface and ground water storage necessary to satisfy the forecasted growth in consumptive use of water in the basin tributary to the Delta. With this method the estimated future surplus flows reflect the ratio of storage requirements to consumptive water requirements, which has been shown to apply

under present conditions of water supply development. This allows for the fact that not all inflow to the Delta can be regulated by reservoirs.

Water Rights

In planning the State Water Project, careful attention has been given to acquisition of adequate water rights in accordance with state law. In obtaining such rights, the State is in virtually the same position, and must proceed in the same manner, as any other party wishing to acquire water rights in California.

Applications for State Water Project

Since 1927, the department and its predecessors have filed a number of applications for the appropriation of water in furtherance of "a general or coordinated plan looking toward the development, utilization, or conservation of the water resources of the State."[6/] Of these state applications, 15 are applicable to the State Water Project.

The essential features of the applications are summarized in Table 1.

Action by California Water Commission

On February 26, 1960, the department requested assignment by the California Water Commission of Applications Nos. 5629, 5630, 14443, 14445A, 17512, 17514, and 17515, for purposes of the

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6/ Water Code, Sec. 10500

State Water Project, downstream from Oroville Dam. The department further requested that the Commission concur in the suggested amendments and that the Commission join with the department in submitting the amended applications to the State Water Rights Board. The applications as amended were filed with the Board on December 29, 1960. Among other things, they described the places of use of the water to be appropriated.

On May 12, 1961, the California Water Commission found[7/] that the proposed use of the applications was for a purpose not in conflict with a general and coordinated plan, and assigned these applications to the department. The assignment was made subject to the following principal terms and conditions:

> "(1) The prior rights of any county in which the water covered by the application originates, to the use of such water as may be necessary for the development of the county, as provided in Section 10505 of the Water Code;
>
> "(2) To water service contracts validly entered into by the department pursuant to Section 12937 and Part 3, Division 6, of the California Water Code; provided that this condition shall not constitute, nor be construed as, a determination required to be made by this Commission pursuant to, nor as a waiver of, any of the requirements of Section 10504.5 of the Water Code with respect to any matter falling within the purview of said Section 10504.5.
>
> "(3) The California Water Commission reserves the right to release from priority within one year from the date of this assignment State Application Nos. 5629, 5630, 14443, 14444, and 14445 in favor of Application Nos. 13681, 13682, 14919, 14920, 15551, and 15552, or to release from priority any of these state applications in favor of any of these applications of the Richvale Irrigation District; and

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7/ As required by Water Code Sec. 10504.

"(4) In accordance with Section 10504.5(a) of the California Water Code, the assignee shall, before making any changes determined by the California Water Commission to be substantial in the project in furtherance of which the assignment is made, submit such changes to the California Water Commission for its approval."

Each of the applications assigned by the Commission to the department on May 12, 1961, for diversion from the Feather River and the Delta, and for off-stream storage below the Delta contained an allocation of the total annual diversion among service areas of the project. These allocations are shown in the first column of the following tabulation.

On March 1, 1963, the Commission declared 65,000 acre-feet of the Central Coastal allocation and 15,000 acre-feet of the South Bay allocation, or a total of 80,000 acre-feet, to be surplus. It approved reallocation of 44,000 acre-feet of this total to Southern California. The remaining 36,000 acre-feet was identified as an amount to be held in trust for the San Joaquin Valley when and if it is required for contracts. The second column of the tabulation indicates the revised allocations including the amount available for the San Joaquin Valley.

Service area	Original allocations in acre-feet	Revised allocations in acre-feet
Feather River	275,000	275,000
North Bay	225,000	225,000
South Bay	225,000	210,000
San Joaquin Valley	1,475,000	1,511,000
Central Coastal	150,000	85,000
Southern California	1,800,000	1,844,000
Total	4,150,000	4,150,000 8/

State Application Nos. 16952 and 18844 were assigned to the department on July 30, 1959, for purposes of Frenchman Reservoir on Little Last Chance Creek, a tributary of the Middle Fork Feather River. Hearings were held by the State Water Rights Board, and on October 17, 1961, Permits Nos. 12945 and 12946 were issued to the department.

The latest assignment of State applications by the California Water Commission to the department took place on October 6, 1961. These were Application Nos. 16951 and 20117 for Antelope Reservoir on Indian Creek a tributary of the East Branch of North Fork Feather River. The department has completed these applications and is negotiating with downstream protestants, preliminary to final action by the State Water Rights Board.

8/ Despite this total allocation at the points of diversion, water supply contracts limit total annual deliveries to 4,000,000 acre-feet.

Other Water Rights

The operation of the State Water Project will be affected by existing vested water rights and by certain water rights applications pending before the State Water Rights Board. These consist primarily of local vested water rights along the Feather and Sacramento Rivers and in the Delta, and related rights applied for by the United States.

Feather River. The release of water from Oroville Reservoir into the Feather River for local use and for conveyance to the Delta and subsequent export must be carried out without impairing existing vested water rights. The department is proceeding to reach agreement with the local water users on the extent of local vested water rights prior to the completion of Oroville Dam. A study of the local rights along the Feather River both above and below Oroville Reservoir was started in 1956 to further such agreement. These studies have involved review of available information on claims of appropriative water rights in the records of the counties in which diversions are made and in the records of the State Water Rights Board. In addition the present status of properties contiguous to the Feather River below Oroville Dam was examined to estimate the extent of riparian lands.

The department also has estimated the quantities of water available to satisfy the local water rights under conditions prior to construction and operation of Oroville Reservoir. On

the basis of these data, the extent to which the assumed water rights could be satisfied by pre-project water supplies was estimated.

The results of these studies already have been discussed with water users along the Feather River in the expectation of arriving at negotiated settlements of all water rights that would have an effect upon the operation of Oroville Reservoir.

Sacramento River and Delta. The Sacramento River provides much of the water used for local irrigation and municipal purposes in a large area extending from the City of Redding on the north to the City of Tracy on the south. There has never been an adjudication to determine the extent and priorities of the local water rights under which these uses are made.

In 1937, the Bureau of Reclamation of the United States Department of Interior began construction of the Federal Central Valley Project. Major features of the project are Shasta Dam and Reservoir on the Sacramento River and Folsom Dam and Reservoir on the American River. Operation of these reservoirs began in 1944 and 1955, respectively. The Trinity River Unit, which will import water from the Trinity River to the Sacramento River Basin, is under construction, and its operation will begin in 1963. The Congress authorized construction of the San Luis Unit of the Central Valley Project in 1961. Construction of this unit, which will be physically integrated with a portion of the State's California Aqueduct, is now underway.

The federal project is supported by water rights applications previously held by the State and by others, which were assigned to the United States, and by direct applications made by the Bureau. The State Water Rights Board has granted permits to appropriate water under all of these applications.

The State Water Rights Board's Decision No. D 990 issued permits under the Bureau's Sacramento River and Delta applications. It provided, among other things, that the export of stored water outside the watershed of the Sacramento River Basin or beyond the Sacramento-San Joaquin Delta shall be subject to the reasonable beneficial use, both present and future, of such stored water within the watershed and in the Delta. The board provided, however, that parties currently diverting water from Sacramento River and/or the Sacramento-San Joaquin Delta must enter into agreements with the United States for the use of such stored water prior to March 1, 1964 and that parties not currently using water from Sacramento River and/or the Sacramento-San Joaquin Delta, must enter into such agreements prior to March 1, 1971.

To implement these provisions, the Bureau of Reclamation and representatives of the water users have negotiated a form of contract which the Bureau is willing to execute with individual water users in settlement of water rights and to provide for purchase of stored project water from the Bureau. A three-man panel of experts from the Bureau interviewed water users and

others early in 1963 to determine in what respects the contract was not satisfactory to the water users and to recommend remedial measures if feasible. The parties are now awaiting word on findings of this panel which may lead to special legislation on this matter.

Water Quality

Criteria for evaluating the suitability of water for municipal, agricultural, and industrial uses have been developed by numerous agencies and associations. Quality limits for the water to be delivered by the State Water Projects were established with the assistance of a special board of consultants[9/], which recommended specific limiting values for the more important

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9/ Raymond A. Hill, Chairman; Charles Gilman Hyde, C. W. Schedler, L. D. Doneen, and J. E. McKee. The water quality limits recommended by the board of consultants as objectives for water to be exported from the southern boundary of the Sacramento-San Joaquin Delta, are as follows: Total Dissolved Solids, 400 ppm (parts per million); Electrical Conductance, 600 micromhos at 25°C; Hardness as $CaCO_3$, 160 ppm; Sodium Percentage, 50%; Sulfate, 100 ppm; Chloride, 100 ppm; Fluoride, 1.0 ppm; Boron, 0.5 ppm; pH Value, 7.0-8.5; Color, 10 ppm; and, other constituents as to which the U. S. Public Health Service has or may establish mandatory or recommended standards for drinking water, USPHS Limits. In presenting these recommendations, the board of consultants stated: "It is the opinion of this Board that the limits set forth will permit full agricultural development in northern California, provide for greatly increased population in that area, and allow the establishment of all industries required for the support of that population. It is the further opinion of this Board that these limits will permit the use of this water for agricultural purposes without detrimental effects, and enable this water to be used for domestic and industrial purposes without placing any undue burden upon the distributors or users."

mineral constituents and characteristics. This board considered the recommendations of many interested parties, including federal, state, and local agencies; agricultural and industrial water users; and associations and societies concerned with water quality. The board recognized that allowances must be made for increases in population and agricultural and industrial development and that waters flowing in all portions of the system should be of satisfactory quality to meet the intended uses without extensive treatment.

The board refrained from recommending specific limits for indices of contamination or for constituents bearing directly on fish and wildlife, as limits for such constituents are subject to regulation by the State Water Pollution Control Boards, the State Board of Public Health, and the State Fish and Game Commission.

For purposes of the water quality objectives of the water supply contracts the recommendations of the board of consultants were considered but most of the limits were increased by about 10 percent to allow for moderate deterioration of quality between the points of diversion in the Delta and the points of delivery.

Article 19(a) of the "Standard Provisions for Water Supply Contract"10/ states as follows:

10/ See page 159 for description.

"It shall be the objective of the State and the State shall take all reasonable measures to make available, at all delivery structures for delivery of project water to the Agency, project water of such quality that the following constituents do not exceed the concentrations stated as follows:

"Constituent	Unit	Monthly Average	Average for any 10-year Period	Maximum
Total Dissolved Solids	ppm.	440	220	---
Total Hardness	ppm.	180	110	---
Chlorides	ppm.	110	55	---
Sulfates	ppm.	110	20	---
Boron	ppm.	0.6	---	---
Sodium Percentage	%	50	40	---
Fluoride	ppm.	---	---	1.5
Lead	ppm.	---	---	0.1
Selenium	ppm.	---	---	0.05
Hexavalent Chromium	ppm.	---	---	0.05
Arsenic	ppm.	---	---	0.05
Iron and Manganese together	ppm.	---	---	0.3
Magnesium	ppm.	---	---	125
Copper	ppm.	---	---	3.0
Zinc	ppm.	---	---	15
Phenol	ppm.	---	---	0.001"

The criteria contained in the contracts are more exacting than criteria contained in Bureau of Reclamation contracts for delivery of water from the Contra Costa and Delta-Mendota Canals, which also divert from the Delta.

Present and Future Water Quality in the Delta

The department has made extensive studies to determine the present quality of water in the Delta and to estimate the probable water quality in the future.

Present Water Quality. Conditions affecting present water quality are considered to be those which have prevailed since the Tracy Pumping Plant of the Central Valley Project began operating in 1951. During this period, quality characteristics at this location have fluctuated through the following ranges:

	Parts per Million		
Total dissolved solids	40	to	660
Total hardness	35	to	260
Chlorides	15	to	260
Sulfates	5	to	95
Sodium	40%	to	70% of the base constituents

On several occasions, concentrations of all constituents, as well as sodium percentages, have exceeded the limiting values recommended by the board of consultants on water quality. All of the maximum values, which occurred late in the summer of 1959, apparently resulted from abnormally low inflows to the Delta. The inflows could have been increased by the operation of storage facilities.

Future Water Quality. Predictions of future water quality for 1970 and 1990 conditions are based on recorded past and present water quality conditions within the Delta, as well as in streams tributary to the Delta; evaluation of the influence of fluctuations in water supply on quality; and estimates of the effects of future development in the basin tributary to the Delta. Consideration was also given to the effects of eventual transfer of water from north coastal streams into the Sacramento River system.

The studies confirm that the critical period for maintenance of water quality coincides with the period of minimum flow. Therefore, in order to forecast the most critical water quality conditions that might occur under operation of the State Water Project, streamflows measured during the historical drought period from 1928 to 1934 have been assumed to recur during the future operation of these facilities.

To test the reliability of the methods used to predict future water quality conditions, computed values were compared with actual water quality conditions in the Delta during 1955 and 1958, years for which comprehensive stream flow and water quality data were available. It was found that the computed average annual concentrations of total dissolved solids in waters diverted by the Tracy Pumping Plant agreed closely with actual values, but computed monthly values did not show the same degree of reliability.

In these studies, it was assumed that by 1970, the Trinity River Division of the Central Valley Project, Oroville Reservoir, and those minimum Delta Facilities required to convey water across the Delta would be in operation. It was assumed also that in 1990, additional water from the Trinity River, as well as water from the Eel River, would be imported into the Sacramento River system, and that all facilities in the Delta would be in operation.

The studies indicate that the quality of water available for export from the Delta under 1970 conditions of development would fluctuate within the following ranges;

	Parts per Million		
Total dissolved solids	110	to	370
Total hardness	50	to	170
Chlorides	10	to	130
Sulfates	5	to	50
Sodium	25%	to	60% of the base constituents

Concentrations of total dissolved solids and sulfates would be less than the limits recommended by the board of consultants at all times. The predicted maximum concentrations of total hardness, and chlorides and of percent sodium would slightly exceed the limiting values recommended by the consultants. This would occur only during a few winter months of low inflow.

The quality of water available for export from the Delta under 1990 conditions of development would fluctuate within the following ranges:

	Parts per Million		
Total dissolved solids	90	to	470
Total hardness	50	to	210
Chlorides	10	to	130
Sulfates	10	to	80
Sodium	10%	to	55% of the base constituents

The mean concentration of total dissolved solids during the eight-year critical dry period would be about 160 ppm. The 400 ppm limit recommended by the board of consultants would be exceeded only in one month during that period. Total hardness

would exceed the recommended limit of 160 ppm on six occasions, while chlorides would exceed the recommended limit of 100 ppm twice. Sulfates would be within the recommended limit at all times, and percent sodium would exceed the limit only in one month.

Each instance where the predicted values exceed the limiting values recommended by the board of consultants would occur during a winter month when scheduled flows across the Delta would be particularly low. This appears to reflect the influence of poor quality local drainage waters within the Delta. It is believed that further study will probably indicate that most of these monthly values in excess of objectives could be eliminated or materially reduced by increasing controlled inflows to the Delta to dilute local drainage waters.

The foregoing discussion of predicted 1970 and 1990 conditions pertains to water qualities at the points of diversion from the Delta. It compares such qualities with the standards recommended by the board of consultants. No studies have been made to estimate how the qualities of water will change through the project transportation system and how they will compare with the aforesaid water quality objectives at points of water delivery set forth in the water supply contracts. As indicated before, these consist of concentrations or percentages that are about 10 percent greater than the consultants' standards. For contractors close to the Delta, quality deterioration in the project

aqueducts will not be large and the 10-percent differential would tend to cover all or a portion of the amounts by which predicted concentrations exceed the consultants' objectives in the Delta. For contractors more distant from the Delta, two opposite tendencies would operate for most contractors. First, the concentrations would tend to be increased either because of local inflow to the aqueduct of water of poorer quality than the Delta supply or because of evaporation from the canals or regulatory reservoirs. Second, the maximum concentrations would tend to be decreased by dilution with waters of better qualities diverted and stored in San Luis Reservoir or in other reservoirs. Generally, the second tendency is believed to be the stronger with the result that the delivered supplies in most months would be within the contractual water quality objectives.

CHAPTER VI. DELIVERIES OF PROJECT WATER

The quantity of water proposed to be delivered from the State Water Project is based on executed water supply contracts and on studies of probable demands for water in service areas not yet under contract.

Because Article 23 of the "Standard Provisions for Water Supply Contract" provides that the State shall subdivide the project transportation facilities as a basis for the proper allocation of costs, the data on water deliveries given in this chapter are listed by aqueduct reaches. The tentative designation of aqueduct reaches is shown in Tables 2, 3, and 4.

Also summarized in Tables 2, 3, and 4 are:

1. The required capacities for the reach;

2. The major features of each reach, as would be set forth in Article 23 of the "Standard Provisions for Water Supply Contract;" and

3. The contractors diverting directly from the reach under water supply contracts executed as of October 1, 1962.1/

The list of contractors in Tables 3, and 4 is neither final nor does it indicate that project service will be limited only to those agencies.

1/ While other contracts have been signed as indicated on page 160 the time required for the large amount of computational work did not allow the tables to be revised. They will be revised in the next edition of this report.

Water Deliveries Under Full Development

The allocation of project water to major service areas has been discussed in Chapter V and is shown in the tabulation on page 105. Included in Tables 2, 3, and 4 are the "Maximum Annual Entitlement" and "Maximum Monthly Delivery Capability," which terms appear in the standard contract provisions.

Delivery schedules in executed contracts and studies of the probable buildup in demand in service areas not yet under contract indicate that the project will be delivering its total annual yield of 4,000,000 acre-feet by about 1990.

Year of Initial Water Delivery

The year of initial water delivery to contracting agencies, as set forth in Article 6(a) of the standard contract provisions, is closely associated with the project construction schedule. As provided in executed contracts, the year of initial water delivery in Southern California is 1972. Initial deliveries in the San Joaquin Valley are scheduled for 1968. Completion of construction of the Coastal Division to furnish water to the San Luis Obispo County Flood Control and Water Conservation District and the Santa Barbara County Flood Control and Water Conservation District is presently estimated at 1980.

Deliveries through the completed South Bay Aqueduct to Santa Clara County Flood Control and Water Conservation District are scheduled to begin in 1964. Water deliveries to Alameda

County Flood Control and Water Conservation District and to Alameda County Water District began in May 1962.

For the purposes of this report, even though water supply contracts have not been completed, the year of initial delivery from the North Bay Aqueduct is assumed to be 1968.

In the Feather River service area the initial water deliveries are assumed to begin during the summer of 1967, following the initial storing of water in Oroville Reservoir. In the Upper Feather River Basin, Frenchman Reservoir began to store water in 1961.

Growth of Annual Water Deliveries

Table 6 summarizes the annual deliveries to each major service area together with an overall summary.

CHAPTER VII. PROJECT WATER YIELD

Project water yield, as used in this report, is determined by the relationships among three factors: the water demands upon the Delta Pool, the water supplies available to the Delta Pool, and the capability of the project conservation facilities to develop supplies to meet the total demands. The yield of the project was determined by comprehensive operation studies, utilizing the surplus flows discussed in Chapter V for each decade from 1960 through 2020 as the basic water supply to the Delta, and utilizing the project demands set forth in Chapter VI. The yield represents the quantity of water that can be made available on a firm annual basis to municipal and industrial users, and for agricultural users on a full irrigation supply basis during an equivalent of six years of the seven-year critical drought period.

Water Demands Upon the Delta Pool

The water demands upon the Delta Pool include, in addition to required deliveries to customers as set forth in Chapter VI, irrecoverable water losses involved in making such deliveries. Such losses include those which will be incurred during the construction period and all seepage and evaporation losses from the aqueduct system when it is in operation. The distinction between construction losses and operational losses must be preserved since the costs of acquiring, pumping, and conveying the former is accounted for as a capital cost, while the latter is accounted for as an annual operating cost.

Operational Losses

Past experience, particularly that of the Bureau of Reclamation, is the basis for estimating the quantities of water that will be lost by seepage from the aqueduct. Such losses will occur in substantial quantity even though the canals may be lined with several inches of concrete. Losses of water by evaporation from reservoirs, as well as from water surfaces in the aqueduct, are based on studies of available evaporation records.

The estimated seepage and evaporation losses are as follows:

Canals

Seepage - .07 cubic foot per square foot per day

Evaporation - 5 feet per year

Reservoirs

Oroville[1/]	40,300 acre-feet per year
Del Valle	3,630 acre-feet per year
Airpoint	710 acre-feet per year
San Luis[1/ 2/]	34,000 acre-feet per year
Castaic	9,100 acre-feet per year
Cedar Springs	6,800 acre-feet per year
Perris	10,200 acre-feet per year
Total Reservoir Losses	104,740 acre-feet per year

1/ Not included in demands on the Delta Pool due to the functions of these facilities for water conservation.

2/ State share of evaporation losses.

Annual losses in the project transportation facilities, computed on the basis of the foregoing estimates, would amount to about 183,000 acre-feet per year by 1990 and are shown for each aqueduct reach in Table 7. This table also shows adjustments of reservoir storage which in some years must be taken into account to reconcile water deliveries with quantities of water transported in the aqueduct. Table 8 shows the total annual water quantities conveyed through both pumping and power recovery plant of the transportation facilities, combining annual deliveries with annual losses.

Losses During Construction

These losses consist of (1) water applied for aqueduct preconsolidation, (2) water for the testing of aqueduct sections and pumps, and (3) water required to bring the aqueduct and reservoir water surfaces to operational levels. The total quantity of such losses will be about 212,500 acre-feet. This loss, in contrast with the operational loss, will occur only once.

Monthly Delivery Capabilities

Article 12(b) of the "Standard Provisions for Water Supply Contract" provides that the maximum monthly delivery of project water shall not be greater than 18 percent of the annual entitlement for agricultural purposes and 11 percent of the annual entitlement for municipal purposes and for all purposes south of the Tehachapi Pumping Plant. The monthly delivery

capabilities used in developing the demands on the Delta Pool are in accord with these limitations. Table 9 presents a summary of the gross water demands upon the Delta Pool, combining water deliveries with operational water losses, under executed and prospective contracts for the project yield of 4,000,000 acre-feet.

Water Supplies to the Delta Pool

Table 9 also presents a summary showing how the demands upon the Delta Pool will be met. The left-hand section of Table 9 recapitulates the gross water demands on the project. These demands are met by the project conservation facilities, except for (1) interim purchases from the federal Central Valley Project, and (2) allowable deficiencies due to shortages in water supplies. Project conservation facilities also must satisfy the State's share of depletions in the Delta water supply in accordance with the Delta Pooling Concept and the "May 16, 1960, Agreement" with the U. S. Bureau of Reclamation described in Chapter VIII.

Interim Purchases from the Bureau of Reclamation

A portion of the gross water demands on the project, namely that for the South Bay Aqueduct, will occur before Oroville Reservoir becomes operational in 1967. Consequently, temporary contracts have been executed with the Bureau of Reclamation for purchase of an interim water supply. As shown on Table 9, the total quantity of water to be purchased under these contracts is estimated to be 269,500 acre-feet.

Allowable Deficiencies

Operation studies of the project were based on the premise that irrigated lands can occasionally sustain a reduction from a full seasonal water supply. Articles 1(m) and 18(a) of the "Standard Provisions for Water Supply Contract" provide for such reduction, within prescribed limits, if enforced by natural water supply conditions. The allowable reduction must not exceed 50 percent of maximum annual entitlements in any one year, or a total of 100 percent of the maximum annual entitlements for agricultural purposes in any series of seven consecutive dry years.

Project operation studies that include the most critical drought period of record, 1927-28 through 1934-35, reveal that a 50 percent deficiency in irrigation supply would have occurred in 1931 and again in 1934 if the project had been fully developed in those years. Since the entire yield of initial conservation facilities will not be required to meet project demands until about the mid-1980's, no deficiency in irrigation water supply is expected to occur before that time. Thereafter, deficiencies will occur only under conditions as severe as those during the 1927-28 through 1934-35 critical dry period. The project yield of 4,000,000 acre-feet annually on the basis of these criteria may be reduced by a maximum of 794,000 acre-feet during any one dry-year and a total of 1,588,000 acre-feet during any dry period of seven consecutive years. The juxtaposition of a number of disadvantageous conditions would be required for such a reduction to occur. The frequency

at which the dry period of seven consecutive years would be repeated is related to this problem; it has occurred one time in about 70 years of record. Also, the possibility of a reduction in yield could be reduced if the date of first delivery of water from the North Coast were advanced. All of the foregoing factors indicate that there is little expectation that a reduction in project yield will occur.

Estimates of Future Water Use in Delta and Tributary Areas

Estimates by the department of annual water uses within the Delta and the basin tributary to the Delta are given by decades in the following table:

Estimated Uses of Water in the Delta and Tributary Areas

(1,000 acre-feet)

	1960	1970	1980	1990	2000	2010
Consumptive use of applied irrigation water	6,600	7,300	8,300	9,400	10,300	11,000
Urban and suburban use	200	300	400	500	700	900
Miscellaneous consumptive use	100	100	200	200	200	200
Associated water losses	500	600	700	700	800	900
Basin exports under existing rights	400	700	900	1,000	1,000	1,000
TOTAL	7,800	9,000	10,500	11,900	13,000	14,000
Increased use over 1960 conditions	-	1,200	2,700	4,100	5,200	6,200

Estimates of future development in the basin tributary to the Delta probably will be reduced as specific project plans are completed.

Detailed operation studies of the Central Valley incorporating the foregoing estimates of future water uses indicate that the yield of the initial conservation facilities will satisfy project water demands until about the mid-1980's. At that time, an additional conservation facility, herein considered to be a project on the Middle Fork Eel River, will be needed. This facility will develop about 800,000 acre-feet annually to meet increasing water requirements up to the project yield of 4,000,000 acre-feet annually and to offset the effects of depletions in the yield of the project expected to result from increased use of water in and above the Delta.

Table 9 shows the portion of the project water demands upon the Delta Pool that the initial conservation facilities will make available and the remaining portion that the additional conservation facility will make available. The combined facilities would supply in the year 2000, and each year thereafter, almost 4,200,000 acre-feet, which is sufficient to supply project demands and transportation losses.

CHAPTER VIII. PROJECT OPERATION

The operation of the State Water Project involves the development of surplus waters in Northern California to replenish and augment surplus flows in the Delta. The Delta will serve as the point of diversion for conveyance and delivery of water to the San Francisco Bay area, San Joaquin Valley, Central Coastal area, and Southern California.

Operation of the project conservation facilities for water supply is based on the occurrence and pattern of flow in the basin tributary to the Delta. Diversions of water from the Delta will be made as and when surplus water is available, generally during the winter and spring months, and when water is available from releases from Oroville Dam. Water pumped during these periods in excess of immediate project demands may be stored in San Luis and Del Valle Reservoirs for later release. Releases from Oroville Reservoir also will be made to meet needs along the Feather River and in the Delta itself.

Certain physical and operational conditions dictate the method of operation of the various power and pumping plants. Pumping back into Oroville under the pump-storage plan, for instance, will be restricted to offpeak periods since the reversible units also will be operated for onpeak generation. This operation will consist of the offpeak pumping of water from Thermalito Afterbay back into Oroville Reservoir at times when the water is not needed downstream. Such an operation permits

the generation of additional onpeak power with no reduction in the amount of water conserved for later use. Also, the power used for such pumping will be obtained during offpeak hours in order to make the pump-storage plan economically attractive.

At the Delta Pumping Plant pumping will be offpeak to the extent possible. At the San Luis Pumping-Generating Plant, water will be pumped into storage in San Luis Reservoir, as well as directly into the aqueduct continuing south from San Luis Reservoir. Offpeak operation of this plant is possible because of the availability of forebay and afterbay storage. Pumping at this plant will be at a maximum when large quantities of surplus water are available in the Delta.

It is assumed, for the purposes of this report, that all other pumping plants will be restricted to offpeak hours to the extent possible during the early years, with gradual change to unrestricted pumping as water demands increase.

Article 17(b) of the "Standard Provisions for Water Supply Contract" provides that regulatory storage reservoirs in the project transportation facilities may be utilized in conjunction with conveyance capacity in the aqueduct to provide peaking deliveries to the water supply contractors. The project operational plan provides that water deliveries to Southern California

and to the South Bay Aqueduct service area will be conveyed on essentially a constant flow basis, and will be reregulated in terminal reservoirs. There is, however, continuing study of the use of local ground water reservoirs for further regulation of project water in the South Bay area and in the Southern California areas. Conveyance through the San Joaquin Valley for the Central Coastal service area is on a constant flow. Terminal regulation is not contemplated on the Coastal Aqueduct at this time.

As shown in Tables 3 and 4, the key conveyance capacities are 300 second-feet for the constant flow diversions to the South Bay Aqueduct; 7,000 second-feet measured at Kettleman City, for the combination demands of the San Joaquin Valley and the constant flow for Southern California and Central Coastal service areas; 2,742 second-feet, measured at the Tehachapi Pumping Plant for Southern California service areas; and 117 second-feet for the Central Coastal service area, measured at the Pyramid Pumping Plant. These capacities are based upon contracts executed as of March 1, 1963, except that the foregoing capacity of the Coastal Aqueduct does not include a contemplated military requirement in Santa Barbara County of 10,000 acre-feet.

The latter two capacities include a reserve capacity of 7½ percent above that required for continuous flow operation to compensate for scheduled and unforeseen outages under full project operation. Diversion capacities directly from the Delta are 380 second-feet for the intake of the North Bay Aqueduct and 10,300 second-feet for the intake of the California Aqueduct, of which 300 second-feet is for the South Bay Aqueduct. The

latter figure represents a combined conservation-transportation capacity. The capacity of the California Aqueduct between the Delta and San Luis Reservoir and the capacity of the Tehachapi Tunnels, are specified in the Burns-Porter Act to be not less than 10,000 second-feet, and 2,500 second-feet, respectively.

Method of Control

Present studies indicate that to achieve maximum reliability and economy and to give best service to contractors the aqueduct system should be operated by remote control with full system electronic monitoring. Under such a plan of operation, all checks and gates could be operated by remote control; operating limits of automatic gate control devices for check gates could be set by remote control; pumping plants could be operated by remote control; and turnout flows could be adjusted by remote control.

Coordinated Operation of State and Federal Facilities

The State Water Project and the federal Central Valley Project are closely related in a physical sense. First, they both divert water from a common source -- the Delta. Second, the operation of the storage facilities of both involves the firming up of surplus waters in the Delta. This close physical and hydrologic relationship dictates the coordinated operation of the State and federal projects.

During 1959 and 1960, the State Water Rights Board held hearings on applications of the Bureau of Reclamation seeking water rights for direct diversion and storage at Shasta Reservoir

and for diversion from the Sacramento River and the Delta. The Board on February 9, 1961, adopted Decision No. D 990 approving these applications and on April 12, 1961, issued permits thereon.

During the course of the hearings the Bureau and the department entered into an "Agreement Between the United States of America and the Department of Water Resources of the State of California for the Coordinated Operation of the Federal Central Valley Project and the State and Feather River and Delta Diversion Projects," dated May 16, 1960. The purpose of this agreement was to resolve differences between the two agencies that had been brought into focus during the proceeding.

The department's estimates of present use and probable future depletions of inflow to the Delta were revealed in the negotiations to be larger than those estimated by the Bureau of Reclamation. The agreement states that estimates of the future depletions cannot be exact or conclusive with available data and knowledge, and that subsequent studies, developments, and uses will necessitate revisions. The agreement provides that water shortages that actually develop will be shared by the two agencies in accordance with a specified formula, whatever depletions may occur in the future.

This formula was based on the operation study by the Bureau of Reclamation[1/] and is supplemented by the department's study estimating the yield of the State Water Project under the

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1/ Hearings before the State Water Rights Board on Applications Nos. 5625, 5626, 9363, 9364, 9365, 9366, 9367, 9368, and 10588, USBR Exhibit No. 164.

Bureau's depletion and water supply estimates. The agreement provides that in the event future depletions of inflow to the Delta are greater than the Bureau assumed in its operation study, the shortages in yield will be shared in the proportions 9.55/13.56 for the Bureau and 4.01/13.56 for the department, these being the relative proportions of the State and federal projects' uses.

The applications to appropriate water for the State and federal projects, which are enumerated in the agreement, reveal a picture of intertwined priority dates. One of the major accomplishments of the agreement was the establishment of a workable operational pattern without judicial determination of these priorities. Instead of storing and diverting water on the basis of complicated priorities, established under these applications, the agreement provides that the State and federal projects will be coordinated to produce the water supplies that are designated for each agency, and that shortages in water supply are to be shared on the basis of the formula discussed above.

The 1960 agreement also recognizes the necessity of reaching agreement on coordinated operation of the two projects. It provides for the establishment of mutually acceptable operational criteria and plans that will produce the maximum combined accomplishment of the Federal Central Valley Project and the

State Water Project[2/]. Negotiation of the operating agreement is underway.

2/ Article 16 of the agreement provides:

"ESTABLISHMENT OF OPERATIONAL CRITERIA

"16. The parties recognize that it is essential for operational criteria in respect to each of the projects to be established prior to the beginning of the operation of the Feather River and Delta Diversion Projects. The parties shall from time to time exchange any and all plans, criteria, and other operational information relative to the operation of their projects and shall establish by agreement mutually acceptable operational criteria and plans including water service that will produce the maximum accomplishment of the Federal Central Valley and the State Feather River and Delta Diversion Projects."

CHAPTER IX. SALE AND PURCHASE OF ELECTRIC POWER

The power generation and power requirements associated with full operation of the State Water Project are of large magnitude and are a major factor affecting the cost of water. Studies and negotiations are being carried on in cooperation with representatives of California public and private utility systems and with federal agencies to insure achievement of the lowest cost of water through coordination of project power operations with those of other utility systems. Application has been made to the United States Bureau of Reclamation for Central Valley Project Power. The possibility of obtaining low-cost power for pumping from the Pacific Northwest and from other sources also is being investigated. These studies and negotiations, however, have not progressed to a point where the results can be included in this report.

For purposes of this report, it is assumed that the power generated by the Oroville-Thermalito facilities will be transmitted over utility system transmission lines and sold commercially at market value based on the estimated cost of privately financed thermal power sources. Power required for pumping on the South Bay and North Bay Aqueducts and at the Delta, San Luis, and Mile 18 Pumping Plants would be purchased from commercial power sources; the power generated at San Luis may be used directly for project pumping. Power produced at the

generating plants on the remainder of the aqueduct system is assumed to be fed back to the West Branch, Pearblossom, Buena Vista, Wheeler Ridge, and Tehachapi Pumping Plants for direct use in project pumping. The balance of the power requirement of these plants would be obtained from commercial power sources. This plan is conservative and the cost can be estimated with reasonable accuracy. Any changes in the plan that might result from further study or arrangements for power from other sources probably would result in financial improvement.

Under the plan of operation described in Chapter VIII, the Oroville and Thermalito Powerplants will generate during onpeak periods to produce power when it has maximum value. Some units will be reversible to operate as pumps using low-cost off-peak power in order to conserve valuable water and to increase the production of firm onpeak power. For the aqueduct pumping plants, operation during the early years will be restricted to offpeak hours to the extent possible, with gradual change to unrestricted pumping as water demands increase. Such a plan requires the earlier installation of some pumping capacity than would otherwise be required but does not increase the ultimate installed capacity. There are certain exceptions to this plan, one being the Delta Pumping Plant, which is assumed to operate unrestricted when necessary to avoid loss of water from the Delta into San Francisco Bay. Another exception is the San Luis Pumping Plant, which is assumed to operate largely offpeak indefinitely.

Project Power Production

The generating capacity of Oroville Powerplant will be 600,000 kilowatts at the high-voltage bus, all of which will be dependable, by virtue of the pumped storage plan. Three of the six units of the powerplant will be conventional turbine generators, each with a rated capacity of 117,000 kilowatts. The other three will be reversible pump-turbines, each with a rated capacity of 87,000 kilowatts. These will generate onpeak power and will also operate offpeak to pump water back into the reservoir. Thermalito Powerplant will have a dependable generating capacity of 98,000 kilowatts at the high-voltage bus, with three pump-turbine units rated at 33,300 kilowatts. The Thermalito facilities will operate on essentially the same schedule as the Oroville Powerplant.

The total Oroville-Thermalito power capability will be 698,000 kilowatts of dependable peaking capacity with an average annual generation of about 2,500,000,000 kilowatt-hours. This production will vary annually with water conditions from a low of slightly over 2,000,000,000 kilowatt-hours to a high of almost 4,000,000,000 kilowatt-hours. The offpeak pumpback operation for Oroville and Thermalito will require an average of approximately 600,000,000 kilowatt-hours annually, varying from a low of slightly less than 200,000,000 kilowatt-hours to a high of almost 1,200,000,000 kilowatt-hours. The efficiency of the pumping-generating operation is such that approximately two-thirds

of the energy consumed in pumping is recovered. The cost of the energy consumed in pumping, of course, is recovered many times over through the approximately 50 percent increase in the dependable peaking capacity and the increased water yield that is achieved by the pumpback operation.

The characteristics of the San Luis Pumping-Generating Plant and the power plants along the aqueduct are shown in the following tabulation:

Plant	Static Head, in Feet	1992 Installed Capacity, in Kilowatts	1992 Annual Energy Generation at Plant (in millions of KWHR)
San Luis	Variable	200,000 2/	126 2/
Cottonwood	210	30,000	212
Elizabeth No. 1 1/	670	58,000	471
Elizabeth No. 2 1/	410	36,000	290
Elizabeth No. 3 1/	700	61,000	494
Devils Canyon No. 1	1,115	97,000	756
Devils Canyon No. 2	645	51,000	408
San Luis Obispo	990	8,000	66
Total		541,000	2,823

The estimated annual energy requirements and energy production of the project pumping and generating plants are

1/ Negotiations are underway with The Metropolitan Water District of Southern California to establish the alignment of the West Branch. An Elizabeth Canyon route and a Piru Creek route are being studied. Future analyses will be based upon the route that is finally selected.

2/ The estimated State's share of the total generation of the joint facility.

shown in Tables 10 and 11, respectively. Table 11 also shows project net energy requirements.

For the power recovery plants, except San Luis, the related aqueduct capacities are those required to accomplish the full water deliveries on a continuous basis. This results in continuous operation of these plants unless special facilities are provided to permit peaking operations. Such peaking operations at the power recovery plants would require provision of forebays, afterbays, and additional penstock and machine capacity. Physical conditions are such, however, that the provision of adequate forebays and afterbays at the sites of the San Luis Obispo, Devils Canyon, Cottonwood, and Elizabeth plants presents difficult problems. Therefore, it is assumed in this report that generation at these plants will be on the basis of continuous operation.

Sale of Project Power

Negotiation for the sale of power from the Oroville-Thermalito Plants is the initial power marketing activity for the State Water Project.3/ The principles which have been established

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3/ A program has been established with the aid of consultants to market the power from the Oroville-Thermalito complex. Mr. Leslie N. McClellan, formerly Chief Engineer, Bureau of Reclamation, studied the problem and made recommendations for a program to be completed in May, 1964. Action to carry out this program has been initiated and Mr. A. Norman Murray, formerly General Manager and Chief Engineer, State Reclamation Board, has been employed by the department to assist in this program.

for the sale of project power provide that power will be sold at market value and that net revenues will be used to reduce the charges for water, except for deliveries to holdings in excess of 160 acres. The entire output of the Oroville-Thermalito facilities is planned to be sold as soon as it becomes available which is estimated to begin in 1967 or 1968 depending upon flow conditions in the Feather River. The projections in this report, however, are conservative and estimate the first power in 1969.

The Pacific Gas and Electric Company's system can utilize Oroville and Thermalito peaking power. The Southern California Edison Company, San Diego Gas and Electric Company, California Electric Power Company, and the municipalities of Los Angeles, Pasadena, Burbank, and Glendale, which operate their own power systems, also can utilize this power. The proposed federal common carrier, the Pacific Northwest-Pacific Southwest Intertie, could be a factor in an arrangement for marketing the Oroville-Thermalito power.

The net revenue from sale of Oroville-Thermalito power, taking into account the energy required for the pumped storage operation and other costs of operation, is estimated to be $19,137,000 annually (Column 4, Table 44).

Power for Project Pumping

The estimated annual electrical energy requirements by individual pumping plants are shown in Table 10. These requirements are for pumping water through aqueducts, into storage at San Luis Reservoir, and for the Oroville-Thermalito pumped storage operation.

In the early years, with the initial offpeak operation of the aqueduct and San Luis plants, there will be relatively high offpeak power demands and low onpeak demands. This situation will change gradually as water deliveries increase, and pumping on a more and more continuous basis will be necessary. Onpeak power demands will increase but there will be little or no increase in offpeak power demands. Some diversity will exist between the power requirements of the Delta Pumping Plant and San Luis Pumping-Generating Plant, which have their maximum power use in the winter, and the power requirements of the Mile 18 Plant and the Buena Vista and Wheeler Ridge Pumping Plants which have their maximum power use in the summer.

Estimated annual power requirements for the Delta Pumping Plant and San Luis Pumping-Generating Plant are based on detailed project operation studies conducted on a monthly basis and covering a 20-year period that included the driest years of record. Oroville-Thermalito energy production and power requirements are based on similar studies covering a 31-year period. The estimate of the energy required for San Luis pumping, as shown in Table 10, is the State's share of the energy required for pumping conserved water. The estimate does not include any pumping at San Luis for purely power production purposes. The significant increases in power requirements in 1968 and 1972 in Table 10 correspond to the start of water deliveries to the San Joaquin Valley and to Southern California.

Sources of Power

The project power requirements shown in Table 10 are almost double the total project generation shown in Table 11. If the Oroville-Thermalito power output is sold, instead of being used directly for project pumping, the presently intended plan, about 73 percent of the total project power requirements will have to be obtained from other sources.

Possible sources of pumping power being considered include: public utility systems in California, including those publicly and privately-owned; the Federal Central Valley Project; surplus power from the Pacific Northwest that may become available to California over the proposed extra-high voltage intertie; power recovery plants on the aqueduct itself; and thermal power-plants either conventional or nuclear fueled that may be constructed in the future specifically to service the pumping plants. It may be advantageous to utilize power from these different sources in various amounts and combinations at different times, depending upon costs, availability, and water delivery requirements.4/

Cost of Power for Pumping

For purposes of this report, power for project pumping is assumed to be purchased power from commercial sources in

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4/ The department has engaged the Fluor Corporation, of Los Angeles, California, to make a thorough study of sources of energy for the State Water Project, and to advise the department on the most economical arrangements. This work is scheduled to be completed by July 1, 1964.

California. The estimated cost of this power is based upon preliminary estimates by Pacific Gas and Electric Company, made in 1954, except that the cost of power for the South Bay Aqueduct until 1968 is based upon the current contract between the State and the Bureau of Reclamation. This assumption results in estimated water costs that can be regarded as conservatively high[5/]. The studies of energy sources currently underway have as their objectives methods of reducing these charges.

Following is a tabulation showing the pumping plants, their respective types of operation, and the estimated cost of power:

Plant	Type of Operation	Cost
South Bay Pumping Plant	Unrestricted	R2F2 until 1968 (2 part rate is $1.14/kw month and 2 mills/kwhr) 1968 - 2041 ($30.00/kw yr. and 3 mills/kwhr.)
North Bay Pumping Plant	Unrestricted	$30/kw yr. and 3 mills/kwhr.
Delta Pumping Plant	Unrestricted	$30/kw yr. and 3 mills/kwhr.
San Luis Pumping-Generating Plant	Offpeak	$1.50/kw yr. and 3 mills/kwhr.
Mile 18 Pumping Plant	Unrestricted	$30/kw yr. and 3 mills/kwhr.
Buena Vista and Wheeler Ridge Pumping Plants	Offpeak to Unrestricted	$3.90/kw yr. (off-peak)-$33.60 kw yr. (unrestricted) and 3 mills/kwhr.

(continued on next page)

5/ See page 197 for further discussion.

(continued)

Plant	Type of Operation	Cost
Tehachapi Pumping Plant	Offpeak to Unrestricted	$4.20/kw yr. (off-peak)-$34.80/kw yr. (unrestricted) and 3 mills/kwhr.
West Branch and Pearblossom Pumping Plants	Offpeak to Unrestricted	A7 Rate Schedule
Coastal Division Pumping Plants	Unrestricted	$33.60/kw yr. and 3 mills/kwhr.

Coordinated Project Operation and Power Interchange

Several opportunities are available to insure the most economic operation of the State Water Project by integrating the project power production and the pumping power requirements with the loads and resources of others.

A Power Advisory Committee,[6/] consisting of representatives of the most directly concerned publicly and privately-owned California public utilities, worked for several years to develop the most feasible method of supplying power to the project and making the best use of its power output. This group recommended an offpeak operation in the early years, to be accomplished by installing sufficient pumping capacity to deliver the required

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6/ In May 1958, the Power Advisory Committee was formed to work with the department on the solution of problems in connection with the utilization of power generated and the supply of power required for pumping. Initially the committee comprised representatives of the Pacific Gas and Electric Company, the Los Angeles Department of Water and Power, and the Southern California Edison Company; the membership was later expanded. The membership and representation of the committee in 1960 was as follows: Harvey O. Banks, Director, California Department of Water Resources; W. L. Chadwick, Vice President, Southern California Edison Company; John F. Bonner, Vice President in Charge of Engineering, Pacific Gas and Electric Company; H. P. Dugan, Regional Director, Bureau of Reclamation, United States Department of the Interior; William S. Peterson, General Manager and Chief Engineer, City of Los Angeles, Department of Water and Power; Carl C. Ernst, President, California Electric Power Company; and Paul E. Shaad, General Manager and Chief Engineer, Sacramento Municipal Utility District.

water by pumping only during offpeak hours. Project peaking generation was considered to be sold to others. Such an operation is an example of coordinated operation of the project with the thermal generation of the existing utility systems.

Studies currently are being made of the coordinated operation of the State Water Project and the Federal Central Valley Project. Substantial benefits would accrue to both projects since coordinated operation would increase the yield of water and power above that which would be developed if each project were operated separately.

Continuing study also is being devoted to the possibilities of a power interconnection with the Pacific Northwest. The studies are being directed by the Power Consultative Committee 7/, consisting of representatives from California interested in obtaining Pacific Northwest power over a proposed federal intertie.

7/ In April 1962, the Power Consultative Committee was formed with membership consisting of those agencies that had indicated their intent to utilize power from a Federal Pacific Northwest-Pacific Southwest common carrier intertie. Membership is as follows: California Department of Water Resources; City of Los Angeles, Department of Water and Power; City of Pasadena, Light and Power Department; City of Burbank, Department of Water, Light and Power; City of Glendale, Public Service Department; and, Sacramento Municipal Utility District. There are two other participating agencies; Bonneville Power Administration; and Bureau of Reclamation, United States Department of the Interior.

CHAPTER X. SALE OF WATER

Contracts for the sale of project water are essentially identical with respect to basic terms and conditions. The contract with the Metropolitan Water District of Southern California was the first water supply contract executed. This contract is based on the Contracting Principles adopted and announced by Governor Brown on January 20, 1960, following enactment by the legislature of the California Water Resources Development Bond Act in 1959. It was executed on November 4, 1960 and serves as the prototype for all other contracts for water service.

Governor's Contracting Principles

The Governor established the policy to be followed by the Department of Water Resources for cost allocation, pricing of water and power, repayment, surcharge for water used on excess land ownerships, and other necessary principles to serve as a basis and to provide guidelines for water supply contracts under the State Water Project. The policies stated by the Governor are as follows:

> "1. Costs shall be allocated on the separable costs-remaining benefits basis for multipurpose development facilities and on a proportionate use basis, by areas, for water transportation facilities.
>
> "2. For purposes of project commodity pricing, costs will be allocated among water supply, flood control, recreation, enhancement of fish and wildlife, drainage, quality control, and such other functions as may be authorized and performed by the particular facility or facilities under consideration.

"3. Rates for water and power and for other reimbursable items will be established so as to return to the State all costs of project operation, maintenance and replacement, all principal and interest on (1) bonds, (2) expenditures from the California Water Fund, and (3) other monies used in the construction of the project works. Those costs declared by the Legislature to be nonreimbursable, and the Federal contribution for flood control and for other items will not be included in the rate structure.

"4. The project will require more power for pumping purposes than it will produce. Power required in the operation of the project must be paid for by the water users whether it is obtained from project or non-project sources. Therefore, the costs of the project facilities producing the power is properly a cost of water supply and in the project cost allocation no separate allocation of the capital costs of power facilities will be made. The capital cost of power will be included in the costs allocated to water supply. The difference between the actual cost of power, that is, the amount necessary to repay the capital and operation and maintenance costs of the power facilities, and the market value of the power provides an economic benefit. A cost allocation study will be made with reference to power facilities for the purpose of determining the economic benefit to be derived from the use of project power for project purposes.

"In addition to the extent that from time to time any power is available for sale, it will be sold at its market value. Preference will be given to public agencies in such sale as required under existing law. The difference between the actual cost and the market value of such power will result in income to reduce project costs. This added income (power credit) will be applied, and the computed economic benefit will be made available, to reduce the cost of project water except for water used on land in single ownership in excess of 160 acres (320 acres in the case of community property).

"5. Under the Delta Pooling Concept, there will be a single price for state project water at the Delta and for state project service areas above the Delta which will be referred to as the Delta Water Rate. The Delta Water Rate will consist of an annual (1) capital cost component, (2) necessary minimum operation, maintenance and replacement component; and (3) an operation and maintenance component which will vary with the amounts of water furnished.

"The Delta Water Rate will be based on the cost of construction and the cost of operation, maintenance and replacement of these conservation facilities allocated to water supply upstream from and within the Delta. The capital cost component and the minimum maintenance and replacement component will be collected irrespective of the amount of water furnished. The operation and maintenance component will be collected from the contractors receiving water in proportion to the amounts of water furnished. Increases and decreases in the capital cost component of the Delta Water Rate will be made from time to time to reflect the then outstanding unpaid reimbursable cost incurred in the construction of facilities necessary to make water available at the Delta.

"6. Those contracting for water from a project aqueduct will pay, in addition to the Delta Water Rate, a charge herein referred to as the 'Transportation Rate'. The Transportation Rate will consist of an annual (1) capital cost component, (2) necessary minimum maintenance and replacement component, and (3) maintenance and operation component which will vary with the amount of water furnished.

"The capital cost component, and the minimum maintenance and replacement component will be allocated to service areas by reaches of aqueduct, using the proportionate use method of cost allocation and will be collected annually irrespective of the amount of water furnished. The maintenance and operation component which varies with the quantity of water delivered will be computed for the same reaches of aqueduct as used for the other components of the Transportation Rate and will be allocated among, and collected annually from, the contractors receiving water in proportion to the amounts of water received. Provision will be made for reserve funds to be used for the purpose of meeting large, unforeseen cost of operation and maintenance, repair and replacement of works. The total annual charge to project water contractors will be the sum of the Transportation Rate plus the Delta Water Rate."

"7.[1/]

1/ Item 7 of the Governor's Statement of Contracting Principles contained general information on costs of water. The costs

1/ continued

were computed on the basis of assumptions that have since changed but they are quoted here for historical reference.

"7. The following is a breakdown of the Delta Water Rate and the Transportation Rate. The Transportation Rate is stated for reaches of the aqueducts where the rate will be set by reaches. These rates are based upon estimated costs. Provision will be made in the contracts for revision of the rates when actual costs become known:

	Areas of Water Service by Aqueduct Reaches	Estimated Operation and Maintenance Costs Plus the Delta Water Rate, in Dollars per Acre-Foot	Estimated Annual Capital Cost Component*, in Dollars
1.	Areas within and upstream from Delta (Delta Water Rate)	$ 3.50**	--
2.	Entire North Bay Aqueduct to terminus in Marin County	7.50	$1,440,000
3.	Entire South Bay Aqueduct (includes cost of possible future extension to Airpoint Reservoir in Santa Clara County if later found necessary)	13.00	1,910,000
4.	Pacheco Pass Tunnel Aqueduct	14.00	980,000

* Average annual payment necessary to repay, with interest, the portion of the aqueduct system capital cost allocated to each service area, based on a 50-year pay-out period.

** Delta Water Rate shown includes capital cost component for conservation facilities within and above Delta. Power credit has been deducted.

1/ continued

Areas of Water Service by Aqueduct Reaches	Estimated Operation and Maintenance Costs Plus the Delta Water Rate, in Dollars per Acre-Foot	Estimated Annual Capital Cost Component*, in Dollars
San Joaquin Valley		
5. San Luis Reservoir to Avenal Gap	11.50	330,000
6. Avenal Gap to Buena Vista Lake	11.50	4,700,000
7. Buena Vista Lake to Wheeler Ridge	13.00	2,610,000
8. Wheeler Ridge to Tehachapi Tunnel	18.50	560,000
Coastal Aqueduct		
9. San Joaquin Valley east of Devils Den	14.00	1,580,000
10. San Joaquin Valley west of Devils Den	19.00	1,070,000
11. In San Luis Obispo and Santa Barbara Counties	22.00	4,420,000
West Branch Aqueduct in Southern California		
12. Entire service area	25.00	24,530,000
East Branch Aqueduct in Southern California		
13. Tehachapi Tunnel to Pearblossom	32.00	1,910,000
14. Pearblossom to Perris Reservoir	35.50	22,580,000

End of quote.

"8. Contracts for dependable water supply shall be for at least 50-year terms, but shall contain provision for changes in rates and operating provisions. Upon expiration of the term of the contract, the contracting agency shall have the option of continued service on terms and conditions prescribed by the State, but at no greater cost than would have been the case had the original contract continued in effect. Should the terms and conditions provide for the furnishing of such continuing water service for only a specified period of years, the contracting agency shall have a like right to continued service at the expiration of such succeeding term during which it was receiving project water.

"9. To ensure continuity and dependability of water supplies the contracts will provide:

"(a) That contracts for dependable water supply will aggregate no more than a stated amount based upon the yield of the project. This amount, which will be approximately 4,000,000 acre-feet annually, is to be increased by the yield due to added storage facilities when and as constructed. In addition, contracts may be executed for interim or nondependable water supply subject to reduction or termination by the State at any time.

"(b) For the furnishing of stated maximum annual amounts of project water. The time and rate of furnishing of water delivery during any year by the State will be pursuant to schedules and amendments thereof submitted by the contracting agency for such year. The State will comply with such schedules consistent with its delivery ability taking into account all such schedules submitted by agencies entitled under contract to a dependable project water supply.

"(c) That in the event of a shortage in the dependable project supply available in any year for export, project water will be prorated among all export contractors. Each contracting agency will receive an amount of water which bears the same relationship to the available supply, computed on the same basis as the project yield studies, that the amount called for in the agency's contract for a particular year bears to the total amount of water required to be delivered pursuant to all contracts in the respective year. However, the Department will reserve the right to prorate on some other basis if required to meet necessary demands for domestic supply, fire prevention, or sanitation in the respective year or season.

"(d) That bond funds will be used to construct added storage facilities and related facilities for local needs to meet commitments to export from the Delta to the extent that California Water Fund monies are used for construction of the original facilities and to the extent such added construction is required by virtue of a reduction, occasioned by operation of area of origin statutes, in the amount of water available for export. This will be subject to the proviso, however, that to the extent that the Director at any time after 1985 finds that any such funds are not then required to meet such reduction and will not be required for such purpose within the next succeeding 10 years, any such funds may be used for the construction of added storage facilities to meet increased demands for export to or from the Delta and to meet local needs.

"(e) That the State will plan the availability of water from the Delta so that deliveries can be made at the time and in the amounts scheduled in the contracts. To the extent possible, five years notice shall be given of any reduction in deliveries which will occur as a result of operation of area of origin statutes.

"10. Construction of any transportation facility financed wholly or in part through the sale of bonds, will not be started unless water service contracts have been executed which will insure recovery of at least 75 percent of the cost of such facility.

"11. Local contracting agencies may make funds available for construction or completion of construction of initial or ultimate facilities and will be credited to the extent of such contributions.

"12. As a general policy, contracts for project water will be executed with public agencies having the taxing, assessment or equivalent power and all other powers required in order to comply with the terms of the contract. Contracts will be executed with others not having the taxing, assessment or equivalent power only when the State can be provided with security sufficient to insure that the obligations incurred will be paid.

"13. Each contracting agency will agree that, in the event in any year it is unable or fails through other means to raise the funds necessary in any year to pay to the State the sum required under the contract, it will use its taxing or assessment power to raise such sum."

The Prototype Contract

The prototype contract with the Metropolitan Water District of Southern California follows the Governor's Contracting Principles. Basically, the contract commits the State to make a water supply available to the contractor and commits the contractor to repay all costs incurred in making such a supply available. The detailed provisions defining the conditions under which the responsibilities of the State and of the contractor shall be carried out makes the document a very complex one. The description presented below is intended to cover only the most important concepts contained in the contract.

Introductory Provisions

This part of the contract includes those definitions which are essential to the terms which follow. Capital costs are defined as all costs incurred subsequent to authorization of the various project facilities. The project repayment period is established as beginning on January 1, 1961, and extending until all bonds secured by the pledge of revenues provided for by the Burns-Porter Act have been repaid.

Various kinds of project conservation facilities are defined. Initial facilities are those to be built at the outset to develop the minimum project yield. Additional facilities are those necessary to prevent any reduction in the minimum project yield. Supplemental facilities are defined as those necessary to supply water in addition to the minimum project yield and to meet local needs.

The minimum project yield is estimated in the contract to be 4,000,000 acre-feet per year, but the actual amount is to be determined by the State on the basis of coordinated operation studies of initial and additional project conservation facilities.

Project transportation facilities are defined as the pumping plants, conduits, and regulating reservoirs necessary to delivery water to the contractor.

The term of contract is defined as the period commencing with the date on which the contract is executed and continuing for the project repayment period or for 75 years, whichever is longer. The contractor is given the option to receive continued service after the expiration of the term of the contract under certain specified conditions. The revenues derived from the contract are pledged to the holders of general obligation bonds issued under the Burns-Porter Act and to other purposes, all in accordance with the priorities set forth in that Act.

Water Service Provisions

The contract specifies the estimated year of initial delivery of water to the contractor. It also establishes the annual entitlements to water and the maximum entitlement to be delivered in any year. The annual entitlements, which are set forth in the contract, are important because they form the basis of the Delta Water Charge. Contractors as of December 31, 1963, may elect to increase their maximum annual entitlements, provided that not all of the minimum project yield is under contract by that date.

The State is obligated to make all reasonable efforts to complete the project facilities necessary for delivery of project water to the contractor. The contractor is to specify the size and location of delivery structures required to serve his needs and to advance funds for their construction. A procedure for determining monthly delivery schedules for each year is provided. Criteria are specified for determination of aqueduct capacities.

Three kinds of shortages in water supply are recognized and procedures for handling such shortages are specified. Objectives for the quality of water to be delivered are established, but the State is not liable if these objectives cannot be realized.

Payment Provisions

Payment provisions are divided into two major categories: (1) the Delta Water Charge, and (2) the Transportation Charge. The nature of these charges is described in detail in Chapter XII. The Delta Water Charge recovers all costs of the project conservation facilities allocable to water supply purposes. The Transportation Charge is designed to recover all costs of the project facilities required to deliver water to the contractors.

The contract provides for a surcharge on water used for agricultural or manufacturing purposes on lands in excess of 160 acres in single beneficial ownership, or 320 acres in joint ownership by husband and wife. The amount of the surcharge, in dollars per acre-foot of water, is defined as equivalent to the "power credit." This credit is based on the revenues accruing to the

State from sale of power generated at the project conservation facilities, after deducting capital costs and operation, maintenance and replacement costs of the power producing features.

General Provisions

The contract contains a number of legal provisions required in administration of the contract. Such items as amendments, assignments, and other matters are included.

The contracts with Metropolitan Water District of Southern California and San Bernardino Valley Municipal Water District, provide in Article 45, that all water supply contracts must be substantially uniform with respect to basic terms and conditions.

Standard Provisions for Water Supply Contract

On August 3, 1962, the Director of Water Resources approved "Standard Provisions for Water Supply Contract," which compiled those provisions of the prototype contract that would remain the same for each contractor. Most of the provisions are identical with those contained in the contract with Metropolitan Water District of Southern California. Minor changes were made for sake of clarity and to remove provisions that were unique to the Metropolitan contract because of physical conditions and other factors. Article 45 of the prototype contract was omitted since the requirement for substantial uniformity was established by the prototype contract.

Status of Contracting Program

As of March 1, 1963, contracts had been executed with twelve agencies, three in Northern California and nine in Southern California. These agencies, and their maximum annual entitlements, are shown in the following tabulation.

Agency	Maximum annual entitlement in acre-feet
Metropolitan Water District of Southern California	1,500,000
San Bernardino Valley Municipal Water District	90,000
Alameda County Flood Control and Water Conservation District (Zone 7)	40,000
Alameda County Water District	42,000
Santa Clara County Flood Control and Water Conservation District	88,000
Antelope Valley-East Kern Water Agency	120,000
Desert Water Agency	33,000
San Gabriel Valley Municipal Water District	25,000
San Gorgonio Pass Water Agency	15,000
Palmdale Irrigation District	15,000
San Luis Obispo County Flood Control and Water Conservation District	25,000
Santa Barbara County Flood Control and Water Conservation District	60,000
TOTAL	2,053,000

The total of 2,053,000 acre-feet is 51 percent of the minimum project yield of 4,000,000 acre-feet per annum.

CHAPTER XI. PROJECT COSTS

This chapter discusses the bases on which the capital and annual costs of the State Water Project have been developed. Nearly all of the estimates of capital costs were prepared originally on the basis of fiscal years, consistent with departmental accounting procedures. The repayment provisions of the prototype water service contract are based on calendar years. Therefore, the original estimates have been converted to calendar year data, under the general assumption that costs would be distributed uniformly throughout the particular fiscal year considered. Operating costs, on the other hand, have been developed directly on the basis of calendar years.

Capital Costs

Capital costs are based in part on actual costs incurred since the date of first project authorization, 1951, and in part on estimates based on preliminary designs and on unit prices prevailing in September 1962. Capital costs consist of the following:

1. Labor, materials, supplies, utilities, and services during construction.
2. Land, easements, and rights-of-way.
3. Railroad, highway, and utility relocations.
4. Clearing and preparing project land.

5. Special works and services provided during construction such as those necessary for the protection of public health and safety, purchases and transportation of water for subsidence preconsolidation, etc.

6. Preservation of fish and wildlife.

Items (1) through (6) are described as "field costs." These costs reflect certain allowances for contingencies during the construction period and they range from about 10 percent to 25 percent of the particular "field cost" considered, with an average of about 15 percent.

Continuing the itemization of the components of capital costs:

7. Design and advance planning costs. These are about eight percent of "field costs."

8. Construction supervision, including allocated departmental general expense, design support during construction, etc. Construction supervision is applied at varying rates to the "field cost" of different groupings of structures as follows:

Oroville Dam, major pumping plants, powerplants, and major tunnels	7%
Major aqueducts	11%
All other dams, branch aqueducts, roads, and miscellaneous structures	15%

9. Operation, maintenance, and allocated general project operating costs incurred:

a. During construction for all facilities.

b. After construction for aqueduct system capacity for the period prior to the time when individual water service contractors are obligated to start annual payment of the Minimum Operation, Maintenance, and Replacement Component of the Transportation Charge.

10. Local impact aid. This is the estimated state's share of payments to local public agencies for temporarily increased municipal costs directly attributable to the influx of workers during the project construction period.[1/]

11. Preliminary planning costs that have been accumulated prior to the preparation of final design. For example, the Delta Facilities and the San Joaquin Drainage Facilities are still in the formulation phase. The estimate of their total capital cost includes an amount to cover the expense of this preliminary planning.

Table 12 presents the estimated annual capital costs by features. Table 13 summarizes the estimated annual capital costs by major components of cost.

1/ Division 19 of the Water Code, commencing with Sec. 65000.

Treatment of Interest During Construction

The Burns-Porter Act has been interpreted to prohibit use of funds provided under the act for payment of interest during construction on bonds issued to finance construction. Consequently, the capital costs presented in Table 12 do not include any cost of interest during construction. The interest cost on all reimbursable capital expenditures, however, is included in the formulas on which contractual repayment obligations are based.

Federal Share of Capital Costs

Several features of the State Water Project serve purposes for which the federal government has financial responsibility.

Oroville Dam and Reservoir. By agreement dated March 8, 1962, the federal government will contribute for flood control at Oroville Dam an amount equal to 22 percent of the capital cost, exclusive of power features, but not to exceed $85,000,000, including separable federal costs. The federal contribution, including the capitalized value of related annual operating costs, is presently estimated as $66,000,000.

Delta Facilities. These facilities are still in the formulation stage, and no formal negotiations have been started with the federal agencies. As planned by the State, however, the facilities will provide significant flood control benefits. On the basis of the State's allocation, these benefits would justify a federal contribution of about $11,000,000.

Del Valle Dam and Reservoir. The federal contribution for flood control purposes is presently being negotiated. For this report a federal contribution of 23 percent of the presently estimated capital cost of the dam and reservoir, including the capitalized value of annual operating expenses was assumed which would amount to $2,453,000.

San Luis Division. The San Luis Division of the California Aqueduct is a joint-use facility shared by the State and the Bureau of Reclamation. The costs are allocated in accordance with the Federal-State agreement of December 30, 1961. The agreement specifies that the Bureau of Reclamation shall pay 45 percent and the State 55 percent of the cost. The joint costs are defined in the agreement as only those costs incurred after July 1, 1959. State costs prior to that date, which were a relatively small amount, are added to the State's share of the joint costs. The net result is an estimated overall federal cost of $195,000,000 and a state cost of $242,000,000.

San Joaquin Drainage Facilities. These facilities to alleviate the drainage problems in the San Joaquin Valley, both present and future, are being planned to carry off surplus waters of poor quality from the federal San Luis service area as well as from areas to be served by the State Water Project. In this report the costs of the total facility have been allocated on the basis of the proportionate capacity requirements of the two agencies.

For the particular drainage plan utilized herein, the estimated allocation is $58,899,000 to the State Water Project and $9,380,000 to the Bureau of Reclamation.

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Table 14 summarizes the estimated annual capital costs of the State Water Project assumed to be allocated to the federal government.

Annual Costs

Generally, annual costs consist of expenditures for operation and maintenance, general expense, replacement, and electric power capacity and energy.

Operation and Maintenance Costs

Operation and maintenance costs are those costs directly attributable to salaries, materials and supplies, and motor vehicle equipment expenses, after construction has been completed.

The cost of salaries and major equipment expenses are based on estimates of the personnel and equipment required to maintain and operate the project. Estimates of personnel are based on 13 proposed maintenance yards located at strategic points in relation to the project. Projections of personnel and equipment are based on Bureau of Reclamation experience with the Delta-Mendota Canal, modified to fit the state's requirements, and on a conventional type of operation, that is, a nonautomated system. Studies of automated operation, as noted in Chapter VIII, are being made.

Individual maintenance yard costs for aqueducts are allocated to the aqueduct reaches within the yard's area of responsibility on the basis of aqueduct length. Salaries are derived by applying top-of-grade pay rates as of December 31, 1961, to the projected employee classifications. The values thus obtained are reduced by 10 percent to allow for transitory unfilled positions and personnel below top-of-grade. This basic salary is increased by 23 percent, in the case of the Sacramento headquarters and major area headquarters personnel, and by 30 percent, in the case of maintenance yard personnel, as an added allowance to cover costs of retirement contributions, standard operating costs, and indirect charges.

Materials and supplies for electro-mechanical equipment are assumed to be a function of installed capacity and quantities and costs are based on Bureau of Reclamation experience. Materials and supplies for reservoirs and aqueducts are estimated as a function of maintenance personnel requirements and are based on state and Bureau experience for related work.

General Expense

General expense includes the engineering, general administration, legal, and financial costs not directly chargeable to operation and maintenance. General expenses are considered as two categories of cost, namely, those connected with personnel assigned to maintenance yards and those of personnel in the Sacramento

headquarters and in the major area headquarters who would be assigned to activities related to the project.

An item equal to 10 percent of the maintenance yard salaries has been assumed to provide for departmental overhead costs required for personnel directly associated with operation and maintenance activities. This general expense item is assigned directly to the same aqueduct reach or feature as the salaries with which it is associated.

Basic salaries of personnel in the Sacramento headquarters and the major area headquarters, in addition to a 23 percent increase for retirement and standard operating and indirect costs, are increased by 52 percent to cover departmental overhead. The sum of all costs for headquarters personnel, amounting to 175 percent of their basic salaries, is considered as general expense and is allocated for each year to the reach or other feature of the facilities on the basis of the reach's or feature's proportionate share of the maximum direct operating costs under full project development.

Replacement Costs

Replacement costs are the costs of replacing those facilities or major items of equipment, such as pumps, generators, and valves, having a useful life shorter than the project repayment period. The costs presented are based on the establishment

of sinking funds which, at interest, will provide sufficient moneys to replace such physical items at the end of their economic life.

Power Costs

The bases for estimates of the cost of electrical power for project pumping are discussed in Chapter IX.

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Table 14 summarizes the estimated annual operating costs for the project.

CHAPTER XII. PROJECT WATER REVENUES

As pointed out in Chapter X, the provisions of water supply contracts are based on the statement "Contracting Principles for Water Service Contracts under the California Water Resources Development System." The most important specific criteria that were developed to insure that water supply contracts would conform to these principles may be summarized as follows:

1. Charges for water must insure the return to the State of all reimbursable project costs, with interest, and must at the same time provide for equitable allocation of costs to the individual contractors.

2. The total annual charge to contractors will be the sum of the Delta Water Charge and the Transportation Charge, for that year.

3. Each of the two charges will be further subdivided into the following components:

   (a) A capital cost component

   (b) A minimum operation, maintenance, power, and replacement component

   (c) A variable operation, maintenance, power, and replacement component

4. The capital and minimum components will be collected irrespective of the annual amounts of water received, while the variable component will be collected on the basis of the annual amounts of water received.

5. The Delta Water Charge together with revenue from sale of power must return all costs allocated to the project function of water conservation, and will be a single price per acre-foot for all contractors.

6. The Transportation Charge must return all costs allocated to the project function of water transportation.

7. Cost allocations shall be on a proportionate use basis by contractors for water transportation facilities.

Costs by Repayment Components

The costs included in each repayment component are identified and discussed in the following sections.

Delta Water Charge

The Delta Water Charge is basically a charge to insure the availability of water for delivery to the contractor, and as such, is determined on the basis of a rate per acre-foot of water. Those costs allocated to the purpose of water conservation form the basis of the charge. They are:

1. The costs of units of the Upper Feather Division of the Feather River Facilities allocated to water conservation.

2. The costs of the Oroville Division of the Feather River Facilities allocated to water conservation.

3. Costs of the Delta Facilities allocated to water conservation.

4. Costs of the California Aqueduct located below the Delta which are allocated to water conservation, consisting of: The State's share of San Luis Dam, Reservoir, and Pumping-Generating Plant of the San Luis Division; a portion of the State's share of the aqueduct reach San Luis Forebay to Mile 18 Pumping Plant of the San Luis Division; and a portion of the North San Joaquin Division of the California Aqueduct.

5. All costs of electrical generation and transmission facilities constructed in connection with the above initial project conservation facilities.

6. Costs of additional project conservation facilities and of supplemental conservation facilities[1/] which are allocated to water conservation.

It is pointed out, however, that not all of the costs of conservation facilities will be recovered through the

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1/ Articles 1(h) and 1(n) of "Standard Provisions for Water Supply Contract."

Delta Water Charge, since revenues from the sale of electrical energy generated at a conservation facility will be applied to the repayment of the costs of that conservation facility.

Item 6 above identifies a significant and fundamental difference between the Transportation Charge and the Delta Water Charge, in that the latter is not restricted to the initial project, i.e., the State Water Facilities. Rather, it applies to the entire California Water Resources Development System. In other words, the conservation portion of the water supply project is "open-ended," and the Delta Water Charge will reflect the costs of all state constructed conservation facilities which are part of the system and which maintain and augment water supplies in the Delta.

The prototype water supply contract specifies that, after 1969, the Delta Water Charge must be sub-divided into the capital, minimum, and variable components listed above. This sub-division would not affect the estimated total charge or the estimated amount of project revenues. Consequently, the Delta Water Charge, for purposes of this report, is treated as a total amount, and no sub-division by components is made. Costs allocated to water conservation, and use as the basis for the Delta Water Charge, are presented in Table 16.

Transportation Charge

In contrast to the Delta Water Charge, which is basically a unit commodity charge, the Transportation Charge is essentially a charge for the use of facilities. It includes all of the State's share of costs of the North Bay, South Bay, and California Aqueducts, except those portions of the North San Joaquin and San Luis Divisions which are allocated to water conservation.

Capital Cost Component. This component includes the repayment of all costs incurred from the date of authorization of construction of the particular facility, generally to the date that the various aqueduct reaches attain operational status. In addition, the component recovers the initial costs of electrical-mechanical units whose installation is staged within the operational period. Estimated annual capital costs of the transportation facilities, by aqueduct reaches, are presented in Tables 17, 18, and 19, for the North Bay, South Bay, and California Aqueducts, respectively. The capital cost component for each water supply contractor represents the annual payments for an allocated share of the tabulated reach costs placed on an appropriate amortization schedule.

Operating Cost Components. The costs included in the minimum operating cost component are those operating costs which are incurred irrespective of the actual amount of water delivered during a particular year. They are those annually

occurring costs which are required to maintain the delivery capability of the transportation facilities whether such facilities are conveying large or small quantities of water, and a pro-ration of overhead costs incurred for the project as a whole and which cannot be directly associated with a particular facility or reach. The costs included in the variable operating cost component are those which vary with, or are dependent upon, the annual water deliveries.

The distribution of annual operating costs between the minimum and variable components has been made in accordance with the following tabulation:

Operating Cost Category	Items of Transportation Operating Costs
1. Variable	The following items for each pumping or power recovery plant which are allocable to the conveyance of annual deliveries from downstream reaches: Electrical power capacity costs or credits. Electrical energy costs or credits. Sinking fund deposits for the replacement of electro-mechanical units. Materials and supplies for electro-mechanical units.
2. Minimum a. Direct Costs	The preceding items for each pumping or power recovery plant which are allocable to the conveyance of annual losses occurring in downstream reaches: Sinking fund deposits for the replacement of items other than electro-mechanical units. Materials and supplies for the items other than electro-mechanical units. Salaries of operation and maintenance personnel plus 40% pro rata on salaries for overhead.

b.	General Costs (Allocated to reaches on the basis of maximum yearly values of (a) above.)	Sacramento headquarters overhead, including share of department overhead. Major area headquarters overhead, including share of department overhead.

Estimated annual minimum operating costs of the transportation facilities, by aqueduct reaches, are presented in Tables 20, 21, and 22, for the North Bay, South Bay, and California Aqueducts, respectively. Estimated annual variable operating costs of the transportation facilities, by aqueduct reaches, are presented in Tables 23, 24, and 25, for the North Bay, South Bay, and California Aqueducts, respectively.

Bureau Water Charge

Water service from the South Bay Aqueduct involves a temporary special charge, in lieu of the Delta Water Charge. This charge covers the cost of water purchased from the Bureau of Reclamation, that is delivered via the Delta-Mendota Canal of the federal Central Valley Project, prior to the time when state water will be available, as discussed in Chapter VII.

Allocation of Costs to Water Supply Contractors

The project costs involved in the Delta Water Charge are recovered from all contractors on the basis of a single rate and the quantities of water they are entitled to receive. The costs of the transportation features of the project must be specifically subdivided and allocated to the individual contractors on the basis of their proportionate use of the transportation

facilities. The cost allocations are made on this basis, with modification to allow for such special allocation considerations as seepage losses, emergency storage, regulatory storage, etc.

Fixed Transportation Costs

Fixed transportation costs consist of the capital cost component and the minimum operating component of the transportation charge. These costs are allocated by a proportionate use of facilities method of cost allocation. The measure of proportionate use is the mean of the following ratios:

1. The ratio of each contractor's maximum annual entitlement to be delivered from or through a reach to the total maximum annual entitlements of all contractors to be delivered from or through a reach; and

2. The ratio of the capacity provided in a reach for the transport and delivery of project water to a contractor to the total capacity provided in a reach for the transport and delivery of project water to all contractors served from or through a reach.

Variable Transportation Costs

In accordance with Article 26 of the standard contract provisions, the proportionate use of an aqueduct reach for the purpose of allocation of variable transportation costs is measured by the total quantity of water delivered from or through the reach to each contractor within a given year. The variable cost is the

only component of the Transportation Charge whose proportionate distribution among contractors changes from year to year.

Joint Conservation-Transportation Costs

The "Standard Provisions for Water Supply Contract" provides that the allocation of costs in aqueduct reaches used jointly for conservation and transportation shall be by the proportionate use of facilities method, although the measure of such use is not specified. As previously pointed out, the North San Joaquin Division and the first reach of the San Luis Division of the California Aqueduct serve both of those functions.

In the North San Joaquin Division, the aqueduct reaches will be utilized solely for water conveyance. The measure of proportionate use between the two functions cannot be based upon quantities of water, since all water conserved will also be transported. Therefore, conveyance capacities are considered to be an equitable measure of use. The minimum capacity of the aqueduct in the North San Joaquin Division is set forth in the Burns-Porter Act as 10,000 second-feet. As shown in Table 4, the division is subdivided into two reaches: (1) Delta through Bethany Forebay, from which the South Bay Aqueduct diverts; and (2) Bethany Forebay to San Luis Forebay. If San Luis Dam and Reservoir were removed from the project, the required transportation capacities of these two reaches would be 7,350 and 7,050 second-feet, respectively, including

allowances for losses occurring within the reaches. It is assumed, therefore, that the capacities in excess of those required for transportation are allocable to water conservation.

The first aqueduct reach of the San Luis Division will be utilized not only for conveyance, but also as a forebay to the San Luis Pumping-Generating Plant and to the Mile 18 Pumping Plant. The former plant is required for the conservation function, while the latter is required solely for transportation. The entire reach will be constructed on a flat gradient thus permitting flows in either direction. Due to the complexity of uses of the reach, the total capacities of the San Luis Pumping-Generating Plant and Mile 18 Pumping Plant are considered to be an equitable measure of use between water conservation and water transportation, respectivley. The design capacity of the San Luis Pumping-Generating Plant is 11,000 second-feet, and for Mile 18 Pumping Plant, 13,100 second-feet. The above assumptions result in the following allocation percentages for the three aqueduct reaches with dual conservation-transportation functions:

Reach	Conservation	Transportation
Delta Through Bethany Forebay	26.504%	73.496%
Bethany Forebay to San Luis Forebay	29.485%	70.515%
San Luis Forebay to Mile 18 Pumping Plant	45.640%	54.360%

The costs allocated to transportation by the foregoing percentage factors are reallocated to water supply contractors in the same manner as described previously.

Special Allocation Considerations

Although the standard contract provisions specify the general measures of proportionate use, they do not cover certain special situations. These special situations are discussed below, together with an explanation of their treatment in this report. Such treatment is subject, however, to future modification as operational criteria become final.

Regulatory Storage. The mean of ratios based on entitlement and transportation capacity cannot logically be applied as a measure of use for a regulation reservoir. The measure of such use theoretically should reflect the relative degree of regulation required for each contractor and this cannot be directly determined from either maximum annual deliveries or maximum required transportation capacity. It has been assumed for purposes of this report that where terminal regulation is required, the relative degree of regulation is the same for all contractors. Under this assumption, the measure of use is in proportion to the maximum annual entitlements to be regulated.

Emergency Storage. The measure of a contractor's use of emergency reservoir storage is based upon the amount of such storage reserved for the contractor, and costs are allocated accordingly. Although there will be emergency storage capacity in the Airpoint Reservoir of the South Bay Aqueduct, the allocation of costs for this unit presents no special problems since

the capacity is solely reserved for the terminal contractor. On the other hand, all three reservoirs in Southern California will contain both regulatory and emergency storage capacity which will be available to several contractors in varying amounts. The emergency storage is generally sufficient to provide a four-week water supply, based upon maximum annual entitlements, for each contractor except those in Southern California taking deliveries above Castaic and Cedar Springs Reservoirs.

Reserve Capacity. Aqueduct capacity is necessary to replenish emergency storage under conditions of full project development and to provide operational flexibility within the system. For this reason, conveyance capacities of the California Aqueduct in reaches downstream from the San Joaquin Valley have been based upon the larger of the following: (1) the maximum reach capacity required to permit downstream deliveries on demand, in conjunction with regulatory storage, or (2) the capacity required to convey downstream water quantities on a continuous basis, plus $7\frac{1}{2}$ percent. This results in excess aqueduct capacity through the San Joaquin Valley for Southern California and Coastal deliveries of at least $7\frac{1}{2}$ percent during months when agricultural water demands are low. On an annual basis, this reserve capacity will convey roughly six percent of the annual entitlements of the Southern California and Coastal area contractors ($7\frac{1}{2}$ percent as reduced by the proportion of time within a year that onpeak agricultural use prevents full use of reserve capacity).

Under present design of the upper reaches of the California Aqueduct, the provision of downstream reserve capacity does not affect final capacities, however, for allocation purposes, the annual quantities susceptible of being conveyed in the offpeak months for Southern California and the Coastal area are included in the gross water quantities associated with deliveries to these two regions. The allocation of costs of reserve capacity and associated water quantities in the aqueduct among the downstream contractors is based on the distribution of such capacity in proportion to their maximum annual entitlements.

Compensating Regulations. Ordinarily, the aqueduct reaches involved in providing deliveries to a particular contractor consist only of those lying between the supply source (the Delta) and the contractor's turnout structure. However, the situation arises in the South Bay area and Southern California where contractors upstream from a regulatory reservoir take a fluctuating delivery from an aqueduct in which the water is moving on a constant flow basis. Water deliveries made in this manner are contingent upon the use of downstream reaches to and including a regulatory reservoir. In these special cases, the aqueduct must be increased in size, and such contractors must be allocated a portion of the costs below their turnout. The quantity of water hypothetically conveyed in such a situation is not the entire maximum annual entitlement of the contractor, but only that

portion which is regulated in the downstream reservoir. This is taken as the volume diverted during the year at discharge rates in excess of the equivalent uniform flow of the contractor's annual entitlement. The downstream capacity to be used in such a situation is that over-and-above the capacity that hypothetically would be required had the contractor taken his delivery on the basis of a constant flow. This capacity is numerically equal to the difference between the equivalent uniform flow of the contractor's annual entitlement and the capacity required to provide the contractor's minimum monthly demand.

Evaporation and Seepage Losses. The costs associated with water losses in open conduit are allocated according to the mean measure of proportionate use. The unique characteristics of such losses, however, must be accounted for both as to quantity of water and the required conveyance capacity. For example, the magnitude of evaporation losses vary throughout the year, depending on the climate of the region. Seepage losses, a function of the wetted perimeter, will occur generally at a more constant rate since fluctuations of water surfaces will be held to an operational minimum. Water transported in upstream reaches to compensate for these losses must be conveyed on demand, or on

a constant flow basis, depending on the availability of regulatory aqueduct storage.

Capacity to compensate for losses occurring within a particular aqueduct reach is allocated on the basis of the water leaving the reach, either as deliveries through contractor turnout structures, or as inflow to the succeeding downstream reach. It is necessary, therefore, to initiate such computations with the terminal reach of each aqueduct branch and to progressively allocate capacity to compensate for losses upstream until the point of supply is reached. Therefore, each increment of loss, both as to the quantity of water and the required aqueduct capacity, is identified with the appropriate contractor, and is progressively compounded in subsequent upstream allocations to reflect the true gross requirements for water delivery at any point in the transportation system.

Summary of Allocation Factors

The preceding special considerations have been accounted for in computing the estimated water charges in this report. The resultant ratios of proportionate use of each aqueduct reach for each contractor are shown in Table 26 for the South Bay Aqueduct, and in Tables 27, 28 and 29 for the California Aqueduct. These ratios of proportionate use are appropriate only for the project outlined in this report.

Determination of Annual Charges to Contractors

The determination of water charges will be a continuous process throughout the repayment period, involving the annual recomputation of all charges in order to reflect: (1) actual costs as they are compiled in accounting records, (2) estimated costs based on current projections, (3) credits for revenues received under prior charges, and (4) the adjustment of estimated future charges to reflect overpayments or underpayments of prior charges. Repayment schedules will be transmitted annually to all contractors in the form of the tables specified in the contracts. These calculations will be completed on or before July 1 of every year, at which time statements of charges for the following calendar year will be furnished to the contractors.

Factors Associated with Determinations of Annual Charges

In addition to determining the ratios of proportionate reach use and the basic costs to be allocated, two other items must be determined before the annual charges can be computed. These are the project interest rate and the project repayment period.

Project Interest Rate. Article 1(r) of the standard contract provisions defines the project interest rate as the weighted average of the interest rates paid by the State on bonds issued under the Burns-Porter Act without regard to any premiums received. It is important to note that the contractors'

interest cost is not the same as the project's out-of-pocket interest cost because interest is not actually paid out on a large segment of capital funds used to finance construction. The California Water Fund comprises the bulk of this category.

Other pertinent aspects of the project interest rate are:

1. It is indexed to the total amount of bonds issued, not to the bonds outstanding, and is therefore constant only after all bonds have been issued under the act.

2. It is retroactive; that is, it applies to all reimbursable costs, including those incurred prior to the time the Burns-Porter Act was approved by the electorate.

3. The project interest rate is set at 4 percent per annum until the first bonds are issued as provided in Article 1(r) of the standard contract provisions. Consequently, that rate has been used for all studies in this report.

Project Repayment Period. In accordance with Article 1(t) of the standard contract provisions, the project repayment period is the period beginning January 1, 1961, and extending until all bonds secured by the pledge of revenues provided for by the Burns-Porter Act have been repaid. Since the maximum term of the bonds is 50 years, the project repayment period will end no later than

50 years after the last bonds are issued. It is not known now just when this last issue will occur, but undoubtedly the date will be governed by the use of those bonds set aside for additional conservation facilities as a result of the use of the California Water Fund. For the purposes of the calculation of the Delta Water Charge for this report, it is assumed that the last bond will be issued in 1985, with the end of the project repayment period occurring in the year 2035.

Delta Water Charge

The Delta Water Charge for a particular contractor is computed as the product of the contractor's annual entitlement to project water and the Delta Water Rate. Article 22(c) of the standard contract provisions contains a formula for computing the Delta Water Rate. The formula establishes the Delta Water Rate as the summation of all net annual costs allocated to conservation over the project repayment period, after deducting revenues from electrical energy generation, divided by the summation of all annual water deliveries over the project repayment period, both computed on a present worth basis. Thus, the Delta Water Charges, together with revenues derived from electrical energy generation, recover, over the project repayment period, all costs allocated to water conservation.

The "Standard Provisions for Water Supply Contracts" provide, in Article 22(b), that the Delta Water Rate will be $3.50 per acre-foot, without regard to components, through December 31, 1969.

After that date, the rate will be computed in accordance with the concept of the formula as follows:

1. The present worths of the differences between all appropriate costs and electrical energy revenues accounted to the time considered at the current project interest rate; plus

2. The present worths of the differences between all estimated future costs and electrical energy revenues, ignoring the construction of future additional or supplemental conservation facilities, to be incurred for the remainder of the project repayment period at the current project interest rate; minus

3. The present worths of all actual charges under the appropriate component collected to the time considered at the current project interest rate; the above quantities all divided by

4. The present worths of the total annual entitlements remaining in the project repayment period, from the time considered.

The application of the foregoing procedure will produce a nearly constant unit rate after December 31, 1969, with adjustments only in the years of initial capital expenditures for construction of additional or supplemental conservation facilities.

The computation of projected Delta Water Rates is shown in Table 30, based on the costs allocated to water conservation as shown in Table 16, and on water deliveries from initial and additional project conservation facilities as shown in Table 9. From the initial rate of $3.50 per acre-foot, the rate increases to about $4.99 per acre-foot on January 1, 1970, and to $6.78 per acre-foot on January 1, 1978, the estimated year in which costs will first be incurred for construction of the Middle Fork Eel River Project.

Table 31 demonstrates that the Delta Water Charges will amortize the total costs, with interest, allocated to water conservation, over the project repayment period.

Table 32 presents the estimated Delta Water Charges for the six water supply contractors as of October 1, 1962,[2/] together with regional summaries for the water not under contract as of that date.

Transportation Charge-Capital Cost Component

Table 33 presents the estimated capital costs allocated to the six water supply contractors and summaries of the costs not covered by contracts as of October 1, 1962. Table 33 is based on the application of the proportionate use factors presented in Tables 26 and 29 to the costs presented in Tables 17, 18, and 19.

While the major factors involved in calculating the capital cost component of the transportation charge for each contractor are the appropriate allocation factors and the costs to be allocated, two additional factors also must be considered.

2/ While other contracts have been signed as indicated on page 160 the time required for the large amount of computational work did not allow the tables to be revised. They will be revised in the next edition to this report. Locations of agencies under contract as of October 1, 1962, and potential service areas are shown on Plate V.

These are:

1. The date of the initial repayment obligation for each contractor.

2. The method of repayment negotiated with each contractor.

Data relating to these factors are summarized in the following tabulation.

ASSUMED FIRST YEAR OF REPAYMENT
FOR WATER SUPPLY CONTRACTORS

Contractor	Calendar year of first payment	Component of transportation charge in first payment
Existing Contractors (As of October 1, 1962)		
Metropolitan W.D. of Southern California	1963	Capital Cost Component
San Bernardino V.M.W.D.	1963	Capital Cost Component
Santa Clara Co. F.C. & W. C. D.	1963	Capital and Minimum Components
Alameda Co. F.C. & W.C.D. Zone 7	1962	Minimum and Variable (Capital in 1963)
Alameda Co. Water District	1962	Minimum and Variable (Capital in 1963)
Antelope Valley-East Kern W.A.	1963	Capital Cost Component
Potential Service Regions		
Remaining Southern California Areas[a]	1964	Capital Cost Component
Central Coastal Area[b]	1964	Capital Cost Component
San Joaquin Valley[c]	1967	Minimum Component (Capital in 1968)
Remaining South Bay Areas	1964	Capital, Minimum and Variable
North Bay Area	1964	Capital Cost Component
Unallocated Reserve[d]	1965	Capital Cost Component

[a] As of March 1, 1963, water supply contracts have been signed with four other agencies, as follows: Desert Water Agency, San Gabriel Valley Municipal Water District, San Gorgonio Pass Water Agency, and Palmdale Irrigation District.

(Footnotes continued on next page.)

Method of Repayment. Under Article 24(c) of the standard contract provisions, each allocated amount of annual capital expenditure is repaid in 50-equal annual installments calculated at the project interest rate. All contracts executed to date, except those with San Luis Obispo and Santa Barbara County Flood Control and Water Conservation Districts, have specified this type of repayment. The contracts with those two agencies provide for deferment of capital charges for the first portion of the Coastal Aqueduct if it is constructed for San Joaquin Valley agricultural water requirements before the facility is needed for the coastal counties. However, Article 45 of the prototype contract provides that repayment of the capital cost component of the Transportation Charge may be modified

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Footnotes continued from previous page.

b/ As of March 1, 1963, water supply contracts have been signed with San Luis Obispo County Flood Control and Water Conservation District and Santa Barbara County Flood Control and Water Conservation District.

c/ All capital cost components are assumed to be repaid in 50-equal annual installments, except for potential contractors in the San Joaquin Valley. Contractors in the San Joaquin Valley (excluding the 15,000 acre-feet "unallocated reserve") are assumed to repay transportation capital costs on the basis of an equivalent unit rate. The "unallocated reserve" is assumed to be used for municipal and industrial purposes.

d/ "Unallocated Reserve" represents 15,000 acre-feet of the minimum project yield in excess of the assumed service area allocations. This quantity of water is assumed to be located physically at Avenal Gap.

depending the State's appraisal of the financial capability of the potential contractor. This variation does not alter the basic requirement that all contractors must repay their total allocated capital costs within the project repayment period at the project interest rate. It has been assumed in this report that all contractors except those within the San Joaquin Valley, will pay on the basis of Article 24(c). For San Joaquin Valley contractors, an equivalent unit rate has been assumed.

Repayment Schedule Summary. Table 34 presents the capital cost component of the Transportation Charge for the six water supply contractors and a summary for the remaining costs not covered by contracts as of October 1, 1962, based on the allocated capital costs shown in Table 33. Repayments under Article 24(c) are equal to the factor 0.04655 (capital recovery factor for 50 years at 4 percent) times the cumulative capital costs outstanding. Interest and principal are considered to be due in the year following the year during which the cost was incurred. For potential service areas in the San Joaquin Valley, computations of repayment data are based on an equivalent unit rate, computed in a manner similar to the Delta Water Charge, being the present value of the allocated costs in Table 33, divided by the present value of water deliveries as shown in Table 6.

Transportation Charge--Minimum Operating Component

The computation of this charge for each contractor is based upon the allocation factors reflecting the mean measure of proportionate use and the costs to be included in this component. Table 35 presents the annual minimum operating component of the Transportation Charge for the six water supply contractors and summaries of the remaining costs not covered by contracts as of October 1, 1962. The values are based on the mean proportionate use factors presented in Tables 26 and 29, and the annual minimum operating costs presented in Tables 20, 21 and 22.

Transportation Charge--Variable Operating Component

Article 26(a) of the standard contract provisions states how the variable operating component is computed for each contractor.

1. An annual unit charge per acre-foot of downstream delivery is computed for each electro-mechanical plant in the transportation facilities which will recover the estimated variable operation, maintenance, power, and replacement costs for the plants for each year.

2. The charge to any contractor is obtained by multiplying the unit factors associated with each upstream plant by the quantity of water delivered to the contractor.

Annual variable operating components, computed on the foregoing bases, are shown in Table 36. The charges are based on operating costs as shown in Tables 23, 24, and 25, and the quantities of water delivered, as shown in Table 5.

Bureau Water Charge

As pointed out previously, the Bureau Water Charge is a special charge assessed in lieu of the Delta Water Charge for those project deliveries made prior to the beginning of operation of the project conservation facilities. Since the charge to the contractors is the same as the Bureau's charge to the State, the State's financing program is not affected. Consequently, neither the annual charge nor its allocation among contractors is shown in this report. The estimated quantities of water involved are set forth in Table 9.

Total Transportation Charges

Table 37 presents the total transportation charges for the six contractors and summaries for the areas not covered by contracts. The values in Table 37 are the summation of those in Tables 34, 35, and 36.

Total Water Charges

Table 38 presents the total water charges (excluding the Bureau Water Charge) for the six contractors and summaries for the areas not covered by contracts. The values in Table 38 are the summation of those in Tables 32 and 37.

Equivalent Unit Canalside Charges

Table 39 presents equivalent unit rates by charge and by component for the six water supply contractors as of October 1, 1962, and summaries for each major service area. The equivalent unit rate is defined as that constant charge which, when assessed against each acre-foot of delivery during the entire repayment period, will produce a sum by the end of the repayment period equivalent to the annual charges which would have been assessed under a water service contract, together with interest computed at the project interest rate. This rate is not used as a basis for charges to the water service contractors but it does provide an ideal medium for comparison purposes and for analyses of different assumptions regarding factors that affect the components of a contractor's repayment obligations. One of the important factors that is still under study is the cost of power for pumping, as was noted on page 144. The charges in Table 39 are computed on the assumption that power for pumping would be purchased from private utility sources. Studies indicate that if such power were available at prices equivalent to public power costs the unit price at the terminus of the East Branch would be reduced by about $10.00 per acre-foot and at the terminus of the West Branch by about $7.00 per acre-foot. In computing these values it was assumed that power generated at the power recovery plants would be used for project pumping.

Annual Net Operating Revenues

Table 40 presents the annual net operating revenues of the entire State utility program, including water conservation, water transportation, and drainage. Net annual operating revenues are defined as annual revenue over and above annual operating costs. These net revenues are available to the project for meeting its repayment obligations, including general obligation bond service. For the water conservation and transportation portions of the project, Table 40 is numerically equal to the total charges shown on Table 38 less the appropriate annual operating costs presented in Table 15. Since repayment of the San Joaquin Valley Drainage Facilities is currently undefined, it is herein assumed that the net annual operating revenues from this facility will begin in 1968, from payments made on the same bases as contained in Article 24(c) of the standard contract provisions. It also is assumed that annual operating costs will be repaid as such costs are incurred by contractors benefiting from the drain.

CHAPTER XIII. PROJECT FINANCING

This chapter presents the modified financing program which has been developed for the State Water Project. This program means that the State can at the same time build the full flood protection of Oroville Dam without financial problems, provide a cushion against escalation of construction costs and for other contingencies, and assure availability of greater funds for replenishment of the Delta through water development of the north coastal streams.

This program has been developed as the result of intensive studies conducted by the Department of Water Resources during 1961 and 1962 and in close cooperation with the department's financial consultants, Dillon, Read & Co. Inc.

The modifications of the original financing program carefully observe the basic principles of the Burns-Porter Act and of the Governor's policies relating to the State Water Project, and consist of the two following major elements:

1. The department will issue about $327,000,000 in revenue bonds to be supported by the power revenues of the Oroville complex. It is expected that these bonds will be issued over a four-year period beginning in 1964. Revenue bonds are authorized by the Central Valley Project Act.

2. The department will apply federal Oroville flood control reimbursement moneys as necessary to payment of general obligation bond interest during the construction period.

The program will avoid borrowing from the General Fund to meet the costs of bond interest during early construction years on the project. Under the original financing program, it was estimated that such General Fund borrowing would have totalled about $75,000,000.

The modified program will provide a balance of about $234,000,000 of authorized but unissued general obligation bonds available, if needed, as a cushion against contingencies for completion of the State Water Project. This compares with about $33,000,000 which would have been available under the original financing program. If this cushion is not used, there will remain under the modified financing program an estimated $413,000,000 of general obligation bonds available for additional water facilities, including facilities for replenishment of the Delta through north coastal developments. This is $221,000,000 more than would have been available under the original program.

This modified financing program will not change the price charged for project water. The mode of determining this price is fixed by the water supply contracts without regard to the manner of disposition of power revenues or the interest paid on revenue bonds.

The modified financing program is consistent with advice given by the Attorney General[1/]. It requires no new authority from the Legislature.

One of the factors which stimulated the studies culminating in this modified financing program was the fact that the Burns-Porter Act, does not make express provision for the use of Burns-Porter Act proceeds to pay interest during construction. Another was the decision to proceed with construction of Oroville Dam in order to provide vital flood protection, power revenues, and other services at the earliest possible date, to utilize the large investment already in place and to avoid possible escalation of costs.

A brief comparison of the results of the modified financing program with those of the original financing program is set forth in Table 41. Plate VI summarizes in chart form the sources of funds for construction of the State Water Project.

The State Water Project will provide a firm supply of 4,000,000 acre-feet annually to the end of the project repayment period of about 75 years. In this report, it has been assumed that the demand for project water would reach substantially this 4,000,000 acre-feet by about 1990. The department has always recognized, however, that the state's water program must be considered as a continuing one, that the acceleration of the timing

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1/ 36 Ops. Cal. Atty. Gen. 160 (1960); Letter, Attorney General to Controller, August 17, 1962, re deposit of certain water resources revenues.

of demands may lead to a requirement for deliveries of 4,000,000 acre-feet in advance of the assumed year of 1990, and that in any case the demand for water will continue to grow beyond this amount. These accelerated or increased demands may be the result of changes in population trends or other economic factors which cannot now be foreseen, or of changes in the availability of water from the Colorado River or other sources affecting the supplies on which the State of California must rely.

The projected figures and assumptions used herein are in a continuous state of revision, and this report will be revised annually to incorporate changes as they are made. The financial study contained in this chapter has been prepared solely for planning purposes. It is not intended in any sense to forecast certainties, but it serves as a "working model" of the manner in which the project will be financed, and its costs repaid, on the basis of the department's best estimates and assumptions at the time of preparation of this report.

Financing Construction

Estimates of Construction Cost

The costs to the State of construction of the project, after 1960 (the commencement of the project repayment period), are estimated at $1,952,000,000. This excludes $101,000,000 covered by appropriations made prior to the end of 1960. Of this latter amount, $59,000,000 had been expended prior to the effective date

of the Burns-Porter Act (November 8, 1960), and another $5,000,000 was expended during the remainder of 1960, leaving a balance of $37,000,000 in the California Water Fund, reserved for expenditures under prior appropriations, as of the end of 1960. Annual capital expenditures are shown on Plate VII.

For the purpose of this study, the estimated costs include the Oroville flood control features[2/], although it is estimated that at least $66,000,000 will be reimbursed to the State on account thereof by the Federal Government. This reimbursement, while subject to revision in amount and to Congressional appropriation of the required funds, is covered by agreement between the Department of Water Resources and the United States Corps of Engineers. No restrictions are imposed upon the expenditure of these funds and, under the modified financing program, they will be applied toward service of the general obligation bonds to be issued for the project.

The construction cost estimates herein are based on designs which are, to a considerable extent, still fluid. They exclude interest during construction and are derived essentially from the multiplication of estimated unit quantities by estimated

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2/ In addition, it is estimated that $13,000,000 will be received from the Federal Government as reimbursement for flood control features of the Delta Facilities and of the Del Valle Reservoir of the South Bay Aqueduct. In this report it is assumed that these funds will be used directly to construct the appropriate flood control features; consequently these funds are excluded from the estimate of the State's costs.

unit costs at present price and wage levels. The estimates include appropriate allowances for engineering, administration and overhead; they contain allowances averaging about 15 percent for contingencies. They do not include specific provision for increases in price and wage levels because it is not practicable to forecast these over the 23-year period of construction. The following table summarizes these estimated costs:

	Total construction cost	Less: Covered by prior appropriations	Balance of construction cost to be financed (1961 - 1985)
		(000,000)	
Conservation facilities:			
Oroville Division (excluding power facilities	$ 109	$ 19	$ 90
Delta and San Luis facilities, etc. (a)	203	6	197
Additional project conservation facility (b)	169	0	169
Total conservation facilities	$ 481	$ 25	$ 456
Oroville power facilities (c)	267	47	220
Transportation facilities	1,019	25	994
San Joaquin drain (a)	59	1	58
Total utility	$1,826	$ 98	$1,728
Non-utility:			
Davis-Grunsky program	130	0	130
Oroville flood control	66	0	66
Other non-utility	31	3	28
Total	$2,053	$101	$1,952

(a) The San Luis facilities are being, and it is assumed that the San Joaquin drain will be, undertaken jointly with the Federal Government. The estimated Federal expenditures are $195,000,000 for the San Luis facilities and $9,000,000 for the San Joaquin drain, which amounts are not included in the above costs.

(b) The modified financing program includes provision for the construction of an additional project conservation facility for the purpose of firming up the project's water supply of 4,000,000 acre-feet. The development of the Middle Fork of the Eel River, constituting one of the north coastal developments under study by the department, has been assumed to be this facility, although the selection of this facility has not been finalized and will depend upon the results of the department's further studies.

(c) Includes allocated costs of Oroville Dam and Reservoir.

Except for the additional project conservation facility, the foregoing constitute essentially the "State Water Facilities," as defined in the Burns-Porter Act. The foregoing conservation facilities, other than such additional facility, are sometimes called the "initial project conservation facilities."

Funds for Construction

To finance this construction, the funds available to the State under the Burns-Porter Act consist of the proceeds of general obligation bonds authorized to be issued thereunder in the aggregate principal amount of $1,750,000,000, together with certain California Water Fund moneys. The California Water Fund is appropriated for the construction of water facilities by the Burns-Porter Act, which reserves the right of the Legislature to re-appropriate the Fund for other purposes. The projections used herein give effect to certain modifications with respect to the California Water Fund as proposed in the 1963-64 State budget being considered by the Legislature at the time of the preparation of this report.

In addition, the funds available to the State for financing the construction of the project include the amounts to be received from the Federal Government as reimbursement for flood control and the proceeds of revenue bonds issuable under the Central Valley Project Act. According to an opinion rendered by the State's Attorney General in 1960, the pledge of revenues provided by the Burns-Porter Act does not preclude the pledge for such revenue bonds of the revenues allocable to the facilities financed by the revenue bonds. The revenue bonds issuable under the modified financing program will provide proceeds for construction equivalent to the total cost of the Oroville power facilities, including reimbursement for amounts theretofore expended thereon, and will be secured by the pledge of the net revenues derived from these facilities.

Under the Burns-Porter Act, none of the proceeds of the general obligation bonds are made expressly available for the payment of interest during construction. Since the major part of the construction expenditures, namely $1,497,000,000, is to be made in the decade ending with 1970, and an insufficient amount of revenues for the payment of interest on the general obligation bonds will be derived during this period, the payment of bond interest during this period would fall upon the General Fund were it not for the development of the financing program herein described.

An adverse impact upon the General Fund will be avoided under this financing program by reason of (1) the issuance of revenue bonds, as to which the interest during construction can be financed out of the revenue bond proceeds, and (2) the application, toward the payment of service on the general obligation bonds during the construction period, of the Federal reimbursement moneys. The program contemplates the holding of appropriate amounts of the Federal reimbursement moneys, as received, in reserve for application to general obligation bond service to the extent of the deficiency of revenues therefor. Thus these moneys are used, to the extent appropriate, as a bond service reserve fund. As these moneys are expected to be received in installments during the decade ending with 1970 and their projected use for general obligation bond service occurs mostly in the same decade, it is not anticipated that an excessive reserve will be created.

	(000,000)	
General obligation bonds		
Authorized	$1,750	
Deduct: unissued	413	
Issued (proceeds for construction) (a)		$1,337
Revenue bonds		
Issued	$ 327	
Deduct: net interest during construction, etc.	60	
Proceeds for construction (a)		267
California Water Fund		
Balance at beginning of 1961 (b)	$ 90	
Add: accruals (1961-1985)	230	
Add: net revenues paid into this Fund and applied toward construction	28	
Total for construction		348
Total funds for construction		$1,952

(a) It is assumed that all of the bonds will be sold at a net price to the State of 100% of their principal amount.

(b) Excludes amount reserved at beginning of 1961 for expenditures under prior appropriations.

The foregoing information is set forth by years in Table 42.

The modified financing program reduces the total issues of general obligation bonds estimated to be required for the completion of the project by $221,000,000, as compared with the amount otherwise required to be issued. This is the combined result of (1) the issuance of revenue bonds, which finance $267,000,000 of construction, plus (2) a gain of $20,000,000 in the amount of net revenues available, after general obligation bond service, for payment into the California Water Fund and for application therefom toward construction, less (3) a decrease of $66,000,000 in construction financed out of the Federal reimbursement moneys, being the amount of such moneys used for general obligation bond service.

The California Water Fund accruals referred to in the table, aggregating $230,000,000 during the project construction period, constitute net payments received on account of oil and gas royalties and bonuses derived by the State under tidelands leases, as well as interest thereon and some miscellaneous income. These accruals net $40,000,000 for the years 1961 through 1963 and, for the years thereafter through the end of the construction

period, $9,000,000 a year. No accruals to the California Water Fund are assumed for the purpose of this program after the project construction period, although it is expected that these accruals will continue.

Scheduling of Bond Sales

Of the total issues of $1,337,000,000 of general obligation bonds projected, some $1,036,000,000 are expected to be issued in the year 1963 through 1970. This is an average of $130,000,000 a year.

In the interest of orderly marketing, the issues of general obligation bonds have been scheduled so as to produce a maximum annual issue not exceeding $140,000,000. This involves the sale of bonds to some extent in advance of construction requirements with a carry-over of unexpended bond proceeds. The Burns-Porter Act authorizes the use of the interest from the temporary investment of unexpended bond proceeds for construction. It does not expressly authorize the use of this interest to apply on the general obligation bond debt service. Therefore, no such interest income with respect to general obligation bond proceeds has been considered in the financial projections.

Sales of revenue bonds are scheduled for the years 1964 through 1967 at an average rate of $82,000,000 and for a maximum annual issue of $85,000,000 in the aggregate amount of $327,000,000.

In practice, the annual amounts of issues, both of general obligation bonds and of revenue bonds, will necessarily vary somewhat from the pattern set up in the financing program. The issues will have to be fitted in with the State's overall financing requirements in a planned marketing procedure. It is believed that marketing of the revenue bonds will not conflict unduly with the marketing of general obligation bonds since they are of moderate amount in relation to the general obligation bonds and, to a considerable extent, will appeal to a different market.

Offset Bonds

The sum of general obligation bond proceeds and of California Water Fund moneys expended for the construction of the State Water Facilities under the Burns-Porter Act is limited to $1,750,000,000. To the extent that California Water Fund moneys are so expended, the amount of general obligation bonds available for the State Water Facilities is reduced, and a corresponding amount of general obligation bonds is reserved for additional facilities (including the additional project conservation facility identified in the project). These additional facilities do not constitute part of the State Water Facilities. The bonds so reserved are frequently referred to as "offset" bonds. Certain appropriations were made from the California Water Fund prior to the Burns-Porter Act. For the purpose of calculating the amount of offset bonds, these appropriations are treated as having been expended prior to the effective date of the Burns-Porter Act.

As shown below, the amount of offset bonds reserved for additional facilities is $179,000,000 (excluding $169,000,000 used for the additional project conservation facility):

	State Water Facilities	Additional facilities	Total
	(000,000)		
General obligation bonds issued	$1,168	$ 169(a)	$1,337
California Water Fund expenditures	348	0	348
Total use of general obligation bonds and California Water Fund moneys	$1,516	$ 169	$1,685
Available balance of authorized general obligation bonds	234(b)	179(c)	413
Total of authorized general obligation bonds and California Water Fund moneys	$1,750	$ 348	$2,098

(a) Additional project conservation facility. It makes no difference in the result whether this is considered to be financed out of general obligation bond proceeds or out of California Water Fund moneys. To the extent that California Water Fund moneys are used for the purpose, the amount of general obligation bonds issued for the State Water Facilities is increased, but the last column of the table, and the last three lines of the table, remain unchanged.

(b) May also be used for additional facilities.

(c) Offset bonds, which may not be used for State Water Facilities.

The tabulation also shows that there remain available for completion of the State Water Facilities $234,000,000 of authorized but unissued general obligation bonds. This provides an important resource in the event that the cost of the State

Water Facilities should exceed the present estimates. To the extent that this reserve of $234,000,000 of authorized general obligation bonds is not used for completion of the State Water Facilities, it is added to the amount available for additional facilities.

The California Water Fund expenditures on the State Water Facilities include amounts of net revenues paid into this Fund beginning with 1977, from which time, until 1980 these expenditures, as projected, will continue to be of fairly substantial amount. This payment of net revenues into the California Water Fund is projected in view of a provision of the Burns-Porter Act, which recites that any remainder of net revenues, after the payment of bond service (including any reimburements of the General Fund therefor), is to be applied first to reimburse the California Water Fund for construction expenditures made therefrom.

Rate Structure

Rate Base Concept

The Department of Water Resources has adopted a rate concept analogous to that of a rate base for public utilities. The rates to be charged for the water will be calculated so as to allow interest to the State on the utility portion[3/] of the capital investment, and the amortization of such investment over

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3/ Includes all conservation and transportation facilities and the San Joaquin Valley Drain. See Table 12.

a stipulated period, out of the net revenues of the utility portion of the project. For this purpose, the average interest rate on the general obligation bonds issued for the project is the project interest rate, the State's construction expenditures on the utility portion of the project are taken as the capital investment, and the period to final maturity of the general obligation bonds is taken as the period of amortization.

Rate Formulas

Each contractor for a water supply will pay annually (1) a conservation charge, known as the "Delta Water Charge," expressed as a rate per acre-foot which will be the same for all contractors, to cover the capital and operating costs of the conservation facilities, and (2) a Transportation Charge to cover the contractor's allocated share of the capital and operating costs of the transportation facilities. In the establishment of the conservation charge, there will be deducted a power credit on account of the revenues of the Oroville power facilities.

The Delta Water Charge is designed to amortize (with interest) over the entire project repayment period the State's capital investment represented by each year's construction expenditures on conservation facilities, together with applicable operating expenses incurred during the year, on the basis of an acre-foot rate applied to the schedule of water deliveries. In general, the transportation charge is designed to amortize (with interest) over the ensuing 50 years the State's capital

investment represented by each year's construction expenditures on transportation facilities, on the basis of equal annual instalments, the applicable operating expenses being added on substantially a pay-as-you-go basis. The State's capital investment in utility facilities is taken as including the pre-1961 construction expenditures from all sources, together with interest from the respective dates of the expenditures.

In the case of agricultural contractors in the San Joaquin Valley, the allocated share of the capital investment in transportation facilities is treated in this report as being amortized (with interest) on an acre-foot basis, similar to the method employed for the Delta Water Charge. The use of such a basis in cases of unreasonable financial hardship is contemplated under Article 45 of the prototype contract. The purpose of using this basis is to keep the Transportation Charge as low as practicable for these contractors during the early years of operation of the project, thus assisting in the sale of agricultural water and promoting the development of irrigation. This is in consideration of the fact that the payment capacity of agricultural water users is generally more limited than that of municipal and industrial users, and also of the fact that expected sales of water in the San Joaquin Valley include substantial volumes for the irrigation of areas not now farmed.

Unlike the general amortization pattern for the capital investment in transportation facilities, which is that of level debt service, the amortization pattern for the capital investment in conservation facilities, and in transportation facilities

allocated to the San Joaquin Valley, follows generally the curve of water deliveries. Since the water deliveries will be small in the early years of operation of the project, the application thereto of an acre-foot rate determined as above produces only a small amount of revenues during these early years, which amount is insufficient even to carry the interest charges on the capital investment. The deficiency is accumulated at interest, so that the revenues derived later in the project repayment period are expected to be sufficient to amortize the investment with full interest.

Adjustment of Delta Water Charge for Additional Facilities

For the initial period through 1969, the Delta Water Charge is set at $3.50 per acre-foot. Thereafter a rate is projected for the period until the commencement of construction in 1978 of the additional project conservation facility, from which time the rate is projected to amortize the investment in this facility as well as in the initial project conservation facilities. In the event of the construction of supplemental conservation facilities to supply water to the contractors in addition to the estimated project yield of 4,000,000 acre-feet a year, and for the purpose of meeting local needs, the Delta Water Charge will be re-calculated to take into account the cost of these supplemental facilities.

Under the existing water contracts, the construction of such supplemental conservation facilities may be undertaken only

after 1985. If and when this construction is undertaken and bonds are issued therefor, the project repayment period used in determining the Delta Water Charge may be extended to take into account the maturities of these bonds. In that case, as a result of the re-determination of the Delta Water Charge, the capital investment in the conservation facilities comprised in the project (i.e. for an estimated project yield of 4,000,000 acre-feet a year) might not be amortized fully within the project repayment period used in this study.

No effect on the Delta Water Rate ensues from the use of revenue bonds. Under the formula for this charge, as implemented in the existing water contracts, the calculation of the rate does not take into account the matter of financing the Oroville power facilities. Also, in the calculations used herein, no account has been taken of the surcharge to be made with respect to deliveries of project water on lands of more than 160 acres under single ownership (or more than 320 acres in the case of community property). The acreage involved, and consequently the amount of the surcharge, cannot be forecast with reasonable accuracy.

Revenues Calculated from Formulas

The application of the rate formulas produces net revenues in the year 2000 (the first year of projected full water deliveries) of $23,000,000 from conservation facilities and $48,000,000 from transportation facilities. In addition, the project will derive revenues from the Oroville power facilities

and from the San Joaquin Drainage Facilities. In the case of the Oroville power facilities, the net revenues are estimated, on the basis of the market value of the power, at amounts increasing to $19,000,000 for 1976 and subsequent years (see Column 4, Table 44). These power revenues are dedicated, under the modified financing program, to the repayment of the revenue bonds as long as any of them are outstanding. In the case of the San Joaquin Drainage Facilities, the revenues are calculated on the basis of the general formula which is used for the calculation of the Transportation Charge.

Table 42 includes information with respect to the amounts of net revenues, as calculated from the rate formulas, applicable to the service of the general obligation bonds.

Since the amounts of bond service as shown in this study are on an accrual basis, the net revenues herein have been adjusted, as to the capital cost element of the Transportation Charge and of the drainage charge, to a similar accrual basis. With respect to the Delta Water Charge, this accrual basis is not used, because the determination of this charge the elements of capital cost, operating expenses and power credit have been merged into a single calculation.

Non-Utility Revenues

The foregoing discussion has excluded from consideration the non-utility features of the project, the major part of which consists of the Davis-Grunsky programs of loans and grants for

local facilities (treated herein as construction expenditures). Under the Burns-Porter Act, an amount equal to $130,000,000 is set aside exclusively for this program.

Davis-Grunsky loans are to be in the form of interest-bearing loans repayable over not exceeding 50 years. Any loan is to be limited to the portion of the cost of the particular project which the Department of Water Resources finds to be beyond the reasonable ability of the borrower to finance from other sources. Nonreimbursable grants are to be for expenditures allocable to the enhancement of fish and wildlife or to recreation.

As it cannot be determined at this time to what extent, or on what amortization schedule, the State will recover the Davis-Grunsky loans, no payments of interest or principal thereon are included in the projections herein. This treatment is also in recognition of the facts that (1) the capital and expense requirements for other non-utility features of the project are uncertain, and (2) the estimates of operating, maintenance and replacement expenditures used in the projections include no provision for expenses relating to any non-utility features.

To the extent, if any, that revenues from Davis-Grunsky loans may exceed the capital and expense requirements, not provided for in the projections, for the non-utility features of the project, the balances of net revenues shown in the projections will be increased.

Description of Bonds

Pledge of Revenues

The bonds authorized by the Burns-Porter Act are general obligations of the State, for the payment of which, as to principal and interest, there will be pledged the full faith and credit of the State and also the net revenues (except as referred to below) of the project and of any facilities additional thereto.

According to the opinion of the Attorney General previously mentioned[1], the revenues which are pledged by the Burns-Porter Act to the payment of the bonds authorized thereunder constitute solely the portion of the revenues which is allocable to the facilities, or portions thereof, constructed out of funds provided by the Burns-Porter Act, namely, proceeds of such bonds and California Water Fund moneys. Thus, if other bonds are issued to complete the financing of construction of the project, or to finance facilities additional thereto, they can be supported by the portion of the revenues which is allocable to the facilities, or portions thereof, constructed out of the proceeds of such other bonds. These other bonds can be, at least in part, revenue bonds, the authorization for which is provided by the existing Central Valley Project Act.

The Burns-Porter Act directs the application of the net revenues pledged thereby, after the payment of current general obligation bond service, to the reimbursement of (1) the General

Fund, with simple interest (at the rate borne by the bonds), for previous advances therefrom for the service of the general obligation bonds authorized by the Burns-Porter Act, and (2) the California Water Fund, without interest, for construction payments made therefrom. After reimbursement of the California Water Fund, any remaining net revenues become available under the Burns-Porter Act for further construction.

It is contemplated that the bonds to be issued under the Burns-Porter Act will contain a recital that the holder of each bond by acceptance thereof agrees to the application of project revenues, not required for the service of the Burns-Porter bonds, to the service of additional general obligation bonds which might be authorized in the future under an additional bond act, and further agrees (in accordance with the aforesaid Attorney General's opinion) that the revenues pledged for the Burns-Porter bonds consist only of those allocable to facilities financed by Burns-Porter funds. This recital is intended to accommodate not only the issuance of the revenue bonds but also the issuance of additional general obligation bonds, if that should prove necessary for enlargement of the project or for any other reason, without detriment to the General Fund.

Pattern of General Obligation Bond Service

Under the Burns-Porter Act, each issue of the bonds authorized thereby must commence to mature not later than ten years after issuance, with a final maturity not later than

50 years after issuance. Because the Burns-Porter Act contains no provision for refunding the bonds, the schedule of maturities must operate to effect full amortization within the 50-year period.

As the rate formulas for sales of water to be delivered by the project are intended to amortize, over not less than 50 years, the State's capital investment represented by construction expenditures for the utility portion of the project, it is necessary in order to make the bonds revenue-supported that the repayment of the bonds be likewise scheduled over a long period. A bond service pattern which is appropriate to the revenue pattern is obtained by providing no maturities until the tenth anniversary after issuance, with maturities scheduled so as to produce level annual service for the last 41 years from the time of issue. For 4 percent bonds, the annual service for the first nine years would be 4 percent (interest only), and for the remaining 41 years approximately 5 percent (interest plus principal payments), of the issue. The average life of such an issue is $35\frac{1}{4}$ years. This is the bond service pattern which is used in this study.

It must be expected that the interest cost on general obligation bonds maturing over a 50-year period will be higher than that which would apply on the State's other bond issues, if the maturities of the latter are scheduled, as has usually been the case, over a period not exceeding 26 years. In the 1920's, when the tax advantages of state and municipal bonds were small

compared with what they are now, the State rarely had to pay on its borrowings a rate as high as 4 percent. The year 1959 was the first since 1933 in which the State had to pay a rate as high as 4 percent on its bond sales. Recently the rate has been considerably lower.

While it is not practicable to predict the course of interest rates for the next two decades, during which time the sales of general obligation bonds for the project are scheduled, any assumption that the rate will average over 4 percent seems unrealistic in the light of historical perspective and current conditions. The department, in its calculations, has assumed an interest rate of 4 percent for the bonds. This is on the expectation that municipal bonds will continue to enjoy tax exemption.

On this basis, and giving effect to the proposed schedule of issuance, the annual service on the general obligation bonds to be issued for the project would be as shown in Table 43.

Revenue Bonds

The revenue bonds, as projected, will mature over a period of 50 years from the date of the first issue, with fixed retirements, in the form of sinking fund payments or a combination of sinking fund payments and serial maturities, calculated to produce level annual bond service for the period from 1969 (the first full year of operation of the Oroville power facilities) to the final maturity of the bonds at the end of the year 2013.

An interest rate slightly higher than that assumed for general obligation bonds has been used in the revenue bond calculations--i.e. 4 percent. The actual rate will of course depend on conditions during the next five years.

To assure the availability of revenues to service the revenue bonds, it is assumed that there will be a power contract or contracts covering the sale of the power to be provided by the Oroville power facilities, extending over the period of 50 years commencing with 1964 (the date of the first issuance of revenue bonds). Alternatively, there could be a short-term contract or contracts providing for the extension of the contract term under certain conditions. Under the Central Valley Project Act[4/], a power contract made with other than a State agency must be cancellable by the department upon five years' notice, if and when the State or any financially responsible State agency makes application for the power, but only if the applicant enters into a contract whereby the State receives a total revenue or consideration at least equal to that which it would have received under the original contract. Under a short-term contract or contracts, the same purpose would be accomplished by a provision for the extension of the contract term for the remainder of the 50-year period (with an agreement by the department in the revenue bond instrument to exercise this provision), in the event that these conditions are not met within five years preceding expiration

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4/ Water Code Section 11671.

of the short-term contract or contracts. Such a contract, if so extended, would have to carry forward for the remainder of its term a similar cancellation provision.

The receipt of revenues commences with the substantial completion of the facilities which, as scheduled, will be at the end of 1968. After the deduction of applicable expenses of operation, maintenance and replacements, the net revenues from firm power are evaluated at about $12,000,000 in 1969, increasing to about $18,000,000 by 1976 (see Column 2, Table 42). The estimated market value of the power also includes a normal expectancy for secondary power, the availability of which from year to year is uncertain.

The projection for the revenue bonds assumes level payments for the firm power which, as calculated, amount to about $16,300,000 annually (see Column 5, Table 44) after the expenses of operation, maintenance and replacements. This part of the calculation uses a rate of 6 percent as being representative of the approximate overall cost of money for a private utility. In addition, the projection takes into account interest earnings, assumed to be at the rate of 2½ percent, on a bond reserve fund, financed out of the proceeds of the revenue bonds. These two sources plus estimated secondary power revenues produce total net revenues ranging between $17,500,000 and $18,100,000 annually (see last column, Table 44).

The level debt service on the revenue bonds, based on a schedule of fixed retirements to maturity, works out at about

$16,300,000 annually. Thus from the foregoing sources there is left a margin for additional bond retirements. On this basis, all of the revenue bonds would be retired in about 40 years from the date of the first issue. The net revenues from Oroville power during the remainder of the project repayment period would be available, if needed, for servicing the general obligation bonds.

Estimated power revenues during the first few years are insufficient to support the payment of interest on the amount of revenue bonds applied to construction of the project. The problem is solved if the contract or contracts for the power are so arranged as to provide firm net power revenues at a level annual amount equivalent over the 50-year period to the amounts at which the market value of this power from year to year, less applicable expenses, is evaluated. It can reasonably be expected that a contractor for the power should be willing to pay for the firm power, once it becomes available, level annual amounts approximately equivalent, on a present worth basis, to the contractor's evaluation of this power over the contract period. This is on the condition that the contractor receives adequate protection in the event of exercise of the cancellation provision.

Table 44 shows the evaluation of the net revenues from Oroville firm and secondary power, the equivalent annual payments for firm power, the amounts of revenue bonds outstanding from year to year, the schedule of fixed retirements therefor, and the total bond service reflecting the projected acceleration of bond retirements.

Financial Analysis by Segments

Table 45 includes a separate analysis for each major segment of the project, showing the surplus or deficit of net revenues which would be generated thereby if it were financed solely out of general obligation bond proceeds. The technique of this analysis consists simply of a comparison between the net revenues to be derived from the particular segment of the project and the bond service which would result from funding the construction costs therefor, beginning with 1961, by general obligation bonds as needed to meet construction requirements.

This analysis shows that for the decade ending with 1970 the conservation facilities would generate a deficit of $62,000,000, the Oroville power facilities a deficit of $29,000,000, and the transportation facilities a deficit of $12,000,000. For the same period, the San Joaquin drain would be approximately self-supporting, while the indicated deficit of the non-utility features would be $14,000,000. Thus the project as a whole would produce a deficit of $117,000,000 for the decade.

However, the use of California Water Fund moneys in lieu of general obligation bond proceeds materially reduces this deficit. The effect of this use of California Water Fund moneys is measured by the saving in general obligation bond service which results therefrom. For the decade through 1970, this savings amounts to $54,000,000. On the other hand, it is necessary to program the

issuance of the bonds, and for this purpose the bond sales are taken at $155,000,000 for 1963 and at $170,000,000 a year for the next four years (before taking advantage of the modified financing program). This produces some excess interest costs on account of the existence of unexpended bond proceeds. After adjustment for these factors, there remains an overall deficit for the decade of $75,000,000 (before taking advantage of the modified financing program), which would have to be met by advances from the General Fund. The avoidance of these advances under the modified financing program is accounted for in part by the substitution of revenue bonds for general obligation bonds in financing the Oroville power facilities, and in part by the use of Federal reimbursement moneys. Neither feature of the modified financing program, by itself, would effect this result.

For the entire project repayment period, the conservation facilities contribute an excess of $197,000,000, the Oroville power facilities contribute an excess of $723,000,000, and the transportation facilities contribute an excess of $124,000,000. Under the assumptions used herein, the non-utility features generate a deficit which is more than offset by the use of California Water Fund moneys, leaving a net balance for the entire period of $1,093,000,000, after repayments to the General Fund (with simple interest) and to the California Water Fund (without interest).

A comparison between the projected results, as referred to above, under the original and modified financing programs is included in Table 45.

Plate VIII shows on separate diagrams the utility net operating revenues and the application thereof over the total repayment period under the modified financing program. The net operating revenues are total revenues excluding operation and maintenance costs.

Certain Assumptions

The modified financing program described herein is based on the best present estimates of the department and assumes (1) validation of the revenue bonds, (2) the negotiation of a satisfactory contract or contracts for the Oroville power, (3) the negotiation of contracts for the sale of the balance of the water to be available for delivery from the project, and (4) the receipt of the Federal flood control reimbursement moneys referred to herein.

TABLE I

STATE WATER RIGHT APPLICATIONS
REQUESTED FOR STATE WATER FACILITIES

APPLICATION NUMBER	SOURCE	AMOUNT OF WATER		POINT OF DIVERSION	PURPOSE OF USE	PLACE OF USE
		Cubic-feet per second	Acre-feet per annum			
5629	Feather River	7,600	380,000	Oroville Dam	Power	Oroville and Thermalito Powerplants
5630	Feather River	1,400	380,000	Direct diversion along the Feather River from Oroville Dam to the confluence of Feather and Sacramento Rivers, and from channels of the Sacramento-San Joaquin Delta. Storage at Oroville Dam.	Irrigation, domestic, municipal & industrial, recreational, fish & wildlife enhancement, flood control, salinity control and navigation.	Feather River and San Joaquin Valley Service Areas
14443	Feather River	1,360	3,500,000	"	"	Feather River, North Bay, South Bay, San Joaquin Valley, Central Coastal, and Southern California Service Areas
	Sacramento-San Joaquin Delta Channels	6,185	42,100			
14444	Feather River	11,000	3,500,000	Oroville Dam	Power	Oroville and Thermalito Powerplants
14445A	Italian Slough	2,115	44,000	California Aqueduct Intake. Storage at Doolan, Del Valle, and Airpoint Reservoirs.	Irrigation, domestic, municipal, industrial, recreational, fish & wildlife enchancement, flood control, salinity control and navigation.	South Bay, San Joaquin Valley, Central Coastal, and Southern California Service Areas
16950*	Big Grizzly Creek		49,000	Grizzly Valley Dam	Irrigation, municipal, stream maintenance, and recreational.	Grizzly Valley Reservoir site and channels of Big Grizzly Creek and M.F. Feather River to Nelson Point Reservoir site. Municipal use at Portola and urban areas in M.F. Feather River Service Area. Irrigation use in Mohawk and Long Valleys.
16951	Indian Creek		18,200	Antelope Valley Dam	Recreational, incidental, domestic and stream flow enhancement.	Antelope Valley Reservoir site and channels of Indian Creek and East Branch of North Fork Feather River to Rich Bar.
16952	Little Last Chance Creek		30,000	Frenchman Dam	Irrigation, domestic stockwatering, and recreational.	Frenchman Reservoir site, channel of Little Last Chance Creek and Last Chance Water District.
16953*	Last Chance Creek		14,300	Dixie Refuge Dam	Recreation and stream maintenance.	Dixie Refuge Reservoir site and channel of Last Chance Creek to Indian Valley.
16954*	Red Clover Creek		8,400	Abbey Bridge Dam	"	Abbey Bridge Reservoir site and channel of Red Clover Creek to Indian Valley.
17512	Italian Slough and San Luis Creek		1,100,000	California Aqueduct Intake and San Luis Dam	Irrigation, domestic, municipal, industrial, recreational, and fish & wildlife enchancement.	South Bay, San Joaquin Valley, Central Coastal, and Southern California Service Areas.
17514	Lindsey Slough	900		North Bay Aqueduct Intake	Municipal & industrial	North Bay Service Area
17515	Lindsey Slough	900		North Bay Aqueduct Intake	Irrigation & domestic	North Bay Service Area
18844	Little Last Chance Creek		20,000	Frenchman Dam	Irrigation, domestic, stockwatering, and recreational.	Frenchman Reservoir site, channel of Little Last Chance Creek, and Last Chance Water District.
20117	Indian Creek		3,400	Antelope Valley Dam	Recreational, incidental domestic, and stream flow enhancement.	Antelope Valley Reservoir site and channels of Indian Creek, and East Branch of North Fork Feather River to Rich Bar.

* These applications are presently being held by the California Water Commission; all other applications are assigned to the Department of Water Resources.

TABLE 2

SUBDIVISION OF THE NORTH BAY AQUEDUCT INTO REACHES

REACH NUMBER AND DESCRIPTION	CAPACITY (cfs)	FEATURES	CONTRACTORS DIVERTING DIRECTLY FROM REACH		
			Contractor	MAXIMUM ANNUAL ENTITLEMENT	MAXIMUM MONTHLY DELIVERY
				(acre-feet)	(acre-feet)
CALHOUN DIVISION					
1 Calhoun Cut to Denverton Creek Siphon	380	Calhoun Pumping Plant Aqueduct	Uncontracted	15,200	2,526
2 Denverton Creek Siphon to Cordelia Pumping Plant	330	Aqueduct	"	21,500	2,365
CORDELIA DIVISION					
3 Cordelia Pumping Plant to Napa Valley Siphon	290	Cordelia Pumping Plant Aqueduct	"	43,700	6,291
4 Napa Valley Siphon to Huichica Creek Siphon	240	Aqueduct	"	6,300	854
SONOMA DIVISION					
5 Huichica Creek Sipon to Sonoma Valley Siphon	160	Aqueduct	"	9,100	1,330
6 Intake Sonoma Valley Siphon to Outlet Sonoma Valley Siphon	140	Aqueduct	"	7,100	1,278
7 Outlet Sonoma Valley Siphon to Petaluma Siphon	110	Aqueduct	"	11,800	2,124
NOVATO DIVISION					
8 Petaluma Siphon to Novato Terminus	70	Aqueduct	"	35,300	3,883
			Total North Bay Aqueduct	150,000	20,651

TABLE 3

SUBDIVISION OF THE SOUTH BAY AQUEDUCT INTO REACHES

REACH NUMBER AND DESCRIPTION	CAPACITY (cfs)	FEATURES	CONTRACTORS DIVERTING DIRECTLY FROM REACH		
			Contractor**	MAXIMUM ANNUAL ENTITLEMENT (acre-feet)	MAXIMUM MONTHLY DELIVERY (acre-feet
LIVERMORE DIVISION					
1 Bethany Forebay to Doolan-Livermore Junction	300	Interim Canal and Pumping Plant South Bay Pumping Plant Aqueduct	None		
2 Doolan-Livermore Junction thru Patterson Reservoir	300	Aqueduct Patterson Reservoir	Alameda County Flood Control & Water Conservation District, Zone 7 Uncontracted	15,000 2,000	1,800 240
DOOLAN DIVISION*					
3 Doolan-Livermore Junction thru Doolan Reservoir		Aqueduct Doolan Reservoir			
ALAMEDA DIVISION					
4 Patterson Reservoir to Del Valle Branch	300	Aqueduct	Uncontracted	12,000	1,320
DEL VALLE DIVISION					
5 Del Valle Branch thru Del Valle Reservoir	120	Del Valle Pumping Plant Del Valle Pipeline Del Valle Reservoir	None		
NILES DIVISION					
6 Del Valle Branch to South Livermore Turnout	363	Aqueduct	Alameda County Flood Control & Water Conservation District, Zone 7 Uncontracted	25,000 4,000	3,000 480
7 South Livermore Turnout to Vallecitos Turnout	305	Aqueduct	Alameda County Water District Uncontracted	37,000 10,000	4,070 1,100
8 Vallecitos Turnout to Alameda-Bayside Turnout	255	Aqueduct	Alameda County Water District Uncontracted	5,000 12,000	425 1,320
SANTA CLARA DIVISION					
9 Alameda-Bayside Turnout thru Airpoint Reservoir	186	Aqueduct Airpoint Reservoir	Santa Clara County Flood Control & Water Conservation District	88,000	11,000
			Total South Bay Aqueduct	210,000	24,755

* Not contemplated for construction at the present time.
** The list of contractors is neither final nor does it indicate that project service will be limited to those agencies.

TABLE 4

SUBDIVISION OF THE CALIFORNIA AQUEDUCT INTO REACHES

REACH NUMBER AND DESCRIPTION	CAPACITY (cfs)	FEATURES	CONTRACTORS DIVERTING DIRECTLY FROM REACH		
			Contractor	MAXIMUM ANNUAL ENTITLEMENT (acre-feet)	MAXIMUM MONTHLY DELIVERY (acre-feet)
NORTH SAN JOAQUIN DIVISION					
1 Delta thru Bethany Forebay	10,300	Intake Canal Fish Protective Facilities Delta Pumping Plant Aqueduct			
2 Bethany Forebay to San Luis Forebay	10,000	Aqueduct	None		
SAN LUIS DIVISION					
- (San Luis Dam and Reservoir)		San Luis Dam and Reservoir San Luis Pump-Generating Plant	(An initial project conservation facility)		
3 San Luis Forebay to Mile 18 Pumping Plant	13,100	San Luis Forebay and Dam Aqueduct	None		
4 Mile 18 Pumping Plant to Panoche Creek	13,100	Aqueduct Mile 18 Pumping Plant	(Federal Service Area)		
5 Panoche Creek to Five Points	11,800	Aqueduct	(Federal Service Area)		
6 Five Points to Arroyo Pasajero	9,350	Aqueduct	(Federal Service Area)		
7 Arroyo Pasajero to Kettleman City	8,350	Aqueduct	(Federal Service Area) Uncontracted	35,500	6,390
SOUTH SAN JOAQUIN DIVISION					
8 Kettleman City to Avenal Gap	6,810	Aqueduct	Uncontracted	15,000	1,275
9 Avenal Gap to Twisselman Road	6,280	Aqueduct	"	137,400	24,732
10 Twisselman Road to Lost Hills	5,875	Aqueduct	"	237,300	42,714
11 Lost Hills to 7th Standard Road	5,160	Aqueduct	"	168,100	30,258
12 7th Standard Road to Tupman Road	4,660	Aqueduct	"	291,700	52,506
13 Tupman Road to Buena Vista Pumping Plant	3,800	Aqueduct	"	162,800	19,784
14 Buena Vista Pumping Plant to Wheeler Ridge Pumping Plant I	3,464	Buena Vista Pumping Plant Aqueduct	"	259,600	46,007
15 Wheeler Ridge Pumping Plant I to Wheeler Ridge Pumping Plant II	2,830	Wheeler Ridge Pumping Plant I Aqueduct	"	3,700	666
16 Wheeler Ridge Pumping Plant II to Tehachapi Pumping Plant	2,820	Wheeler Ridge Pumping Plant II Aqueduct	"	45,200	8,136

TABLE 4 (continued)

SUBDIVISION OF THE CALIFORNIA AQUEDUCT INTO REACHES

REACH NUMBER AND DESCRIPTION	CAPACITY (cfs)	FEATURES	CONTRACTORS DIVERTING DIRECTLY FROM REACH		
			Contractor*	MAXIMUM ANNUAL ENTITLEMENT (acre-feet)	MAXIMUM MONTHLY DELIVERY (acre-feet)
TEHACHAPI DIVISION					
17 Tehachapi Pumping Plant to Surge Tank	2,742	Tehachapi Pumping Plant Tehachapi Tunnels	Antelope Valley-East Kern Water Agency Uncontracted	14,000 6,000	1,540 510
ANTELOPE DIVISION					
18 Surge Tank thru Cottonwood Power Plant	2,712	Surge Tank Aqueduct Cottonwood Power Plant	None		
19 Cottonwood Power Plant to West Branch Junction	2,712	Aqueduct	Antelope Valley-East Kern Water Agency	11,000	1,210
EAST BRANCH DIVISION					
20 West Branch Junction to Palmdale Reservoir	1,510	Aqueduct	Antelope Valley-East Kern Water Agency Uncontracted	75,500 1,000	8,305 85
21 Palmdale Reservoir to Littlerock Creek	1,500	Aqueduct	Uncontracted	500	55
22 Littlerock Creek to West Fork Mojave River	1,500	Aqueduct Pearblossom Pumping Plant	Antelope Valley-East Kern Water Agency Uncontracted	19,500 8,500	2,145 935
23 West Fork Mojave River to Cedar Springs Reservoir	1,486	Aqueduct	None		
24 Cedar Springs Dam and Reservoir		Cedar Springs Dam and Reservoir	None		
25 Cedar Springs Reservoir to South Portal San Bernardino Tunnel	1,386	San Bernardino Tunnel	San Bernardino Valley Municipal Water District Uncontracted	13,500 57,000	1,485 6,270
26 South Portal San Bernardino Tunnel thru Devil Canyon Power Plant No. 1	1,257	Aqueduct Devil Canyon Power Plant No. 1	San Bernardino Valley Municipal Water District	76,500	8,415
27 Devil Canyon Power Plant No. 1 thru Devil Canyon Power Plant No. 2	1,118	Aqueduct Devil Canyon Power Plant No. 2	Metropolitan Water District of Southern California	240,000	26,400
28 Devil Canyon Power Plant No. 2 thru Perris Reservoir	728	Aqueduct Perris Dam and Reservoir	Metropolitan Water District of Southern California	480,000	52,800
WEST BRANCH DIVISION					
29 West Branch Junction to Castaic Dam and Reservoir	1,197	West Branch Pumping Plant Elizabeth Power Plants Nos. 1, 2, and 3 Aqueduct	None		
30 Castaic Dam and Reservoir		Castaic Dam and Reservoir	Metropolitan Water District of Southern California Uncontracted	780,000 17,000	85,800 1,870

* The list of contractors is neither final nor does it indicate that project service will be limited to those agencies.

TABLE 4 (continued)

SUBDIVISION OF THE CALIFORNIA AQUEDUCT INTO REACHES

REACH NUMBER AND DESCRIPTION	CAPACITY (cfs)	FEATURES	CONTRACTORS DIVERTING DIRECTLY FROM REACH		
			Contractor	MAXIMUM ANNUAL ENTITLEMENT	MAXIMUM MONTHLY DELIVERY
				(acre-feet)	(acre-feet)
COASTAL DIVISION					
31 Avenal Gap thru Avenal Pumping Plant	510	Aqueduct Avenal Pumping Plant	None		
32 Avenal Pumping Plant to Turnout 3.0	510	Aqueduct	Uncontracted	133,700	24,066
33 Turnout 3.0 to San Luis Obispo	117	Aqueduct. Pyramid Pumping Plant Sawtooth Pumping Plant Temblor Pumping Plant San Luis Obispo Power Plant	"	10,000	850
34 San Luis Obispo to Arroyo Grande	105	Aqueduct	"	5,000	425
35 Arroyo Grande to Santa Maria Terminus	91	Aqueduct	"	60,000	5,100
			Total California Aqueduct	3,365,000	460,734

TABLE 5

ANNUAL WATER DELIVERIES CONVEYED THROUGH
EACH PUMPING AND POWER RECOVERY PLANT

(in acre-feet)

Calendar Year	NORTH BAY AQUEDUCT				SOUTH BAY AQUEDUCT				
	Calhoun Pumping Plant	Uncontracted	Cordelia Pumping Plant	Uncontracted	South Bay Pumping Plant	Alameda Co. Water District	Alameda Co. F.C.&W.C.D. Zone 7	Santa Clara Co. F.C. & W.C.D.	Uncontracted
1962					17,900	16,900	1,000		
63					20,100	17,600	2,500		
64					47,900	18,100	4,000	25,800	
65					75,900	18,800	4,500	51,600	1,000
66					95,900	19,400	5,000	70,500	1,000
67					109,500	14,300	6,200	88,000	1,000
68	1,300		1,300	1,300	111,500	15,000	7,500	88,000	1,000
69	1,700		1,700	1,700	113,300	15,500	8,800	88,000	1,000
1970	5,000	1,000	4,000	4,000	115,200	16,200	10,000	88,000	1,000
71	8,400	1,600	6,800	6,800	117,600	17,000	11,200	88,000	1,400
72	23,400	2,200	21,200	21,200	120,100	17,900	12,400	88,000	1,800
73	28,600	2,800	25,800	25,800	122,600	18,800	13,600	88,000	2,200
74	33,800	3,400	30,400	30,400	125,000	19,600	14,800	88,000	2,600
75	53,000	10,000	43,000	43,000	127,500	20,500	16,000	88,000	3,000
76	59,400	12,000	47,400	47,400	129,900	21,300	17,200	88,000	3,400
77	65,800	14,000	51,800	51,800	132,400	22,200	18,400	88,000	3,800
78	72,200	16,000	56,200	56,200	134,900	23,100	19,600	88,000	4,200
79	78,700	18,100	60,600	60,600	137,300	23,900	20,800	88,000	4,600
1980	85,000	20,000	65,000	65,000	139,800	24,800	22,000	88,000	5,000
81	91,600	21,800	69,800	69,800	142,500	26,000	23,000	88,000	5,500
82	98,200	23,600	74,600	74,600	145,200	27,200	24,000	88,000	6,000
83	104,800	25,400	79,400	79,400	147,900	28,400	25,000	88,000	6,500
84	111,400	27,200	84,200	84,200	150,600	29,600	26,000	88,000	7,000
85	118,000	29,000	89,000	89,000	154,300	30,800	27,000	88,000	8,500
86	124,200	30,400	93,800	93,800	159,100	32,100	28,000	88,000	11,000
87	130,700	32,100	98,600	98,600	162,800	33,300	29,000	88,000	12,500
88	137,000	33,600	103,400	103,400	167,500	34,500	30,000	88,000	15,000
89	143,400	35,200	108,200	108,200	171,200	35,700	31,000	88,000	16,500
1990	150,000	36,700	113,300	113,300	174,900	36,900	32,000	88,000	18,000
91	150,000	36,700	113,300	113,300	180,800	38,400	34,000	88,000	20,400
92	150,000	36,700	113,300	113,300	184,700	39,900	36,000	88,000	20,800
93	150,000	36,700	113,300	113,300	190,600	41,400	38,000	88,000	23,200
94	150,000	36,700	113,300	113,300	193,600	42,000	40,000	88,000	23,600
95	150,000	36,700	113,300	113,300	196,000	42,000	40,000	88,000	26,000
96	150,000	36,700	113,300	113,300	200,000	42,000	40,000	88,000	30,000
97	150,000	36,700	113,300	113,300	205,000	42,000	40,000	88,000	35,000
98	150,000	36,700	113,300	113,300	206,000	42,000	40,000	88,000	36,000
99	150,000	36,700	113,300	113,300	208,000	42,000	40,000	88,000	38,000
2000 1/	150,000	36,700	113,300	113,300	210,000	42,000	40,000	88,000	40,000

NOTE: Columns identified by contracting agency present total annual entitlements delivered from aqueduct reaches between, or downstream from, the identified plants.

1/ and thereafter for the remainder of the project repayment period.

TABLE 5 (continued)

ANNUAL WATER DELIVERIES CONVEYED THROUGH
EACH PUMPING AND POWER RECOVERY PLANT

(in acre-feet)

Calendar Year	NORTH SAN JOAQUIN DIVISION		SAN LUIS DIVISION	SOUTH SAN JOAQUIN DIVISION							TEHACHAPI DIVISION			ANTELOPE DIVISION	
	Delta Pumping Plant	South Bay Aqueduct	Mile 18 Pumping Plant	Uncontracted 1/	Buena Vista Pumping Plant	Uncontracted	Wheeler Ridge Pumping Plant I	Uncontracted	Wheeler Ridge Pumping Plant II	Uncontracted	Tehachapi Pumping Plant	Antelope Valley-East Kern Water Agency	Uncontracted	Cottonwood Power Plant	Antelope Valley-East Kern Water Agency
1962															
63															
64															
65															
66															
67	109,500	109,500													
68	289,100	111,500	177,600	150,900											
69	355,600	113,300	242,300	205,000											
1970	423,900	115,200	308,700	260,500											
71	490,900	117,600	373,300	314,500											
72	992,400	120,100	872,300	453,500	349,400	133,800	215,600	1,500	214,100	28,000	186,100		6,000	180,100	4,000
73	1,213,800	122,600	1,091,200	528,200	482,700	159,300	323,400	2,000	321,400	32,300	289,100		7,400	281,700	5,000
74	1,417,300	125,000	1,292,300	593,200	610,900	180,200	430,700	2,400	428,300	35,800	392,500		8,800	383,700	6,000
75	1,621,300	127,500	1,493,800	660,000	736,200	199,200	537,000	3,100	533,900	38,400	495,500		10,200	485,300	7,000
76	1,815,100	129,900	1,685,200	719,600	860,000	217,600	642,400	3,700	638,700	40,200	598,500		11,600	586,900	8,000
77	2,000,000	132,400	1,867,600	781,100	972,900	225,000	747,900	3,700	744,200	42,200	702,000		13,000	689,000	9,000
78	2,180,500	134,900	2,045,600	838,300	1,085,600	233,300	852,300	3,700	848,600	43,700	804,900		14,400	790,500	10,000
79	2,341,400	137,300	2,204,100	878,900	1,197,300	241,000	956,300	3,700	952,600	44,700	907,900		15,800	892,100	11,000
1980	2,513,900	139,800	2,374,100	933,100	1,305,300	246,700	1,058,600	3,700	1,054,900	45,200	1,009,700		17,200	992,500	11,000
81	2,638,100	142,500	2,495,600	949,700	1,409,200	248,800	1,160,400	3,700	1,156,700	45,200	1,111,500		18,600	1,092,900	11,000
82	2,742,800	145,200	2,597,600	969,300	1,488,600	250,500	1,238,100	3,700	1,234,400	45,200	1,189,200		20,000	1,169,200	11,000
83	2,836,500	147,900	2,688,600	978,900	1,567,000	252,500	1,314,500	3,700	1,310,800	45,200	1,265,600		20,000	1,245,600	11,000
84	2,932,000	150,600	2,781,400	988,500	1,645,700	254,300	1,391,400	3,700	1,387,700	45,200	1,342,500		20,000	1,322,500	11,000
85	3,021,100	154,300	2,866,800	996,800	1,713,800	255,100	1,458,700	3,700	1,455,000	45,200	1,409,800	1,800	18,200	1,389,800	11,000
86	3,107,400	159,100	2,948,300	1,005,200	1,779,400	255,700	1,523,700	3,700	1,520,000	45,200	1,474,800	3,500	16,500	1,454,800	11,000
87	3,192,600	162,800	3,029,800	1,013,500	1,845,100	256,300	1,588,800	3,700	1,585,100	45,200	1,539,900	5,800	14,200	1,519,900	11,000
88	3,280,300	167,500	3,112,800	1,021,800	1,910,800	257,000	1,653,800	3,700	1,650,100	45,200	1,604,900	8,500	11,500	1,584,900	11,000
89	3,371,300	171,200	3,200,100	1,030,200	1,976,200	257,500	1,718,700	3,700	1,715,000	45,200	1,669,800	11,300	8,700	1,649,800	11,000
1990	3,464,300	174,900	3,289,400	1,038,600	2,042,100	258,300	1,783,800	3,700	1,780,100	45,200	1,734,900	14,000	6,000	1,714,900	11,000
91	3,545,200	180,800	3,364,400	1,047,800	2,107,900	259,000	1,848,900	3,700	1,845,200	45,200	1,800,000	14,000	6,000	1,780,000	11,000
92	3,549,700	184,700	3,365,000	1,047,800	2,108,500	259,600	1,848,900	3,700	1,845,200	45,200	1,800,000	14,000	6,000	1,780,000	11,000
93	3,555,600	190,600	3,365,000	1,047,800	2,108,500	259,600	1,848,900	3,700	1,845,200	45,200	1,800,000	14,000	6,000	1,780,000	11,000
94	3,558,600	193,600	3,365,000	1,047,800	2,108,500	259,600	1,848,900	3,700	1,845,200	45,200	1,800,000	14,000	6,000	1,780,000	11,000
95	3,561,000	196,000	3,365,000	1,047,800	2,108,500	259,600	1,848,900	3,700	1,845,200	45,200	1,800,000	14,000	6,000	1,780,000	11,000
96	3,565,000	200,000	3,365,000	1,047,800	2,108,500	259,600	1,848,900	3,700	1,845,200	45,200	1,800,000	14,000	6,000	1,780,000	11,000
97	3,570,000	205,000	3,365,000	1,047,800	2,108,500	259,600	1,848,900	3,700	1,845,200	45,200	1,800,000	14,000	6,000	1,780,000	11,000
98	3,571,000	206,000	3,365,000	1,047,800	2,108,500	259,600	1,848,900	3,700	1,845,200	45,200	1,800,000	14,000	6,000	1,780,000	11,000
99	3,573,000	208,000	3,365,000	1,047,800	2,108,500	259,600	1,848,900	3,700	1,845,200	45,200	1,800,000	14,000	6,000	1,780,000	11,000
2000 2/	3,575,000	210,000	3,365,000	1,047,800	2,108,500	259,600	1,848,900	3,700	1,845,200	45,200	1,800,000	14,000	6,000	1,780,000	11,000

NOTE: Columns identified by contracting agency present total annual entitlements delivered from aqueduct reaches between, or downstream from, the identified plants.

1/ Not including Coastal Division.
2/ and thereafter for the remainder of the project repayment period.

TABLE 5 (continued)

ANNUAL WATER DELIVERIES CONVEYED THROUGH
EACH PUMPING AND POWER RECOVERY PLANT

(in acre-feet)

Calendar Year	EAST BRANCH DIVISION										WEST BRANCH DIVISION			COASTAL DIVISION			
	Antelope Valley-East Kern Water Agency	Uncontracted	Pearblossom Pumping Plant	Antelope Valley-East Kern Water Agency	S.B.V.M.W.D.	Uncontracted	Devil Canyon Power Plant No. 1	S.B.V.M.W.D.	Devil Canyon Power Plant No. 2	M.W.D.	West Branch P.P. and Elizabeth P.P.'s 1,2,&3	M.W.D.	Uncontracted	Avenal Pumping Plant	Uncontracted	All Other Plants 1/	Uncontracted
1962																	
63																	
64																	
65																	
66																	
67																	
68														26,700	26,700		
69														37,300	37,300		
1970														48,200	48,200		
71														58,800	58,800		
72	16,000	1,000	94,700		2,300	26,700	65,700	12,700	53,000	53,000	64,400	57,400	7,000	69,400	69,400		
73	20,000	1,600	143,300		3,900	30,800	108,600	13,100	95,500	95,500	111,800	103,400	8,400	80,300	80,300		
74	24,000	2,300	192,100		5,700	35,000	151,400	13,500	137,900	137,900	159,300	149,400	9,900	88,200	88,200		
75	28,000	2,900	240,700		7,200	39,100	194,400	14,000	180,400	180,400	206,700	195,400	11,300	97,600	97,600		
76	32,000	3,500	289,300		8,800	43,200	237,300	14,400	222,900	222,900	254,100	241,400	12,700	105,600	105,600		
77	36,000	4,200	338,200		10,400	47,500	280,300	14,800	265,500	265,500	301,600	287,400	14,200	113,600	113,600		
78	40,000	4,800	386,700		12,000	51,500	323,200	15,200	308,000	308,000	349,000	333,400	15,600	121,700	121,700		
79	44,000	5,400	435,300		13,700	55,600	366,000	15,600	350,400	350,400	396,400	379,400	17,000	127,900	127,900		
1980	49,000	6,100	484,000		15,200	59,800	409,000	16,100	392,900	392,900	442,400	425,400	17,000	135,700	133,700	2,000	2,000
81	54,000	6,800	532,600		16,900	63,900	451,800	16,500	435,300	435,300	488,500	471,500	17,000	136,700	133,700	3,000	3,000
82	59,500	6,800	572,500		16,500	69,800	486,200	22,500	463,700	463,700	519,400	502,400	17,000	139,700	133,700	6,000	6,000
83	65,000	6,800	612,600		16,100	75,800	520,700	28,500	492,200	492,200	550,200	533,200	17,000	142,700	133,700	9,000	9,000
84	70,500	6,400	653,500		15,700	82,700	555,100	34,500	520,600	520,600	581,100	564,100	17,000	147,200	133,700	13,500	13,500
85	72,500	4,400	690,000	1,700	15,400	83,300	589,600	40,500	549,100	549,100	611,900	594,900	17,000	156,200	133,700	22,500	22,500
86	74,500	2,500	724,000	3,500	14,900	81,500	624,100	46,500	577,600	577,600	642,800	625,800	17,000	163,700	133,700	30,000	30,000
87	75,500	1,500	758,300	5,700	14,600	79,300	658,700	52,500	606,200	606,200	673,600	656,600	17,000	171,200	133,700	37,500	37,500
88	75,500	1,500	792,400	8,500	14,300	76,500	693,100	58,500	634,600	634,600	704,500	687,500	17,000	180,200	133,700	46,500	46,500
89	75,500	1,500	826,500	11,200	13,900	73,800	727,600	64,500	663,100	663,100	735,300	718,300	17,000	193,700	133,700	60,000	60,000
1990	75,500	1,500	860,700	14,000	13,600	71,000	762,100	70,500	691,600	691,600	766,200	749,200	17,000	208,700	133,700	75,000	75,000
91	75,500	1,500	895,000	19,500	13,500	65,500	796,500	76,500	720,000	720,000	797,000	780,000	17,000	208,700	133,700	75,000	75,000
92	75,500	1,500	895,000	19,500	13,500	65,500	796,500	76,500	720,000	720,000	797,000	780,000	17,000	208,700	133,700	75,000	75,000
93	75,500	1,500	895,000	19,500	13,500	65,500	796,500	76,500	720,000	720,000	797,000	780,000	17,000	208,700	133,700	75,000	75,000
94	75,500	1,500	895,000	19,500	13,500	65,500	796,500	76,500	720,000	720,000	797,000	780,000	17,000	208,700	133,700	75,000	75,000
95	75,500	1,500	895,000	19,500	13,500	65,500	796,500	76,500	720,000	720,000	797,000	780,000	17,000	208,700	133,700	75,000	75,000
96	75,500	1,500	895,000	19,500	13,500	65,500	796,500	76,500	720,000	720,000	797,000	780,000	17,000	208,700	133,700	75,000	75,000
97	75,500	1,500	895,000	19,500	13,500	65,500	796,500	76,500	720,000	720,000	797,000	780,000	17,000	208,700	133,700	75,000	75,000
98	75,500	1,500	895,000	19,500	13,500	65,500	796,500	76,500	720,000	720,000	797,000	780,000	17,000	208,700	133,700	75,000	75,000
99	75,500	1,500	895,000	19,500	13,500	65,500	796,500	76,500	720,000	720,000	797,000	780,000	17,000	208,700	133,700	75,000	75,000
2000 2/	75,500	1,500	895,000	19,500	13,500	65,500	796,500	76,500	720,000	720,000	797,000	780,000	17,000	208,700	133,700	75,000	75,000

NOTE: Columns identified by contracting agency present total annual entitlements delivered from aqueduct reaches between, or downstream from, the identified plants.

1/ Pyramid, Sawtooth, Temblor Pumping Plants and San Luis Obispo Power Plant.
2/ and thereafter for the remainder of the project repayment period.

TABLE 6

ANNUAL WATER DELIVERIES
TO MAJOR SERVICE AREAS

(in 1,000's of acre-feet)

CALENDAR YEAR	FEATHER RIVER	NORTH BAY	SOUTH BAY	SAN JOAQUIN VALLEY[1]	CENTRAL COASTAL	SOUTHERN CALIFORNIA	TOTAL
1962			17.9				17.9
63	4.8		20.1				24.9
64	4.8		47.9				52.7
65	4.8		75.9				80.7
66	4.8		95.9				100.7
67	122.7		109.5				232.2
68	128.6	1.3	111.5	177.6			419.0
69	134.5	1.7	113.3	242.3			491.8
1970	140.4	5.0	115.2	308.7			569.3
71	146.3	8.4	117.6	373.3			645.6
72	152.3	23.4	120.1	686.2		186.1	1168.1
73	158.0	28.6	122.6	802.1		289.1	1400.4
74	163.9	33.8	125.0	899.8		392.5	1615.0
75	169.8	53.0	127.5	998.3		495.5	1844.1
76	175.7	59.4	129.9	1086.7		598.5	2050.2
77	181.6	65.8	132.4	1165.6		702.0	2247.4
78	187.4	72.2	134.9	1240.7		804.9	2440.1
79	193.3	78.7	137.3	1296.2		907.9	2613.4
1980	199.2	85.0	139.8	1362.4	2.0	1009.7	2798.1
81	208.9	91.6	142.5	1381.1	3.0	1111.5	2938.6
82	218.6	98.2	145.2	1402.4	6.0	1189.2	3059.6
83	228.2	104.8	147.9	1414.0	9.0	1265.6	3169.5
84	237.9	111.4	150.6	1425.4	13.5	1342.5	3281.3
85	247.6	118.0	154.3	1434.5	22.5	1409.8	3386.7
86	257.3	124.2	159.1	1443.5	30.0	1474.8	3488.9
87	267.0	130.7	162.8	1452.4	37.5	1539.9	3590.3
88	275.0	137.0	167.5	1461.4	46.5	1604.9	3692.3
89	275.0	143.4	171.2	1470.3	60.0	1669.8	3789.7
1990	275.0	150.0	174.9	1479.5	75.0	1734.9	3889.3
91	275.0	150.0	180.8	1489.4	75.0	1800.0	3970.2
92	275.0	150.0	184.7	1490.0	75.0	1800.0	3974.7
93	275.0	150.0	190.6	1490.0	75.0	1800.0	3980.6
94	275.0	150.0	193.6	1490.0	75.0	1800.0	3983.6
95	275.0	150.0	196.0	1490.0	75.0	1800.0	3986.0
96	275.0	150.0	200.0	1490.0	75.0	1800.0	3990.0
97	275.0	150.0	205.0	1490.0	75.0	1800.0	3995.0
98	275.0	150.0	206.0	1490.0	75.0	1800.0	3996.0
99	275.0	150.0	208.0	1490.0	75.0	1800.0	3998.0
2000[2]	275.0	150.0	210.0	1490.0	75.0	1800.0	4000.0

[1] Includes unallocated reserve of 15,000 acre-feet per year commencing in 1980.
[2] and thereafter for the remainder of the repayment period.

TABLE 7

ESTIMATED ANNUAL OPERATIONAL WATER LOSSES
FOR AQUEDUCT REACHES

(in acre-feet per year)

NORTH BAY AQUEDUCT

DIVISION & REACH	OPERATIONAL REQUIREMENTS	
	Evaporation & Seepage Loss	Reservoir Change in Storage
CALHOUN DIVISION		
Reach 1	800 68-00	
2	3200 68-00	
CORDELIA DIVISION		
3	200 68-00	
4	200 68-00	
SONOMA DIVISION		
5	300 72-00	
6		
7	600 72-00	
NOVATO DIVISION		
8	100 72-00	

SOUTH BAY AQUEDUCT

LIVERMORE DIVISION		
Reach 1	2/	
2	240 62-00	
DOOLAN DIVISION 1/		
3		
ALAMEDA DIVISION		
4	810 64-00	
DEL VALLE DIVISION		
5	3/	
NILES DIVISION		
6		
7		
8		
SANTA CLARA DIVISION		
9	710 64-00	

CALIFORNIA AQUEDUCT

DIVISION & REACH	OPERATIONAL REQUIREMENTS	
	Evaporation & Seepage Loss	Reservoir Change in Storage
NORTH SAN JOAQUIN DIVISION 4/		
Reach 1	500 68-00	
2	26300 68-00	
SAN LUIS DIVISION 4/		
3	7200 68-00 5/	
4	9500 68-00	
5	14900 68-00	
6	6000 68-00	
7	8400 68-00	
SOUTH SAN JOAQUIN DIVISION		
8	5640 68-00	
9	5410 68-00	
10	5630 68-00	
11	4980 68-00	
12	7320 72-00	
13	5520 72-00	
14	9600 72-00	
15	720 72-00	
16	4020 72-00	
TEHACHAPI DIVISION		
17		
ANTELOPE DIVISION		
18		
19	3300 72-00	
EAST BRANCH DIVISION		
20	6700 72-00	
21	2900 72-00	
22	7500 72-00	
23		
24	6800 72-00,	6/
25		
26		
27		
28	10200 72-00	7/
WEST BRANCH DIVISION		
29		
30	9100 72-00	8/
COASTAL DIVISION		
31	400 68-00	
32	400 68-00	
33	1800 80-00	
34	500 80-00	
35	1000 80-00	

NOTES: (A) Underlined figures represent year of occurrence (i.e., 68-00 signifies years 1968-2000, incl.).
(B) Water requirements for and beyond the year 2000 are constant.

1/ Not contemplated for construction at the present time.
2/ 770 62-66, 410 67-00.
3/ 2000 66, 2400 67, 2600 68, 2700 69, 2800 70-71, 2900 72-73, 3000 74-75, 3100 76-77, 3200 78-91, 3300 92, 3400 93, 3500 94-00.
4/ Operational losses allocated to conservation are not included:
Reach 1 - 200 AF/YR, Reach 2 - 11,000 AF/YR, Reach 3 - 6,000 AF/YR, and San Luis Reservoir - 34,000 AF/YR.
5/ Includes 3,100 acre-feet per year evaporation and seepage losses in San Luis Forebay.
6/ 86800 72, 61300 73, 14900 74, 5100 75, -1500 76-81, -800 82, -2800 83-84, -2500 85-91.
7/ 48900 72, 34500 73, 8400 74, 2800 75, -900 76-81, -500 82, -1600 83-84, -1400 85-91.
8/ 45200 72, 31900 73, 1000 74, -1900 75-82, 1200 83-91.

TABLE 8

ANNUAL TOTAL WATER QUANTITIES CONVEYED THROUGH
EACH PUMPING AND POWER RECOVERY PLANT

(in acre-feet)

Calendar Year	NORTH BAY AQUEDUCT				SOUTH BAY AQUEDUCT	
	Calhoun Pumping Plant	Deliveries & Losses	Cordelia Pumping Plant	Deliveries & Losses	South Bay Pumping Plant	Deliveries & Losses
62					18,900	18,900
63					21,100	21,100
64					50,500	50,500
65					78,500	78,500
66					100,500	100,500
67					114,100	114,100
68	5,700	4,000	1,700	1,700	116,300	116,300
69	6,100	4,000	2,100	2,100	118,200	118,200
1970	9,400	5,000	4,400	4,400	120,200	120,200
71	12,800	5,600	7,200	7,200	122,600	122,600
72	28,800	6,200	22,600	22,600	125,200	125,200
73	34,000	6,800	27,200	27,200	127,700	127,700
74	39,200	7,400	31,800	31,800	130,200	130,200
75	58,400	14,000	44,400	44,400	132,700	132,700
76	64,800	16,000	48,800	48,800	135,200	135,200
77	71,200	18,000	53,200	53,200	137,700	137,700
78	77,600	20,000	57,600	57,600	140,300	140,300
79	84,100	22,100	62,000	62,000	142,700	142,700
1980	90,400	24,000	66,400	66,400	145,200	145,200
81	97,000	25,800	71,200	71,200	147,900	147,900
82	103,600	27,600	76,000	76,000	150,600	150,600
83	110,200	29,400	80,800	80,800	153,300	153,300
84	116,800	31,200	85,600	85,600	156,000	156,000
85	123,400	33,000	90,400	90,400	159,700	159,700
86	129,600	34,400	95,200	95,200	164,500	164,500
87	136,100	36,100	100,000	100,000	168,200	168,200
88	142,400	37,600	104,800	104,800	172,900	172,900
89	148,800	39,200	109,600	109,600	176,600	176,600
1990	155,400	40,700	114,700	114,700	180,300	180,300
91	155,400	40,700	114,700	114,700	186,200	186,200
92	155,400	40,700	114,700	114,700	190,200	190,200
93	155,400	40,700	114,700	114,700	196,200	196,200
94	155,400	40,700	114,700	114,700	199,300	199,300
95	155,400	40,700	114,700	114,700	201,700	201,700
96	155,400	40,700	114,700	114,700	205,700	205,700
97	155,400	40,700	114,700	114,700	210,700	210,700
98	155,400	40,700	114,700	114,700	211,700	211,700
99	155,400	40,700	114,700	114,700	213,700	213,700
2000 1/	155,400	40,700	114,700	114,700	215,700	215,700

NOTE: Columns entitled "Deliveries & Losses" present total annual quantities delivered or lost from aqueduct reaches between, or downstream from, the identified plants.

1/ and thereafter for the remainder of the project repayment period.

TABLE 8 (continued)

ANNUAL TOTAL WATER QUANTITIES CONVEYED THROUGH
EACH PUMPING AND POWER RECOVERY PLANT

(in acre-feet)

Calendar Year	NORTH SAN JOAQUIN DIVISION		SAN LUIS DIVISION			SOUTH SAN JOAQUIN DIVISION							TEHACHAPI DIVISION	
	Delta Pumping Plant	Deliveries & Losses[1]	Losses	Mile 18 Pumping Plant	Losses	Deliveries & Losses[2]	Buena Vista Pumping Plant	Deliveries & Losses	Wheeler Ridge Pumping Plant I	Deliveries & Losses	Wheeler Ridge Pumping Plant II	Deliveries & Losses	Tehachapi Pumping Plant	Deliveries
1962														
63														
64														
65														
66														
67	114,100	114,100												
68	389,100	143,100	7,200	238,800	38,800	200,000								
69	455,700	145,000	7,200	303,500	38,800	264,700								
1970	524,100	147,000	7,200	369,900	38,800	331,100								
71	591,100	149,400	7,200	434,500	38,800	395,700								
72	1,347,300	152,000	7,200	1,188,100	38,800	558,100	591,200	143,400	447,800	2,300	445,500	32,000	413,500	6,000
73	1,515,500	154,500	7,200	1,353,800	38,800	643,700	671,300	168,900	502,400	2,700	499,700	36,400	463,300	7,400
74	1,615,700	157,000	7,200	1,451,500	38,800	716,600	696,100	189,800	506,300	3,100	503,200	39,900	463,300	8,800
75	1,801,400	159,500	7,200	1,634,700	38,800	792,800	803,100	208,800	594,300	3,800	590,500	42,500	548,000	10,200
76	1,985,000	162,000	7,200	1,815,800	38,800	860,400	916,600	227,200	689,400	4,400	685,000	44,300	640,700	11,600
77	2,169,900	164,500	7,200	1,998,200	38,800	929,900	1,029,500	234,600	794,900	4,400	790,500	46,300	744,200	13,000
78	2,350,500	167,100	7,200	2,176,200	38,800	995,200	1,142,200	242,900	899,300	4,400	894,900	47,800	847,100	14,400
79	2,511,400	169,500	7,200	2,334,700	38,800	1,042,000	1,253,900	250,600	1,003,300	4,400	998,900	48,800	950,100	15,800
1980	2,687,200	172,000	7,200	2,508,000	38,800	1,107,300	1,361,900	256,300	1,105,600	4,400	1,101,200	49,300	1,051,900	17,200
81	2,811,400	174,700	7,200	2,629,500	38,800	1,124,900	1,465,800	258,400	1,207,400	4,400	1,203,000	49,300	1,153,700	18,600
82	2,917,200	177,400	7,200	2,732,600	38,800	1,147,500	1,546,300	260,100	1,286,200	4,400	1,281,800	49,300	1,232,500	20,000
83	3,010,900	180,100	7,200	2,823,600	38,800	1,160,100	1,624,700	262,100	1,362,600	4,400	1,358,200	49,300	1,308,900	20,000
84	3,106,400	182,800	7,200	2,916,400	38,800	1,174,200	1,703,400	263,900	1,439,500	4,400	1,435,100	49,300	1,385,800	20,000
85	3,196,000	186,500	7,200	3,002,300	38,800	1,191,500	1,772,000	264,700	1,507,300	4,400	1,502,900	49,300	1,453,600	20,000
86	3,282,300	191,300	7,200	3,083,800	38,800	1,207,400	1,837,600	265,300	1,572,300	4,400	1,567,900	49,300	1,518,600	20,000
87	3,367,500	195,000	7,200	3,165,300	38,800	1,223,200	1,903,300	265,900	1,637,400	4,400	1,633,000	49,300	1,583,700	20,000
88	3,455,200	199,700	7,200	3,248,300	38,800	1,240,500	1,969,000	266,600	1,702,400	4,400	1,698,000	49,300	1,648,700	20,000
89	3,546,200	203,400	7,200	3,335,600	38,800	1,262,400	2,034,400	267,100	1,767,300	4,400	1,762,900	49,300	1,713,600	20,000
1990	3,639,200	207,100	7,200	3,424,900	38,800	1,285,800	2,100,300	267,900	1,832,400	4,400	1,828,000	49,300	1,778,700	20,000
91	3,720,100	213,000	7,200	3,499,900	38,800	1,295,000	2,166,100	268,600	1,897,500	4,400	1,893,100	49,300	1,843,800	20,000
92	3,727,400	217,000	7,200	3,503,200	38,800	1,295,000	2,169,400	269,200	1,900,200	4,400	1,895,800	49,300	1,846,500	20,000
93	3,733,400	223,000	7,200	3,503,200	38,800	1,295,000	2,169,400	269,200	1,900,200	4,400	1,895,800	49,300	1,846,500	20,000
94	3,736,500	226,100	7,200	3,503,200	38,800	1,295,000	2,169,400	269,200	1,900,200	4,400	1,895,800	49,300	1,846,500	20,000
95	3,738,900	228,500	7,200	3,503,200	38,800	1,295,000	2,169,400	269,200	1,900,200	4,400	1,895,800	49,300	1,846,500	20,000
96	3,742,900	232,500	7,200	3,503,200	38,800	1,295,000	2,169,400	269,200	1,900,200	4,400	1,895,800	49,300	1,846,500	20,000
97	3,747,900	237,500	7,200	3,503,200	38,800	1,295,000	2,169,400	269,200	1,900,200	4,400	1,895,800	49,300	1,846,500	20,000
98	3,748,900	238,500	7,200	3,503,200	38,800	1,295,000	2,169,400	269,200	1,900,200	4,400	1,895,800	49,300	1,846,500	20,000
99	3,750,900	240,500	7,200	3,503,200	38,800	1,295,000	2,169,400	269,200	1,900,200	4,400	1,895,800	49,300	1,846,500	20,000
2000 [3]	3,752,900	242,500	7,200	3,503,200	38,800	1,295,000	2,169,400	269,200	1,900,200	4,400	1,895,800	49,300	1,846,500	20,000

NOTE: Columns entitled "Deliveries & Losses" present total annual quantities delivered or lost from aqueduct reaches between, or downstream from, the identified plants.

[1] Includes South Bay Aqueduct.
[2] Includes Coastal Division.
[3] and thereafter for the remainder of the project repayment period.

TABLE 8 (continued)

ANNUAL TOTAL WATER QUANTITIES CONVEYED THROUGH
EACH PUMPING AND POWER RECOVERY PLANT

(in acre-feet)

Calendar Year	ANTELOPE DIVISION		EAST BRANCH DIVISION							WEST BRANCH DIVISION		COASTAL DIVISION				
	Cottonwood Power Plant	Deliveries & Losses	Deliveries & Losses	Pearblossom Pumping Plant	Deliveries & Losses	Devil Canyon Power Plant No. 1	Deliveries	Devil Canyon Power Plant No. 2	Deliveries & Losses	West Branch P. P. and Elizabeth P.P.s 1,2,&3	Deliveries & Losses	Losses	Avenal Pumping Plant	Deliveries & Losses	All Other Plants 1/	Deliveries & Losses
1962																
63																
64																
65																
66																
67																
68												400	27,100	27,100		
69												400	37,700	37,700		
1970												400	48,600	48,600		
71												400	59,200	59,200		
72	407,500	7,300	26,600	254,900	130,100	124,800	12,700	112,100	112,100	118,700	118,700	400	69,800	69,800		
73	455,900	8,300	31,200	263,600	110,300	153,300	13,100	140,200	140,200	152,800	152,800	400	80,700	80,700		
74	454,500	9,300	35,900	239,900	69,900	170,000	13,500	156,500	156,500	169,400	169,400	400	88,600	88,600		
75	537,800	10,300	40,500	273,100	65,700	207,400	14,000	193,400	193,400	213,900	213,900	400	98,000	98,000		
76	629,100	11,300	45,100	311,400	64,800	246,600	14,400	232,200	232,200	261,300	261,300	400	106,000	106,000		
77	731,200	12,300	49,800	360,300	70,700	289,600	14,800	274,800	274,800	308,800	308,800	400	114,000	114,000		
78	832,700	13,300	54,400	408,800	76,300	332,500	15,200	317,300	317,300	356,200	356,200	400	122,100	122,100		
79	934,300	14,300	59,000	457,400	82,100	375,300	15,600	359,700	359,700	403,600	403,600	400	128,300	128,300		
1980	1,034,700	14,300	64,700	506,100	87,800	418,300	16,100	402,200	402,200	449,600	449,600	400	139,400	134,700	4,700	4,700
81	1,135,100	14,300	70,400	554,700	93,600	461,100	16,500	444,600	444,600	495,700	495,700	400	140,400	134,700	5,700	5,700
82	1,212,500	14,300	75,900	595,700	99,800	495,900	22,500	473,400	473,400	526,600	526,600	400	143,400	134,700	8,700	8,700
83	1,288,900	14,300	81,400	632,700	103,400	529,300	28,500	500,800	500,800	560,500	560,500	400	146,400	134,700	11,700	11,700
84	1,365,800	14,300	86,500	673,600	109,900	563,700	34,500	529,200	529,200	591,400	591,400	400	150,900	134,700	16,200	16,200
85	1,433,600	14,300	86,500	710,600	112,200	598,400	40,500	557,900	557,900	622,200	622,200	400	159,900	134,700	25,200	25,200
86	1,498,600	14,300	86,600	744,600	111,700	632,900	46,500	586,400	586,400	653,100	653,100	400	167,400	134,700	32,700	32,700
87	1,563,700	14,300	86,600	778,900	111,400	667,500	52,500	615,000	615,000	683,900	683,900	400	174,900	134,700	40,200	40,200
88	1,628,700	14,300	86,600	813,000	111,100	701,900	58,500	643,400	643,400	714,800	714,800	400	183,900	134,700	49,200	49,200
89	1,693,600	14,300	86,600	847,100	110,700	736,400	64,500	671,900	671,900	745,600	745,600	400	197,400	134,700	62,700	62,700
1990	1,758,700	14,300	86,600	881,300	110,400	770,900	70,500	700,400	700,400	776,500	776,500	400	212,400	134,700	77,700	77,700
91	1,823,800	14,300	86,600	915,600	110,300	805,300	76,500	728,800	728,800	807,300	807,300	400	212,400	134,700	77,700	77,700
92	1,826,500	14,300	86,600	919,500	112,800	806,700	76,500	730,200	730,200	806,100	806,100	400	212,400	134,700	77,700	77,700
93	1,826,500	14,300	86,600	919,500	112,800	806,700	76,500	730,200	730,200	806,100	806,100	400	212,400	134,700	77,700	77,700
94	1,826,500	14,300	86,600	919,500	112,800	806,700	76,500	730,200	730,200	806,100	806,100	400	212,400	134,700	77,700	77,700
95	1,826,500	14,300	86,600	919,500	112,800	806,700	76,500	730,200	730,200	806,100	806,100	400	212,400	134,700	77,700	77,700
96	1,826,500	14,300	86,600	919,500	112,800	806,700	76,500	730,200	730,200	806,100	806,100	400	212,400	134,700	77,700	77,700
97	1,826,500	14,300	86,600	919,500	112,800	806,700	76,500	730,200	730,200	806,100	806,100	400	212,400	134,700	77,700	77,700
98	1,826,500	14,300	86,600	919,500	112,800	806,700	76,500	730,200	730,200	806,100	806,100	400	212,400	134,700	77,700	77,700
99	1,826,500	14,300	86,600	919,500	112,800	806,700	76,500	730,200	730,200	806,100	806,100	400	212,400	134,700	77,700	77,700
2000 2/	1,826,500	14,300	86,600	919,500	112,800	806,700	76,500	730,200	730,200	806,100	806,100	400	212,400	134,700	77,700	77,700

NOTE: Columns entitled "Deliveries & Losses" present total annual quantities delivered or lost from aqueduct reaches between, or downstream from, the identified plants.

1/ Pyramid, Sawtooth, Temblor Pumping Plants and San Luis Obispo Power Plant.
2/ and thereafter for the remainder of the project repayment period.

TABLE 9

PROJECT WATER DEMANDS AND WATER SUPPLIES

(in 1,000's of acre-feet)

Calendar Year	DEMANDS ON DELTA POOL (STATE ONLY)							SUPPLIES TO DELTA POOL			
	Deliveries					Losses 1/	Total	Purchased Bureau Water 2/	Initial Conservation Facilities 3/	Additional Conservation Facilities 4/	Total
	Feather River Service Area	North Bay Aqueduct	South Bay Aqueduct	California Aqueduct	Total						
1962			17.9		17.9	1.0	18.9	18.9			18.9
63	4.8		20.1		24.9	1.0	25.9	21.1	4.8		25.9
64	4.8		47.9		52.7	2.6	55.3	50.5	4.8		55.3
65	4.8		75.9		80.7	2.6	83.3	78.5	4.8		83.3
66	4.8		95.9		100.7	4.6	105.3	100.5	4.8		105.3
67	122.7		109.5		232.2	4.6	236.8		236.8		236.8
68	128.6	1.3	111.5	177.6	419.0	104.4	523.4		523.4		523.4
69	134.5	1.7	113.3	242.3	491.8	104.5	596.3		596.3		596.3
1970	140.4	5.0	115.2	308.7	569.3	104.6	673.9		673.9		673.9
71	146.3	8.4	117.6	373.3	645.6	104.6	750.2		750.2		750.2
72	152.3	23.4	120.1	872.3	1168.1	360.3	1528.4		1528.4		1528.4
73	158.0	28.6	122.6	1091.2	1400.4	307.1	1707.5		1707.5		1707.5
74	163.9	33.8	125.0	1292.3	1615.0	203.8	1818.8		1818.8		1818.8
75	169.8	53.0	127.5	1493.8	1844.1	185.5	2029.6		2029.6		2029.6
76	175.7	59.4	129.9	1685.2	2050.2	175.3	2225.5		2225.5		2225.5
77	181.6	65.8	132.4	1867.6	2247.4	175.3	2422.7		2422.7		2422.7
78	187.4	72.2	134.9	2045.6	2440.1	175.4	2615.5		2615.7		2615.5
79	193.3	78.7	137.3	2204.1	2613.4	175.4	2788.8		2788.8		2788.8
1980	199.2	85.0	139.8	2374.1	2798.1	178.7	2976.8		2976.8		2976.8
81	208.9	91.6	142.5	2495.6	2938.6	178.7	3117.3		3117.3		3117.3
82	218.6	98.2	145.2	2597.6	3059.6	179.8	3239.4		3239.4		3239.4
83	228.2	104.8	147.9	2688.6	3169.5	179.8	3349.3		3349.3		3349.3
84	237.9	111.4	150.6	2781.4	3281.3	179.8	3461.1		3461.1		3461.1
85	247.6	118.0	154.3	2866.8	3386.7	180.3	3567.0		3567.0		3567.0
86	257.3	124.2	159.1	3948.3	3488.9	180.3	3669.2		3575.2	94.0	3669.2
87	267.0	130.7	162.8	3029.8	3590.3	180.3	3770.6		3582.8	187.8	3770.6
88	275.0	137.0	167.5	3112.8	3692.3	180.3	3872.6		3590.3	282.3	3872.6
89	275.0	143.4	171.2	3200.1	3789.7	180.3	3970.0		3592.3	377.7	3970.0
1990	275.0	150.0	174.9	3289.4	3889.3	180.3	4069.6		3595.7	473.9	4069.6
91	275.0	150.0	180.8	3364.4	3970.2	180.3	4150.5		3632.4	518.1	4150.5
92	275.0	150.0	184.7	3365.0	3974.7	183.1	4157.8		3617.0	540.8	4157.8
93	275.0	150.0	190.6	3365.0	3980.6	183.2	4163.8		3600.8	563.0	4163.8
94	275.0	150.0	193.6	3365.0	3983.6	183.3	4166.9		3582.4	584.5	4166.9
95	275.0	150.0	196.0	3365.0	3986.0	183.3	4169.3		3563.6	605.7	4169.3
96	275.0	150.0	200.0	3365.0	3990.0	183.3	4173.3		3551.8	621.5	4173.3
97	275.0	150.0	205.0	3365.0	3995.0	183.3	4178.3		3540.7	637.6	4178.3
98	275.0	150.0	206.0	3365.0	3996.0	183.3	4179.3		3526.7	652.6	4179.3
99	275.0	150.0	208.0	3365.0	3998.0	183.3	4181.3		3513.5	667.8	4181.3
2000	275.0	150.0	210.0	3365.0	4000.0	183.3	4183.3		3500.3	683.0	4183.3
01	275.0	150.0	210.0	3365.0	4000.0	183.3	4183.3		3488.5	694.8	4183.3
02	275.0	150.0	210.0	3365.0	4000.0	183.3	4183.3		3476.8	706.5	4183.3
03	275.0	150.0	210.0	3365.0	4000.0	183.3	4183.3		3465.1	718.2	4183.3
04	275.0	150.0	210.0	3365.0	4000.0	183.3	4183.3		3453.4	729.9	4183.3
05	275.0	150.0	210.0	3365.0	4000.0	183.3	4183.3		3441.6	741.7	4183.3
06	275.0	150.0	210.0	3365.0	4000.0	183.3	4183.3		3429.9	753.4	4183.3
07	275.0	150.0	210.0	3365.0	4000.0	183.3	4183.3		3418.2	765.1	4183.3
08	275.0	150.0	210.0	3365.0	4000.0	183.3	4183.3		3406.5	776.8	4183.3
09	275.0	150.0	210.0	3365.0	4000.0	183.3	4183.3		3394.7	788.6	4183.3
2010 5/	275.0	150.0	210.0	3365.0	4000.0	183.3	4183.3		3383.3	800.0	4183.3

1/ Operational losses allocated to conservation are not included: 34,000 AF/YR in San Luis Reservoir and 17,200 AF/YR in the California Aqueduct, all starting in 1968.

2/ Total of purchased Bureau water is 269,500 acre-feet.

3/ The initial conservation facilities include Frenchman, Oroville and San Luis Reservoirs, and Delta Facilities.

4/ The additional conservation facilities are the Middle Fork Eel River Facilities.

5/ and thereafter for the remainder of the project repayment period.

TABLE 10

ESTIMATED ANNUAL PROJECT ENERGY
REQUIREMENTS BY PUMPING PLANTS

(in millions of KWH)

Calendar Year	OROVILLE-THERMALITO PUMPING PLANTS	NORTH BAY AQUEDUCT PUMPING PLANTS	SOUTH BAY AQUEDUCT PUMPING PLANTS	CALIFORNIA AQUEDUCT											SAN JOAQUIN DRAIN PUMPING PLANTS	TOTAL STATE WATER FACILITIES
				Delta Pumping Plant	San Luis Pumping-Generating Plant	Mile 18 Pumping Plant	Buena Vista Pumping Plant	Wheeler Ridge Pumping Plant I	Wheeler Ridge Pumping Plant II	Tehachapi Pumping Plant	Pearblossom Pumping Plant	West Branch Pumping Plant	Avenal Pumping Plant	Pyramid, Sawtooth, and Temblor Pump'g. Pl'ts		
1962			18													18
63			19													19
64			48													48
65			68													68
66			96													96
67			99	41												140
68		2	94	130	69	63							7		17	382
69		2	95	132	73	51							9		17	379
70		3	97	134	77	55							12		17	395
71		4	98	154	80	65							14		17	432
72		10	101	311	105	190	167	165	275	1,072	181	44	17		17	2,655
73	882	10	103	381	116	206	175	167	277	1,072	169	50	19		17	3,644
74	882	11	105	444	126	221	182	168	279	1,072	154	55	21		17	3,737
75	882	16	107	508	137	249	210	198	328	1,395	175	70	23		24	4,322
76	575	18	109	542	153	277	239	229	380	1,483	200	85	25		24	4,339
77	575	20	111	574	168	266	269	264	439	1,723	231	101	27		24	4,792
78	575	22	113	605	183	337	298	299	497	1,961	261	116	29		24	5,320
79	575	23	115	633	196	356	327	333	555	2,199	293	132	30		24	5,791
80	575	25	117	665	212	382	355	367	611	2,435	325	147	33	9	30	6,288
81	575	27	119	680	217	400	383	401	668	2,671	357	162	33	10	30	6,733
82	575	29	121	692	224	416	404	427	712	2,853	385	172	34	15	30	7,089
83	575	30	123	703	230	430	424	453	754	3,030	409	183	35	21	30	7,430
84	575	33	125	714	235	444	444	478	796	3,208	437	193	36	28	30	7,776
85	575	35	128	724	239	457	462	501	834	3,365	460	203	38	44	30	8,095
86	575	36	132	763	158	470	480	522	871	3,516	482	213	39	57	30	8,344
87	575	38	135	801	162	482	497	544	907	3,666	504	223	41	71	30	8,676
88	575	40	139	839	166	495	514	566	943	3,817	526	233	43	86	30	9,012
89	575	42	142	877	171	508	531	587	979	3,967	548	243	46	110	30	9,356
90	575	44	145	915	175	522	548	609	1,015	4,118	570	253	50	137	33	9,709
91	575	44	149	936	179	533	565	630	1,051	4,268	592	263	50	137	33	10,005
92	575	44	151	936	179	534	566	631	1,053	4,275	594	263	50	137	33	10,021
93	575	44	151	936	179	534	566	631	1,053	4,275	594	263	50	137	33	10,021
94	575	44	151	936	179	534	566	631	1,053	4,275	594	263	50	137	33	10,021
95	575	44	151	936	179	534	566	631	1,053	4,275	594	263	50	137	33	10,021
96	575	44	151	936	179	534	566	631	1,053	4,275	594	263	50	137	33	10,021
97	575	44	151	936	179	534	566	631	1,053	4,275	594	263	50	137	33	10,021
98	575	44	151	936	179	534	566	631	1,053	4,275	594	263	50	137	33	10,021
99	575	44	151	936	179	534	566	631	1,053	4,275	594	263	50	137	33	10,021
2000*	575	44	151	936	179	534	566	631	1,053	4,275	594	263	50	137	33	10,021

* and thereafter for the remainder of the project repayment period.

TABLE 11

ESTIMATED ANNUAL PROJECT ENERGY GENERATION
AND NET PROJECT ENERGY REQUIREMENTS

(in millions of KWH)

Calendar Year	ENERGY GENERATION									ENERGY REQUIREMENTS AT PUMPING PLANTS (Table 10)	ENERGY REQUIREMENTS IN EXCESS OF GENERATION	ENERGY GENERATION IN EXCESS OF REQUIREMENTS
	Oroville-Thermalito Power Plants	Cottonwood Power Plant	Elizabeth Power Plants Nos. 1, 2, & 3	San Luis Pumping-Generating Plant	Devil Canyon Power Plant No. 1	Devil Canyon Power Plant No. 2	San Luis Obispo Power Plant	Total Generation at Power Plants	Total Generation at Load Center			
1962										18	18	
63										19	19	
64										48	48	
65										68	68	
66										96	96	
67										140	140	
68				32				32	31	382	351	
69	1,897			33				1,930	1,815	379		1,436
1970	1,897			34				1,931	1,816	395		1,421
71	1,897			36				1,933	1,818	432		1,386
72	1,897	53	213	47	118	63		2,391	2,263	2,655	392	
73	2,772	53	238	52	144	78		3,337	3,153	3,644	491	
74	2,772	53	264	57	159	87		3,392	3,207	3,737	530	
75	2,772	62	333	62	194	108		3,531	3,245	4,322	1,077	
76	2,528	73	407	76	231	130		3,445	3,265	4,339	1,074	
77	2,528	85	481	90	272	154		3,610	3,425	4,792	1,367	
78	2,528	97	555	103	312	177		3,772	3,582	5,320	1,738	
79	2,528	108	629	115	352	201		3,933	3,739	5,791	2,052	
1980	2,528	120	701	129	392	225		4,095	3,894	6,288	2,394	
81	2,528	132	772	136	432	248		4,248	4,044	6,733	2,689	
82	2,528	141	821	144	465	264		4,363	4,155	7,089	2,934	
83	2,528	149	874	152	496	280		4,479	4,268	7,430	3,162	
84	2,528	158	922	158	528	296		4,590	4,365	7,776	3,411	
85	2,528	166	970	163	561	312		4,700	4,482	8,095	3,613	
86	2,528	174	1,018	111	593	328	27	4,779	4,498	8,344	3,846	
87	2,528	181	1,066	114	626	344	33	4,892	4,669	8,676	4,007	
88	2,528	189	1,113	117	658	359	41	5,005	4,777	9,012	4,235	
89	2,528	196	1,161	120	690	375	52	5,122	4,891	9,356	4,465	
1990	2,528	204	1,209	123	723	391	65	5,243	5,010	9,709	4,699	
91	2,528	211	1,258	126	755	407	65	5,350	5,113	10,005	4,892	
92	2,528	212	1,255	126	756	408	65	5,350	5,113	10,021	4,908	
93	2,528	212	1,255	126	756	408	65	5,350	5,113	10,021	4,908	
94	2,528	212	1,255	126	756	408	65	5,350	5,113	10,021	4,908	
95	2,528	212	1,255	126	756	408	65	5,350	5,113	10,021	4,908	
96	2,528	212	1,255	126	756	408	65	5,350	5,113	10,021	4,908	
97	2,528	212	1,255	126	756	408	65	5,350	5,113	10,021	4,908	
98	2,528	212	1,255	126	756	408	65	5,350	5,113	10,021	4,908	
99	2,528	212	1,255	126	756	408	65	5,350	5,113	10,021	4,908	
2000*	2,528	212	1,255	126	756	408	65	5,350	5,113	10,021	4,908	

* and thereafter for the remainder of the project repayment period.

TABLE 12

ESTIMATED ANNUAL CAPITAL COSTS

(in dollars)

Calendar Year	STATE NON-UTILITY PROGRAM				STATE UTILITY PROGRAM											TOTAL CAPITAL COSTS, STATE ONLY
					CONSERVATION						TRANSPORTATION				DRAINAGE	TOTAL STATE UTILITY
	Feather River Facilities (Upper Feather Division)	Delta Facilities	Local Projects	TOTAL STATE NON-UTILITY	Feather River Facilities: Upper Feather Division	Feather River Facilities: Oroville Division	Delta Facilities	California Aqueduct	Middle Fork Eel River Facilities**	TOTAL CONSERVATION	North Bay Aqueduct	South Bay Aqueduct	California Aqueduct	TOTAL TRANSPORTATION	San Joaquin Drainage Facilities	
1952 thru 1960*	1,433,279	482,523	1,365,000	3,280,802	1,795,553	66,534,937	1,130,728	2,137,957		71,599,175	623,783	10,009,418	14,132,645	24,765,846	1,122,759	97,487,780	100,768,582
61	75,726	10,820	427,593	514,139	88,931	3,251,325	52,055	158,342	15,071	3,565,724	16,368	520,042	1,368,007	1,904,417	68,184	5,538,325	6,052,464
62	1,062,913		1,572,407	2,635,320	224,153	21,719,522	98,391	5,420,581	30,699	27,493,346	39,410	1,040,761	23,353,682	24,433,853	45,268	51,972,467	54,607,787
63	1,446,500	734,357	4,000,000	6,180,857	41,500	44,073,651	2,672,203	17,291,780	31,769	64,110,903	436,281	13,788,529	41,652,484	55,877,294	37,381	120,025,578	126,206,435
64	540,000	535,400	6,000,000	7,075,400		56,771,846	2,500,851	29,938,163	31,765	89,242,625	756,781	14,147,386	63,911,708	78,815,875	100,000	168,158,500	175,233,900
65		334,900	8,000,000	8,334,900		59,255,406	616,750	35,816,360	32,389	95,720,905	2,442,415	4,304,740	82,863,092	89,610,247		185,331,152	193,666,052
66		137,900	10,000,000	10,137,900		67,298,974	469,209	34,195,646	35,105	101,998,934	3,793,496	66,600	101,565,194	105,425,290	14,052,000	221,476,224	231,614,124
67	49,000	394,400	10,000,000	10,443,400		46,385,500	1,800,900	21,915,368	37,191	70,138,959	3,825,368		114,669,939	118,495,307	14,052,000	202,686,266	213,129,666
68	231,500	1,031,800	10,000,000	11,263,300		11,032,500	8,169,100	7,120,403	37,733	26,359,736	2,339,712		125,738,183	128,077,895	7,026,000	161,463,631	172,726,931
69	1,240,000	1,166,100	10,000,000	12,406,100		55,500	8,233,500	791,373	38,596	9,118,969	545,583	160,000	130,499,654	131,205,237		140,324,206	152,730,306
1970	1,526,000	818,600	10,000,000	12,344,600		51,000	3,707,400	273,000	39,808	4,071,208	1,374,128		87,324,104	88,698,232		92,769,440	105,114,040
71	868,500	1,706,200	10,000,000	12,574,700		25,500	606,100	342,000	40,670	1,014,270	1,951,244		35,396,582	37,347,826		38,362,096	50,936,796
72	568,000	956,800	10,000,000	11,524,800			272,300	342,000	96,056	710,356	1,749,500		21,434,225	23,183,725		23,894,081	35,418,881
73	168,000	1,080,400	10,000,000	11,248,400			1,514,600	342,000	96,056	1,952,656	984,000		18,588,225	19,572,225	10,704,000	32,228,881	43,477,281
74		2,964,800	10,000,000	12,964,800			2,551,800	342,000	96,056	2,989,856	105,500		16,086,225	16,191,725	10,704,000	29,885,581	42,850,381
75		2,240,900	10,000,000	12,240,900			2,089,600	395,000	96,056	2,580,656			12,168,225	12,168,225		14,748,881	26,989,781
76		2,217,600	10,000,000	12,217,600			1,856,700	447,500	96,056	2,400,256	1,500		7,022,225	7,023,725		9,423,981	21,641,581
77		2,127,600		2,127,600			956,500	561,500	96,056	1,614,056	27,000		14,448,225	14,475,225		16,089,281	18,216,881
78		872,200		872,200			241,400	578,000	2,096,056	2,915,456	111,000		20,837,725	20,948,725		23,864,181	24,736,381
79		345,100		345,100			146,900	411,000	6,096,056	6,653,956	85,500		10,462,265	10,547,765	455,000	17,656,721	18,001,821
1980		314,100		314,100			1,072,100	289,000	21,096,056	22,457,156			1,207,000	1,207,000		23,664,156	23,978,256
81								289,000	43,096,056	43,385,056			861,000	861,000		44,246,056	44,246,056
82								175,000	48,096,056	48,271,056	7,500		1,176,500	1,184,000		49,455,056	49,455,056
83								220,000	36,096,056	36,316,056	112,500		2,258,500	2,371,000		38,687,056	38,687,056
84								236,000	10,096,056	10,332,056	105,000		2,382,500	2,487,500		12,819,556	12,819,556
85								69,000	1,322,056	1,391,056		160,000	1,691,000	1,851,000	532,000	3,774,056	3,774,056
86																	
87																	
88																	
89																	
1990																	
TOTAL	9,209,418	20,472,500	131,365,000	161,046,918	2,150,137	376,455,661	40,759,087	160,097,973	168,941,580	748,404,438	21,433,569	44,197,476	953,099,114	1,018,730,159	58,898,592	1,826,033,189	1,987,080,107

* Expenditures only from appropriations authorized prior to November 8, 1960. Of the total considered expended through December 31, 1960, $59,140,316 was actually expended as of November 8, 1960; $5,253,451 during the remainder of 1960; an estimated $30,442,697 during 1961; an estimated $5,453,915 during 1962; and an estimated $478,203 in 1963.

** Costs shown for the Middle Fork Eel River Facilities prior to the initial year of construction in 1978 represent its equivalent share of allocated general operating costs. These costs cannot be properly charged against the facility prior to its authorization, presently unspecified.

TABLE 13

ESTIMATED ANNUAL CAPITAL COSTS BY MAJOR COMPONENTS OF COST

(in dollars)

Calendar Year	Design and Construction	Right of Way & Relocations	General* Operating Expense	O M & R*	Local Impact	Preliminary Planning	Total
1952 thru 1960	33,823,780	63,664,000					97,487,780
61	1,287,073	2,786,000	835,559	4,700	43,000	581,993	5,538,325
62	28,107,872	21,223.000	1,708,971	97	157,500	775,027	51,972,467
63	74,211,540	43,062,000	1,769,912	5,770	343,500	632,856	120,025,578
64	126,565,308	39,062,000	1,773,046	5,770	472,000	280,376	168,158,500
65	165,725,960	16,946,000	1,886,608	162,870	486,500	123,214	185,331,152
66	204,215,200	14,449,000	2,104,019	190,046	473,500	44,459	221,476,224
67	191,702,400	9,031,000	1,524,410	173,956	254,500		202,686,266
68	159,234,600	1,045,000	1,102,579	56,952	24,500		161,463,631
69	138,070,500	1,083,000	1,143,230	27,476			140,324,206
1970	90,805,400	677,000	1,197,317	89,723			92,769,440
71	36,997,100	207,000	987,078	170,918			38,362,096
72	23,610,800		283,281				23,894,081
73	30,887,600	1,058,000	283,281				32,228,881
74	28,547,300	1,055,000	283,281				29,885,581
75	14,425,600	40,000	283,281				14,748,881
76	9,140,700		283,281				9,423,981
77	15,806,000		283,281				16,089,281
78	23,538,900	42,000	283,281				23,864,181
79	17,098,400	259,000	283,281	16,040			17,656,721
1980	22,661,100	907,000	96,056				23,664,156
81	42,293,000	1,857,000	96,056				44,246,056
82	47,284,000	2,075,000	96,056				49,455,056
83	37,799,000	792,000	96,056				38,687,056
84	12,723,500		96,056				12,819,556
85	3,452,000		96,056	226,000			3,774,056
86							
87							
88							
89							
1990							
TOTALS	1,580,014,633	221,320,000	18,875,313	1,130,318	2,255,000	2,437,925	1,826,033.189

* Costs occurring prior to project operation only.

TABLE 14

ESTIMATED ANNUAL CAPITAL COSTS
ALLOCATED TO THE FEDERAL GOVERNMENT

(in dollars)

Calendar Year	FLOOD CONTROL			WATER SUPPLY	DRAINAGE	TOTAL FEDERAL CAPITAL EXPENDITURES
	Oroville Division	Delta Facilities	South Bay Aqueduct	San Luis Division	San Joaquin Drainage Facilities	
1952 thru 1960		128,076		1,305,607		1,433,683
61		33,175		1,193,875		1,227,050
62	4,684,500		102,100	6,785,500		11,572,100
63	13,475,000	840,800	869,300	22,729,500		37,914,600
64	14,127,500	403,000	1,125,400	39,780,000		55,435,900
65	11,475,000	403,000	358,200	46,430,500		58,666,700
66	11,953,000	165,900		41,339,500	3,752,000	57,210,400
67	8,050,000	283,200		25,778,500	3,752,000	37,863,700
68	2,235,000	283,200		9,050,000	1,876,000	13,444,200
69		428,000		1,102,500		1,530,500
1970		452,800				452,800
71		1,692,200				1,692,200
72		699,400				699,400
73		699,800				699,800
74		1,423,200				1,423,200
75		612,100				612,100
76		612,100				612,100
77		612,100				612,100
78		612,100				612,100
79		391,800				391,800
1980		253,500				253,500
81						
82						
83						
84						
85						
86						
87						
88						
89						
1990						
TOTALS	66,000,000	11,029,451	2,455,000	195,495,482	9,380,000	284,359,933

TABLE 15

ESTIMATED ANNUAL OPERATING COSTS

(in dollars)

Calendar Year	CONSERVATION						TRANSPORTATION				DRAINAGE	TOTAL STATE UTILITY
	Feather River Facilities		Delta Facilities	California Aqueduct	Middle Fork Eel River Facilities	Total Conservation	North Bay Aqueduct	South Bay Aqueduct	California Aqueduct	Total Transportation	San Joaquin Drainage Facilities	
	Upper Feather Division	Oroville Division										
1962	6,021					6,021		152,637		152,637		158,658
63	6,045					6,045		166,235		166,235		172,280
64	6,358					6,358		296,807		296,807		303,165
65	6,480					6,480		403,823		403,823		410,303
66	6,628					6,628		578,050		578,050		584,678
67	6,687	793,441	376,623	90,342		1,267,093		629,310	678,915	1,308,225		2,575,318
68	6,687	1,412,397	383,577	1,372,369		3,175,030	172,634	605,286	2,629,120	3,407,040	430,000	7,012,070
69	6,769	*12,547,264	393,227	1,544,094		*10,603,174	189,088	947,606	3,617,129	4,753,823	860,000	* 4,989,351
1970	6,810	*13,446,376	647,924	1,725,900		*11,065,742	202,960	958,367	3,950,634	5,111,961	860,000	* 5,093,781
71	7,169	*14,101,251	847,030	1,829,602		*11,417,450	242,620	969,268	4,894,280	6,106,168	860,000	* 4,451,282
72	7,433	*14,084,266	850,378	1,967,828		*11,258,627	371,349	975,513	15,405,047	16,751,909	860,000	6,353,282
73	7,433	*16,076,911	906,978	2,151,684		*13,010,816	378,631	981,523	17,042,528	18,402,682	860,000	6,251,866
74	7,433	*17,102,911	914,678	2,273,793		*13,907,007	387,172	987,525	17,734,612	19,109,309	860,000	6,062,302
75	7,433	*18,128,911	976,278	2,297,375		*14,847,825	445,396	993,536	20,014,436	21,453,368	1,447,000	8,052,543
76	7,433	*18,979,911	987,178	2,473,960		*15,511,340	451,396	999,539	22,068,761	23,519,696	1,447,000	9,455,356
77	7,433	*18,979,911	1,048,578	2,593,992		*15,329,908	494,691	1,064,059	24,136,036	25,694,786	1,447,000	11,811,878
78	7,433	*18,979,911	1,065,978	2,768,269		*15,138,231	503,863	1,071,072	26,303,804	27,878,739	1,447,000	14,187,508
79	7,433	*18,979,911	1,073,878	2,864,136		*15,034,464	507,788	1,076,076	30,206,396	31,790,260	1,447,000	18,202,796
1980	7,433	*18,931,662	1,102,778	3,130,751		*14,690,700	553,835	1,086,520	34,073,976	35,714,331	1,526,000	22,549,631
81	7,433	*18,931,662	1,126,378	3,187,949		*14,609,902	562,835	1,093,533	37,784,402	39,440,770	1,526,000	26,356,868
82	7,433	*18,931,662	1,135,178	3,358,185		*14,430,866	569,835	1,157,051	41,461,540	43,188,426	1,526,000	30,283,560
83	7,433	*18,931,662	1,143,978	3,194,655		*14,585,596	574,835	1,193,065	44,158,745	45,926,645	1,526,000	32,867,049
84	7,433	*18,931,662	1,152,578	3,455,168		*14,316,483	586,054	1,169,071	45,850,062	47,605,187	1,526,000	34,814,704
85	7,433	*18,931,662	1,161,778	3,586,747		*14,175,704	628,979	1,178,075	49,456,693	51,263,747	1,575,000	38,663,043
86	7,433	*18,931,662	1,170,378	3,007,826	276,000	*14,470,025	633,979	1,190,095	50,975,704	52,799,778	1,575,000	39,904,753
87	7,433	*18,931,662	1,179,278	3,017,826	276,000	*14,451,125	679,274	1,257,656	52,257,085	54,194,015	1,575,000	41,317,890
88	7,433	*18,931,662	1,188,078	2,995,826	276,000	*14,464,325	685,274	1,269,658	55,311,635	57,266,567	1,575,000	44,377,242
89	7,433	*18,931,662	1,196,978	3,006,826	276,000	*14,444,425	692,274	1,277,666	56,050,637	58,020,577	1,575,000	45,151,152
1990	7,433	*18,931,662	1,205,678	2,504,826	276,000	*14,937,725	692,274	1,286,670	59,012,357	60,991,301	1,575,000	47,628,576
91	7,433	*18,931,662	1,205,678	2,273,826	276,000	*15,168,725	692,274	1,298,695	59,782,356	61,773,325	1,575,000	48,179,600
92	7,433	*18,931,662	1,205,678	2,273,826	276,000	*15,168,725	692,274	1,305,691	59,813,356	61,811,321	1,575,000	48,217,596
93	7,433	*18,931,662	1,205,678	2,273,826	276,000	*15,168,725	692,274	1,320,705	59,813,356	61,826,335	1,575,000	48,232,610
94	7,433	*18,931,662	1,205,678	2,273,826	276,000	*15,168,725	692,274	1,327,712	59,813,356	61,833,342	1,575,000	48,239,617
95	7,433	*18,931,662	1,205,678	2,273,826	276,000	*15,168,725	692,274	1,338,718	59,813,358	61,844,350	1,575,000	48,250,625
96	7,433	*18,931,662	1,205,678	2,273,826	276,000	*15,168,725	692,274	1,348,723	59,813,355	61,854,352	1,575,000	48,260,627
97	7,433	*18,931,662	1,205,678	2,273,826	276,000	*15,168,725	692,274	1,360,730	59,813,427	61,866,431	1,575,000	48,272,706
98	7,433	*18,931,662	1,205,678	2,273,826	276,000	*15,168,725	692,274	1,362,728	59,813,356	61,868,358	1,575,000	48,274,633
99	7,433	*18,931,662	1,205,678	2,273,826	276,000	*15,168,725	692,274	1,367,726	59,813,426	61,873,426	1,575,000	48,279,701
2000**	7,433	*18,931,662	1,205,678	2,273,826	276,000	*15,168,725	692,274	1,372,724	59,813,356	61,878,354	1,575,000	48,284,629

* A credit; power revenues exceed operating expenses.
** and thereafter for the remainder of the project repayment period.

TABLE 16

ESTIMATED CAPITAL AND ANNUAL OPERATING COSTS
ALLOCATED TO CONSERVATION

(in dollars)

Calendar Year	CAPITAL COSTS*									ANNUAL OPERATING COSTS									TOTAL EXPENDITURES	
	FEATHER RIVER FACILITIES		DELTA FACILITIES	CALIFORNIA AQUEDUCT				TOTAL, INITIAL CONSERVATION FACILITIES	TOTAL, ADDITIONAL CONSERVATION FACILITY**	FEATHER RIVER FACILITIES		DELTA FACILITIES	CALIFORNIA AQUEDUCT				TOTAL, INITIAL CONSERVATION FACILITIES	TOTAL, ADDITIONAL CONSERVATION FACILITY**	INITIAL CONSERVATION FACILITIES	ADDITIONAL CONSERVATION FACILITY**
	Upper Feather Division	Oroville Division		Reach 1	Reach 2	Reach 3	San Luis Dam and Reservoir			Upper Feather Division	Oroville Division (Net)		Reach 1	Reach 2	Reach 3	San Luis Dam and Reservoir (Net)				
1952		152,894		1,907	1,263	1,625	14,435	172,124											172,124	
53		265,775		4,690	3,104	4,320	38,381	316,270											316,270	
54		246,029		5,830	3,858	5,144	45,705	306,566											306,566	
55		151,561		3,111	2,059	2,508	22,288	181,527											181,527	
56		1,292,343		3,798	2,515	3,146	27,954	1,329,756											1,329,756	
57	127,359	6,720,183	71,403	4,303	2,848	4,969	44,150	6,975,215											6,975,215	
58	259,760	9,550,239	74,309	6,871	4,548	10,046	89,269	9,995,044											9,995,044	
59	337,374	10,301,946	94,766	58,832	38,936	40,407	359,006	11,231,267											11,231,267	
1960	516,808	15,869,580	208,038	96,873	64,111	49,837	442,790	17,247,837											17,247,837	
61	571,536	20,895,286	334,539	101,551	127,435	76,788	711,841	22,818,976	15,071										22,818,976	15,071
62	296,000	26,059,948	498,119	286,792	542,398	447,654	3,906,982	32,037,893	30,699	6,021							6,021		32,043,914	30,699
63	41,500	44,073,651	2,672,203	1,577,507	1,396,403	1,450,913	12,866,957	64,079,134	31,769	6,045							6,045		64,085,179	31,769
64		56,771,846	2,500,851	2,203,505	2,805,901	2,504,507	22,424,250	89,210,860	31,765	6,358							6,358		89,217,218	31,765
65		59,255,496	616,750	1,740,919	5,009,744	2,922,626	26,144,071	95,688,516	32,389	6,480							6,480		95,694,996	32,389
66		67,598,974	469,209	1,748,360	6,554,060	2,603,558	23,289,668	101,963,829	35,105	6,628							6,628		101,970,457	35,105
67		46,385,500	1,800,900	972,500	4,746,020	1,632,616	14,564,232	70,101,768	37,191	6,687		793,441	376,623	90,342			1,267,093		71,368,861	37,191
68		11,032,500	8,169,100	184,000	1,301,000	568,903	5,066,500	26,322,003	37,733	6,687		1,412,397	383,577	504,553	94,081	25,170	748,565	3,175,030	29,497,033	37,733
69		55,500	8,233,500	106,000		69,373	616,000	9,080,373	38,596	6,769	(-) 12,547,264	393,227	507,893	122,848	32,143	881,210	(-)10,603,174	(-) 1,522,801	38,596
1970		51,000	3,707,400	273,000				4,031,400	39,808	6,810	(-) 13,446,376	647,924	523,858	151,833	36,859	1,013,350	(-)11,065,742	(-) 7,034,342	39,808
71		25,500	606,100	342,000				973,600	40,670	7,169	(-) 14,101,251	847,030	533,077	166,634	38,792	1,091,099	(-)11,417,450	(-)10,443,850	40,670
72			272,300	342,000				614,300	96,056	7,433	(-) 14,084,266	850,378	709,905	175,750	39,794	1,042,379	(-)11,258,627	(-)10,644,327	96,056
73			1,514,600	342,000				1,856,600	96,056	7,433	(-) 16,076,911	906,978	790,258	176,188	39,794	1,145,444	(-)13,010,816	(-)11,154,216	96,056
74			2,551,800	342,000				2,893,800	96,056	7,433	(-) 17,102,911	914,678	880,007	176,188	39,794	1,177,804	(-)13,907,007	(-)11,013,207	96,056
75			2,089,600	395,000				2,484,600	96,056	7,433	(-) 18,128,911	976,278	963,229	176,188	39,794	1,118,164	(-)14,847,825	(-)12,363,225	96,056
76			1,856,700	447,500				2,304,200	96,056	7,433	(-) 18,979,911	987,178	1,133,209	176,188	39,794	1,124,769	(-)15,511,340	(-)13,207,140	96,056
77			956,500	561,500				1,518,000	96,056	7,433	(-) 18,979,911	1,048,578	1,217,226	176,188	39,794	1,160,784	(-)15,329,908	(-)13,811,908	96,056
78			241,400	578,000				819,400	2,096,056	7,433	(-) 18,979,911	1,065,978	1,386,488	176,188	39,794	1,165,799	(-)15,138,231	(-)14,318,831	2,096,056
79			146,900	411,000				557,900	6,096,056	7,433	(-) 18,979,911	1,073,878	1,480,930	176,188	39,794	1,167,224	(-)15,034,464	(-)14,476,564	6,096,056
1980			1,072,100	289,000				1,361,100	21,096,056	7,433	(-) 18,931,662	1,102,778	1,659,043	185,969	46,067	1,239,672	(-)14,690,700	(-)13,329,600	21,096,056
81				289,000				289,000	43,096,056	7,433	(-) 18,931,662	1,126,378	1,743,061	185,969	46,067	1,212,852	(-)14,609,902	(-)14,320,902	43,096,056
82				175,000				175,000	40,096,056	7,433	(-) 18,931,662	1,135,178	1,913,117	185,969	46,067	1,213,032	(-)14,430,866	(-)14,255,866	40,096,056
83				220,000				220,000	36,096,056	7,433	(-) 18,931,662	1,143,978	1,747,997	185,969	46,067	1,214,622	(-)14,585,596	(-)14,365,596	36,096,056
84				236,000				236,000	10,096,056	7,433	(-) 18,931,662	1,152,578	2,036,625	185,969	46,067	1,186,507	(-)14,316,483	(-)14,080,483	10,096,056
85				69,000				69,000	1,322,056	7,433	(-) 18,931,662	1,161,778	2,166,319	185,969	46,067	1,188,392	(-)14,175,704	(-)14,106,704	1,322,056
86										7,433	(-) 18,931,662	1,170,378	1,762,398	185,969	46,067	1,013,392	(-)14,746,025	(-)14,746,025	276,000
87										7,433	(-) 18,931,662	1,179,278	1,762,398	185,969	46,067	1,023,392	(-)14,727,125	(-)14,727,125	276,000
88										7,433	(-) 18,931,662	1,188,078	1,762,398	185,969	46,067	1,001,392	(-)14,740,325	(-)14,740,325	276,000
89										7,433	(-) 18,931,662	1,196,978	1,762,398	185,969	46,067	1,012,392	(-)14,720,425	(-)14,720,425	276,000
1990										7,433	(-) 18,931,662	1,205,678	1,762,398	185,969	46,067	510,392	(-)15,213,725	(-)15,213,725	276,000
91 and thereafter for the remainder of the project repayment period (2035)										7,433	(-) 18,931,662	1,205,678	1,762,398	185,969	46,067	279,392	(-)15,444,725	(-)15,444,725	276,000	
TOTAL	2,150,137	376,455,661	40,759,087	14,419,349	22,605,203	12,398,942	110,674,479	579,462,858	168,941,580	541,366	(-)1,239,374,768	77,490,873	110,107,037	12,358,726	3,031,068	37,225,268	(-)998,620,430	13,800,000	(-)419,157,572	182,741,580

* Must be reduced by an allocated share of revenues accruing from the sale or other disposal of electrical energy (herein included as a negative operating cost) before segregation into components of the Delta Water Charge.
** Herein considered to consist of the Middle Fork Eel River Facilities.

TABLE 17

ANNUAL CAPITAL COSTS ALLOCATED TO TRANSPORTATION
NORTH BAY AQUEDUCT

(in dollars)

Calendar Year	CALHOUN DIVISION		CORDELIA DIVISION		SONOMA DIVISION			NOVATO DIVISION	TOTAL
	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	
1952									
53									
54									
55									
56									
57	13,075	19,362	26,550	15,828	4,706	10,433	6,955	6,601	103510
58	19,150	28,355	72,877	43,448	7,152	15,855	10,570	13,548	210955
59	7,490	11,090	49,543	29,536	2,871	6,365	4,244	8,818	119957
1960	12,846	19,022	18,254	10,882	4,171	9,246	6,165	19,723	100309
61	15,444	19,929	20,096	10,098	4,661	8,700	7,364	18,898	105190
62	9,146	6,842	11,527	2,581	2,087	907	4,169	2,381	39640
63	28,832	106,729	82,521	30,416	19,358	17,525	58,210	92,690	436281
64	47,332	205,729	152,021	57,916	36,358	34,025	111,710	111,690	756781
65	214,786	537,564	511,113	318,109	137,918	250,268	255,828	216,829	2442415
66	366,872	771,284	816,634	551,121	222,736	450,123	347,464	267,262	3793496
67	527,504	673,094	954,060	523,441	205,995	433,738	294,979	212,557	3825368
68	357,000	401,500	612,500	282,500	116,310	232,882	189,935	147,085	2339712
69	27,500	143,000	102,000	47,000	26,936	32,163	85,014	81,970	545583
1970	106,000	303,000	281,000	176,000	77,774	139,810	156,689	133,855	1374128
71	172,500	396,500	410,000	282,000	117,300	233,321	190,739	148,884	1951244
72	161,500	330,000	366,000	259,000	101,000	216,000	143,000	173,000	1749500
73	101,500	165,000	271,500	129,500	50,500	108,000	71,500	86,500	984000
74	20,000		85,500						105500
75	000		000						0
76	1,500		000						1500
77	21,000		6,000						27000
78	19,500		91,500						111000
79	000		85,500						85500
1980	000		000						0
81	000		000						0
82	1,500		6,000						7500
83	21,000		91,500						112500
84	19,500		85,500						105000
85									
86									
87									
88									
89									
1990									
91									
92									
93									
94									
95									
96									
97									
98									
99									
2000									
Totals	2,292,477	4,138,000	5,209,696	2,769,376	1,137,833	2,199,361	1,944,535	1,742,291	21433569

TABLE 18

ANNUAL CAPITAL COSTS ALLOCATED TO TRANSPORTATION
SOUTH BAY AQUEDUCT

(in dollars)

Calendar Year	LIVERMORE DIVISION		DOOLAN DIVISION	ALAMEDA DIVISION	DEL VALLE DIVISION	NILES DIVISION			SANTA CLARA DIVISION	TOTAL
	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	Reach 9	
1952	089	018		024	122	013	109		109	484
53	445	092		123	607	066	538		542	2413
54	1,456	303		402	1,981	215	1,759		1,774	7890
55	2,010	418		526	2,640	287	2,344		2,368	10593
56	26,127	5,439		6,667	32,930	3,573	29,206		34,570	138512
57	59,462	12,378		15,197	74,949	8,132	66,471		344,944	581533
58	262,510	54,646		8,913	43,956	4,769	38,985		349,619	763398
59	497,896	103,646		22,430	55,693	1,329	10,860		101,460	793314
1960	1,296,287	269,845		100,726	243,120	3,637	29,730		151,539	2094884
61	1,915,861	693,493		280,000	217,820	3,853	35,007	23,665	100,296	3269995
62	1,166,100	489,000		852,652	392,966	22,970	187,486	343,256	452,775	3907205
63	876,800	9,500		1,578,009	1,409,540	233,992	1,910,366	3,403,500	4,366,822	13788529
64	1,983,600			679,400	2,851,639	187,200	1,528,200	2,549,700	4,367,647	14147386
65	699,500				3,458,540	1,400	11,500	18,700	115,100	4304740
66					66,600					66600
67										0
68										0
69	160,000									160000
1970										
71										
72										
73										
74										
75										
76										
77										
78										
79										
1980										
81										
82										
83										
84										
85	160,000									160000
86										
87										
88										
89										
1990										
91										
92										
93										
94										
95										
96										
97										
98										
99										
2000										
Totals	9,108,143	1,638,778		3,545,069	8,853,103	471,436	3,852,561	6,338,821	10,389,563	44197476

TABLE 19

ANNUAL CAPITAL COSTS ALLOCATED TO TRANSPORTATION
CALIFORNIA AQUEDUCT

(in dollars)

Calendar Year	NORTH SAN JOAQUIN DIVISION			SAN LUIS DIVISION					
	Reach 1	Reach 2	Subtotal	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Subtotal
1952	5,289	3,019	8308	1,935	5,130	3,781	840	3,841	15527
53	13,007	7,423	20430	5,145	13,639	10,053	2,234	10,213	41284
54	16,165	9,227	25392	6,127	16,242	11,971	2,661	12,160	49161
55	8,628	4,925	13553	2,988	7,921	5,838	1,297	5,931	23975
56	10,534	6,012	16546	3,748	9,933	7,322	1,627	7,438	30068
57	11,932	6,810	18742	5,918	15,689	11,564	2,570	11,748	47489
58	19,054	10,876	29930	11,967	31,723	23,382	5,196	23,753	96021
59	163,144	93,117	256261	48,127	127,576	94,033	20,896	95,525	386157
1960	268,632	153,326	421958	59,358	157,350	115,978	25,773	117,820	476279
61	280,816	304,807	585623	91,459	154,678	183,106	42,871	184,899	657013
62	793,627	1,297,474	2091101	533,182	617,836	1,010,442	233,546	1,027,824	3422830
63	4,372,926	3,339,877	7712803	1,728,127	5,439,040	3,344,305	763,397	3,408,977	14683846
64	6,108,919	6,710,373	12819292	2,983,018	7,944,036	5,838,804	1,326,147	5,951,726	24043731
65	4,827,568	11,979,192	16806760	3,481,025	9,264,788	6,812,098	1,545,266	6,942,949	28046126
66	4,848,551	15,674,296	20522847	3,100,993	8,262,533	6,070,521	1,379,158	6,188,039	25001244
67	2,697,000	11,349,609	14046609	1,944,546	5,203,470	3,805,704	869,899	3,875,228	15698847
68	510,500	3,111,000	3621500	677,597	2,015,500	1,323,500	301,000	1,351,500	5669097
69	293,000		293000	82,627		161,000	36,000	163,500	443127
1970	756,000		756000						
71	948,000		948000						
72	948,000		948000						
73	948,000		948000						
74	948,000		948000						
75	1,094,500		1094500						
76	1,241,500		1241500						
77	1,558,000		1558000						
78	1,603,000		1603000						
79	1,140,000		1140000						
1980	801,500		801500						
81	801,500		801500						
82	485,000		485000						
83	609,500		609500						
84	655,000		655000						
85	192,000		192000						
86									
87									
88									
89									
1990									
91									
92									
93									
94									
95									
96									
97									
98									
99									
2000									
Totals	39,978,792	54,061,363	94040155	14,767,887	39,287,084	28,833,402	6,560,378	29,383,071	118831822

TABLE 19 (continued)

ANNUAL CAPITAL COSTS ALLOCATED TO TRANSPORTATION
CALIFORNIA AQUEDUCT

(in dollars)

Calendar Year	SOUTH SAN JOAQUIN DIVISION									
	Reach 8	Reach 9	Reach 10	Reach 11	Reach 12	Reach 13	Reach 14	Reach 15	Reach 16	Subtotal
1952	676	630	631	796	3,638	1,887	876	676	4,454	14264
53	2,488	2,320	2,320	2,929	13,389	6,944	3,223	2,488	16,385	52486
54	3,215	2,998	2,998	3,784	17,303	8,973	4,164	3,215	21,173	67823
55	1,518	1,416	1,416	1,787	8,169	4,237	1,967	1,518	9,997	32025
56	4,753	4,433	4,433	5,596	25,584	13,268	6,157	4,753	31,310	100287
57	11,520	10,742	10,742	13,562	61,999	32,154	14,922	11,520	75,876	243037
58	23,112	21,552	21,552	27,207	124,384	64,508	29,938	23,112	152,226	487591
59	34,031	31,733	31,733	40,062	183,148	94,984	44,081	34,031	224,143	717946
1960	40,329	37,605	37,605	47,475	217,041	112,562	52,240	40,329	265,621	850807
61	72,957	39,765	46,317	62,380	140,370	91,118	142,272	110,824	235,870	941873
62	222,639	72,783	115,893	111,997	112,688	196,601	408,620	272,008	218,942	1732171
63	458,531	108,158	181,273	167,882	232,798	301,472	636,320	354,784	311,483	2752701
64	3,015,530	256,157	341,772	276,881	246,797	633,970	1,078,314	563,281	651,479	7064181
65	4,847,663	997,785	1,166,901	255,512	163,005	2,080,767	1,514,235	1,039,716	1,045,676	13111260
66	2,128,819	3,501,270	4,016,407	2,176,038	586,426	3,157,721	2,476,443	1,417,773	1,493,273	20954170
67		2,714,441	3,109,605	3,740,931	1,141,636	2,665,374	3,360,219	1,211,668	1,741,167	19685041
68				1,629,500	1,160,317	1,122,321	3,323,019	933,323	1,797,772	9966252
69					3,784,223		6,317,814	957,617	3,257,129	14316783
1970					5,758,275		12,166,968	2,716,316	5,567,649	26209208
71					2,540,300		8,625,541	2,837,613	4,089,420	18092874
72							1,567,000	825,000	1,107,500	3499500
73							999,000	823,500	1,082,500	2905000
74							632,000	1,329,500	1,746,500	3708000
75							148,500	1,416,500	1,868,500	3433500
76								825,000	1,089,500	1914500
77								175,500	228,500	404000
78										
79										
1980										
81										
82										
83										
84										
85										
86										
87										
88										
89										
1990										
91										
92										
93										
94										
95										
96										
97										
98										
99										
2000										
Totals	10,867,781	7,803,788	9,091,598	8,564,319	16,521,490	10,588,861	43,553,833	17,931,565	28,334,045	153257280

TABLE 19 (continued)

ANNUAL CAPITAL COSTS ALLOCATED TO TRANSPORTATION
CALIFORNIA AQUEDUCT

(in dollars)

Calendar Year	TEHACHAPI DIVISION	ANTELOPE DIVISION			EAST BRANCH DIVISION									
	Reach 17	Reach 18	Reach 19	Subtotal	Reach 20	Reach 21	Reach 22	Reach 23	Reach 24	Reach 25	Reach 26	Reach 27	Reach 28	Subtotal
1952	11,844	6,304		6304	3,530	6,968	3,123	1,278	4,364	3,656	2,367	2,149	13,653	41088
53	37,495	21,128		21128	11,830	23,358	10,466	4,284	14,626	12,256	7,932	7,203	45,764	137719
54	69,007	23,400		23400	13,106	25,876	11,595	4,745	16,202	13,578	8,788	7,980	50,697	152567
55	45,089	9,103		9103	5,099	10,068	4,512	1,846	6,305	5,284	3,419	3,105	19,726	59364
56	71,231	11,531		11531	6,456	12,745	5,712	2,338	7,980	6,688	4,328	3,930	24,972	75149
57	166,426	32,362		32362	18,116	35,769	16,028	6,559	22,397	18,770	12,148	11,030	70,081	210898
58	210,177	46,863		46863	24,749	48,863	21,896	8,960	30,597	25,643	16,595	15,068	95,738	288109
59	166,498	56,320		56320	31,213	61,626	27,616	11,300	38,589	32,341	20,930	19,003	120,746	363364
1960	230,591	57,892		57892	120,612	238,136	106,711	43,668	149,115	124,964	80,877	73,435	466,583	1404101
61	1,629,167	210,677	116,783	327460	254,353	347,483	242,608	65,249	482,204	215,139	109,425	106,098	2,145,009	3967568
62	3,891,084	289,626	252,272	541898	611,102	1,311,637	315,593	59,535	781,261	220,055	91,301	128,729	3,500,837	7020050
63	4,783,309	213,443	399,168	612611	931,144	2,371,529	407,415	62,599	781,830	118,619	80,261	142,637	3,411,235	8307269
64	7,804,319	251,495	454,934	706429	944,509	2,411,293	482,979	35,642	495,876	9,162	141,908	162,749	2,102,340	6786458
65	13,833,654	203,886	200,107	403993	509,930	1,380,460	290,927	86,750	278,994	210,271	288,045	240,794	976,868	4263039
66	20,710,198	864,920	1,452,832	2317752	50,608	350,675	135,620	164,947	279,209	417,969	359,517	306,109	1,070,652	3135306
67	19,398,794	4,226,186	4,315,669	8541855	4,412,939	7,592,000	1,883,970	851,662	210,443	2,580,686	752,264	815,180	6,623,690	25722834
68	11,257,885	4,338,438	4,432,257	8770695	9,122,430	13,550,580	4,633,860	2,305,837	3,155,633	7,113,862	2,582,907	2,854,180	21,212,164	66531453
69	8,406,009	1,449,061	1,577,843	3026904	5,383,007	10,869,583	5,674,262	3,073,581	9,253,399	7,114,608	3,527,090	3,821,664	27,708,109	76425303
1970	4,331,694	561,384		561384	687,463	4,764,506	2,914,252	1,542,513	9,254,181	2,374,369	1,546,810	1,640,894	15,971,291	40696279
71	3,357,903	574,624		574624			000		3,091,661		735,637	000	3,459,920	7287218
72	7,546,000	1,006,000		1006000			000				1,305,000	000		1305000
73	8,878,000	503,000		503000			719,500				652,500	000		1372000
74	8,878,500						1,439,000				000	000		1439000
75	5,771,500						719,500				38,500	23,000		781000
76	1,332,000										1,017,500	1,010,000		2027500
77											1,958,000	1,974,500		3932500
78											979,000	987,500		1966500
79											000			0
1980											000			0
81											39,000			39000
82											691,500			691500
83											1,305,000			1305000
84											652,500			652500
85														
86														
87														
88														
89														
1990														
91														
92														
93														
94														
95														
96														
97														
98														
99														
2000														
Totals	132,818,374	14,957,643	13,201,865	28159508	23,142,196	45,413,155	20,067,145	8,333,293	28,354,866	20,617,920	19,011,049	14,356,937	89,090,075	268386636

TABLE 19 (continued)

ANNUAL CAPITAL COSTS ALLOCATED TO TRANSPORTATION
CALIFORNIA AQUEDUCT

(in dollars)

Calendar Year	WEST BRANCH DIVISION			COASTAL DIVISION						TOTAL CALIFORNIA AQUEDUCT
	Reach 29	Reach 30	Subtotal	Reach 31	Reach 32	Reach 33	Reach 34	Reach 35	Subtotal	
1952	6,352		6352	149	048	1,275	104	270	1846	105533
53	21,309		21309	563	178	4,805	393	1,018	6957	338808
54	23,635		23635	903	286	7,705	631	1,631	11156	422141
55	9,209		9209	523	165	4,460	366	945	6459	198777
56	11,618		11618	730	231	6,228	510	1,319	9018	325448
57	32,606		32606	2,048	648	17,481	1,430	3,703	25310	776870
58	47,171		47171	4,350	1,376	37,144	3,038	7,867	53775	1259637
59	97,270		97270	7,428	2,351	63,418	5,187	13,433	91817	2135633
1960	128,142		128142	8,644	2,735	73,798	6,037	15,632	106846	3676616
61	412,325	151,653	563978	12,808	2,264	88,320	4,636	11,058	119086	8791768
62	1,609,839	303,890	1913729	59,413	34,385	106,049	3,430	6,963	210240	20823103
63	2,355,751	155,550	2511301	102,350	66,933	108,708	3,516	7,137	288644	41652484
64	3,983,203	118,158	4101361	103,144	67,465	342,999	20,574	51,755	585937	63911708
65	4,784,105	267,431	5051536	325,886	303,545	582,521	37,720	97,052	1346724	82863092
66	3,830,982	2,993,427	6824409	840,739	516,691	494,759	70,486	176,593	2099268	101565194
67	4,089,758	5,569,969	9659727	901,676	248,846	406,750	103,277	255,683	1916232	114669939
68	13,401,146	5,420,910	18822056	323,500		416,068	103,514	256,163	1099245	125738183
69	21,416,062	5,384,524	26800586			427,265	103,844	256,833	787942	130499654
1970	10,222,522	4,041,177	14263699	17,500		299,602	54,694	134,044	505840	87324104
71	3,250,304	1,358,250	4608554	341,500		169,316	5,476	11,117	527409	35396582
72	6,295,000		6295000	647,500		170,515	5,515	11,195	834725	21434225
73	3,471,500		3471500	323,500		170,515	5,515	11,195	510725	18588225
74	648,500		648500			385,015	23,015	56,195	464225	16086225
75	324,500		324500			621,515	40,515	101,195	763225	12168225
76						427,515	23,015	56,195	506725	7022225
77						6,582,015	547,515	1,424,195	8553725	14448225
78						13,341,015	1,090,015	2,837,195	17268225	20837725
79						7,346,312	549,053	1,426,900	9322265	10462265
1980						405,500			405500	1207000
81						20,500			20500	861000
82									0	1176500
83						344,000			344000	2258500
84						1,075,000			1075000	2382500
85						1,499,000			1499000	1691000
86										
87										
88										
89										
1990										
91										
92										
93										
94										
95										
96										
97										
98										
99										
2000										
Totals	80,472,809	25,764,939	106237748	4,024,854	1,248,147	36,047,088	2,813,021	7,234,481	51367591	953099114

TABLE 20

ANNUAL MINIMUM OPERATING COSTS ALLOCATED TO TRANSPORTATION
NORTH BAY AQUEDUCT

(in dollars)

Calendar Year	CALHOUN DIVISION		CORDELIA DIVISION		SONOMA DIVISION			NOVATO DIVISION	TOTAL
	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	
1952									
53									
54									
55									
56									
57									
58									
59									
1960									
61									
62									
63									
64									
65									
66									
67									
68	41,340	31,750	53,948	11,460					138498
69	45,098	33,801	55,826	12,633					147358
1970	45,112	37,168	54,379	13,786					150445
71	44,077	37,251	54,849	13,818					149995
72	51,878	39,981	67,172	14,730	12,198	4,848	24,515	13,763	229085
73	51,777	40,478	66,471	15,119	12,349	5,172	24,731	14,022	230119
74	52,295	40,972	66,017	15,508	12,500	5,496	24,945	14,281	232014
75	51,848	40,972	65,900	15,508	12,500	5,496	24,945	14,281	231450
76	51,642	40,972	65,504	15,508	12,500	5,496	24,945	14,281	230848
77	51,549	40,972	66,130	15,508	12,500	5,496	24,945	14,281	231381
78	51,762	40,972	65,729	15,508	12,500	5,496	24,945	14,281	231193
79	51,618	40,972	65,377	15,508	12,500	5,496	24,945	14,281	230697
1980	51,548	40,972	65,943	15,508	12,500	5,496	24,945	14,281	231193
81	51,594	40,972	65,634	15,508	12,500	5,496	24,945	14,281	230930
82	51,529	40,972	65,364	15,508	12,500	5,496	24,945	14,281	230595
83	51,424	40,972	65,110	15,508	12,500	5,496	24,945	14,281	230236
84	51,522	40,972	64,916	15,508	12,500	5,496	24,945	14,281	230140
85	51,436	40,972	65,296	15,508	12,500	5,496	24,945	14,281	230434
86	51,356	40,972	65,083	15,508	12,500	5,496	24,945	14,281	230141
87	51,439	40,972	65,396	15,508	12,500	5,496	24,945	14,281	230537
88	51,364	40,972	65,212	15,508	12,500	5,496	24,945	14,281	230278
89	51,332	40,972	65,040	15,508	12,500	5,496	24,945	14,281	230074
1990	51,265	40,972	64,802	15,508	12,500	5,496	24,945	14,281	229769
91	51,265	40,972	64,802	15,508	12,500	5,496	24,945	14,281	229769
92	51,265	40,972	64,802	15,508	12,500	5,496	24,945	14,281	229769
93	51,265	40,972	64,802	15,508	12,500	5,496	24,945	14,281	229769
94	51,265	40,972	64,802	15,508	12,500	5,496	24,945	14,281	229769
95	51,265	40,972	64,802	15,508	12,500	5,496	24,945	14,281	229769
96	51,265	40,972	64,802	15,508	12,500	5,496	24,945	14,281	229769
97	51,265	40,972	64,802	15,508	12,500	5,496	24,945	14,281	229769
98	51,265	40,972	64,802	15,508	12,500	5,496	24,945	14,281	229769
99	51,265	40,972	64,802	15,508	12,500	5,496	24,945	14,281	229769
2000*	51,265	40,972	64,802	15,508	12,500	5,496	24,945	14,281	229769

* and thereafter for the remainder of the project repayment period.

TABLE 21

ANNUAL MINIMUM OPERATING COSTS ALLOCATED TO TRANSPORTATION
SOUTH BAY AQUEDUCT

(in dollars)

Calendar Year	LIVERMORE DIVISION		DOOLAN DIVISION	ALAMEDA DIVISION	DEL VALLE DIVISION	NILES DIVISION			SANTA CLARA DIVISION	TOTAL
	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	Reach 9	
1952										
53										
54										
55										
56										
57										
58										
59										
1960										
61										
62	74,553	3,451								78004
63	77,288	3,648								80936
64	71,097	2,736		11,940		645	5,159	11,250	6,906	109733
65	75,464	2,907		12,679		728	5,960	13,092	16,190	127020
66	91,904	3,579		15,445	24,062	886	7,258	15,822	19,227	178183
67	94,283	3,658		15,786	24,801	907	7,429	16,150	19,640	182654
68	92,013	3,755		16,268	24,938	934	7,644	16,630	20,129	182311
69	108,990	3,854		16,700	25,875	960	7,863	17,047	20,652	201941
1970	112,341	3,957		17,146	26,841	988	8,057	17,478	21,192	208000
71	112,407	3,965		17,179	26,913	990	8,103	17,510	21,232	208299
72	112,743	3,969		17,197	26,953	991	8,113	17,528	21,255	208749
73	112,398	3,969		17,197	26,953	991	8,113	17,528	21,255	208404
74	112,637	3,969		17,197	26,953	991	8,113	17,528	21,255	208643
75	112,309	3,969		17,197	26,953	991	8,113	17,528	21,255	208315
76	112,551	3,969		17,197	26,953	991	8,113	17,528	21,255	208557
77	114,492	3,969		17,197	26,953	991	8,113	17,528	21,255	210498
78	114,762	3,969		17,197	26,953	991	8,113	17,528	21,255	210768
79	114,416	3,969		17,197	26,953	991	8,113	17,528	21,255	210422
1980	114,250	3,969		17,197	26,953	991	8,113	17,528	21,255	210256
81	113,936	3,969		17,197	26,953	991	8,113	17,528	21,255	209942
82	115,647	3,969		17,197	26,953	991	8,113	17,528	21,255	211653
83	115,278	3,969		17,197	26,953	991	8,113	17,528	21,255	211284
84	114,920	3,969		17,197	26,953	991	8,113	17,528	21,255	210926
85	114,478	3,969		17,197	26,953	991	8,113	17,528	21,255	210484
86	113,948	3,969		17,197	26,953	991	8,113	17,528	21,255	209954
87	115,431	3,969		17,197	26,953	991	8,113	17,528	21,255	211437
88	114,906	3,969		17,197	26,953	991	8,113	17,528	21,255	210912
89	114,479	3,969		17,197	26,953	991	8,113	17,528	21,255	210485
1990	114,092	3,969		17,197	26,953	991	8,113	17,528	21,255	210098
91	113,452	3,969		17,197	26,953	991	8,113	17,528	21,255	209458
92	113,559	3,969		17,197	26,953	991	8,113	17,528	21,255	209565
93	113,591	3,969		17,197	26,953	991	8,113	17,528	21,255	209597
94	113,856	3,969		17,197	26,953	991	8,113	17,528	21,255	209862
95	113,796	3,969		17,197	26,953	991	8,113	17,528	21,255	209802
96	113,466	3,969		17,197	26,953	991	8,113	17,528	21,255	209472
97	113,057	3,969		17,197	26,953	991	8,113	17,528	21,255	209063
98	112,964	3,969		17,197	26,953	991	8,113	17,528	21,255	208970
99	112,816	3,969		17,197	26,953	991	8,113	17,528	21,255	208822
2000*	112,665	3,969		17,197	26,953	991	8,113	17,528	21,255	208671

* and thereafter for the remainder of the project repayment period.

TABLE 22

ANNUAL MINIMUM OPERATING COSTS ALLOCATED TO TRANSPORTATION
CALIFORNIA AQUEDUCT

(in dollars)

Calendar Year	NORTH SAN JOAQUIN DIVISION			SAN LUIS DIVISION					
	Reach 1	Reach 2	Subtotal	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Subtotal
1952									
53									
54									
55									
56									
57									
58									
59									
1960									
61									
62									
63									
64									
65									
66									
67	245,852		245852						
68	475,564	224,987	700551	29,978	230,399	108,478	36,397	62,420	467672
69	578,764	293,787	872551	38,285	325,709	149,078	50,865	86,743	650680
1970	601,647	363,106	964753	43,901	323,653	168,318	57,782	97,819	691473
71	617,740	398,502	1016242	46,202	361,248	199,898	69,071	115,745	792164
72	969,428	420,302	1389730	47,398	702,320	204,879	70,856	118,580	1144033
73	933,430	421,348	1354778	47,398	652,224	204,879	70,856	118,580	1093937
74	777,895	421,348	1199243	47,398	497,383	204,879	70,856	118,580	939096
75	747,544	421,348	1168892	47,398	471,430	204,879	70,856	118,580	913143
76	744,779	421,348	1166127	47,398	454,892	204,879	70,856	118,580	896605
77	741,683	421,348	1163031	47,398	443,795	204,879	70,856	118,580	885508
78	755,319	421,348	1176667	47,398	452,280	204,879	70,856	118,580	893993
79	755,163	421,348	1176511	47,398	447,300	204,879	70,856	118,580	889013
1980	797,551	444,741	1242292	54,868	472,425	221,597	76,800	127,950	953640
81	798,999	444,741	1243740	54,868	471,621	221,597	76,800	127,950	952836
82	816,402	444,741	1261143	54,868	471,513	221,597	76,800	127,950	952728
83	779,208	444,741	1223949	54,868	467,623	221,597	76,800	127,950	948838
84	814,706	444,741	1259447	54,868	468,072	221,597	76,800	127,950	949287
85	825,839	444,741	1270580	54,868	465,327	221,597	76,800	127,950	946542
86	761,502	444,741	1206243	54,868	466,233	221,597	76,800	127,950	947448
87	758,632	444,741	1203373	54,868	463,327	221,597	76,800	127,950	944542
88	755,591	444,741	1200332	54,868	462,857	221,597	76,800	127,950	944072
89	752,387	444,741	1197128	54,868	459,757	221,597	76,800	127,950	940972
1990	749,168	444,741	1193909	54,868	460,302	221,597	76,800	127,950	941517
91	744,762	444,741	1189503	54,868	457,927	221,597	76,800	127,950	939142
92	749,435	444,741	1194176	54,868	461,244	221,597	76,800	127,950	942459
93	749,081	444,741	1193822	54,868	461,244	221,597	76,800	127,950	942459
94	749,010	444,741	1193751	54,868	461,244	221,597	76,800	127,950	942459
95	748,797	444,741	1193538	54,868	461,244	221,597	76,800	127,950	942459
96	748,443	444,741	1193184	54,868	461,244	221,597	76,800	127,950	942459
97	748,019	444,741	1192760	54,868	461,244	221,597	76,800	127,950	942459
98	747,877	444,741	1192618	54,868	461,244	221,597	76,800	127,950	942459
99	747,735	444,741	1192476	54,868	461,244	221,597	76,800	127,950	942459
2000*	747,523	444,741	1192264	54,868	461,244	221,597	76,800	127,950	942459

* and thereafter for the remainder of the project repayment period.

TABLE 22 (continued)

ANNUAL MINIMUM OPERATING COSTS ALLOCATED TO TRANSPORTATION
CALIFORNIA AQUEDUCT

(in dollars)

Calendar Year	SOUTH SAN JOAQUIN DIVISION									
	Reach 8	Reach 9	Reach 10	Reach 11	Reach 12	Reach 13	Reach 14	Reach 15	Reach 16	Subtotal
1952										
53										
54										
55										
56										
57										
58										
59										
1960										
61										
62										
63										
64										
65										
66										
67	20,840									20840
68	49,131	46,042	46,806	117,390						259369
69	63,245	60,144	61,201	61,659		48,400				294649
1970	77,470	74,339	75,690	76,270		49,901				353670
71	90,864	87,711	89,337	90,032		51,068				409012
72	77,595	74,438	75,590	76,349	121,353	93,452	506,764	406,505	692,555	2124601
73	77,595	74,438	75,590	76,349	121,353	104,726	475,442	335,867	577,559	1918919
74	77,595	74,438	75,590	76,349	121,353	122,699	387,362	191,232	343,968	1470586
75	77,595	74,438	75,590	76,349	121,353	153,842	462,624	211,138	366,905	1619834
76	77,595	74,438	75,590	76,349	121,353	153,842	448,893	196,697	342,713	1567470
77	77,595	74,438	75,590	76,349	121,353	153,842	454,203	197,235	343,531	1574136
78	77,595	74,438	75,590	76,349	121,353	153,842	464,760	196,619	342,689	1583235
79	77,595	74,438	75,590	76,349	121,353	153,842	468,951	201,469	350,769	1600356
1980	72,448	69,391	70,261	71,158	112,900	161,099	499,162	223,715	385,607	1665741
81	72,448	69,391	70,261	71,158	112,900	161,099	505,634	233,125	393,815	1689831
82	72,448	69,391	70,261	71,158	112,900	161,099	509,795	237,463	406,602	1711117
83	72,448	69,391	70,261	71,158	112,900	161,099	511,790	242,009	414,178	1725234
84	72,448	69,391	70,261	71,158	112,900	161,099	511,821	243,992	418,740	1731810
85	72,448	69,391	70,261	71,158	112,900	161,099	514,791	251,277	426,908	1750233
86	72,448	69,391	70,261	71,158	112,900	161,099	516,974	251,581	430,209	1756021
87	72,448	69,391	70,261	71,158	112,900	161,099	518,852	253,414	432,980	1762503
88	72,448	69,391	70,261	71,158	112,900	161,099	520,182	256,701	435,750	1769890
89	72,448	69,391	70,261	71,158	112,900	161,099	519,554	258,194	441,179	1776184
1990	72,448	69,391	70,261	71,158	112,900	161,099	521,283	263,353	443,415	1785308
91	72,448	69,391	70,261	71,158	112,900	161,099	522,741	261,102	445,572	1786672
92	72,448	69,391	70,261	71,158	112,900	161,099	528,038	267,390	456,537	1809222
93	72,448	69,391	70,261	71,158	112,900	161,099	528,038	267,390	456,537	1809222
94	72,448	69,391	70,261	71,158	112,900	161,099	528,038	267,390	456,537	1809222
95	72,448	69,391	70,261	71,158	112,900	161,099	528,038	267,390	456,537	1809222
96	72,448	69,391	70,261	71,158	112,900	161,099	528,038	267,390	456,537	1809222
97	72,448	69,391	70,261	71,158	112,900	161,099	528,038	267,390	456,537	1809222
98	72,448	69,391	70,261	71,158	112,900	161,099	528,038	267,390	456,537	1809222
99	72,448	69,391	70,261	71,158	112,900	161,099	528,038	267,390	456,537	1809222
2000*	72,448	69,391	70,261	71,158	112,900	161,099	528,038	267,390	456,537	1809222

* and thereafter for the remainder of the project repayment period.

TABLE 22 (continued)

ANNUAL MINIMUM OPERATING COSTS ALLOCATED TO TRANSPORTATION
CALIFORNIA AQUEDUCT

(in dollars)

Calendar Year	TEHACHAPI DIVISION	ANTELOPE DIVISION			EAST BRANCH DIVISION									
	Reach 17	Reach 18	Reach 19	Subtotal	Reach 20	Reach 21	Reach 22	Reach 23	Reach 24	Reach 25	Reach 26	Reach 27	Reach 28	Subtotal
1952														
53														
54														
55														
56														
57														
58														
59														
1960														
61														
62														
63														
64														
65														
66														
67														
68														
69														
1970			35,025	35025										
71			43,022	43022	63,779	64,519	196,640	12,490		5,703		72,019		415150
72	2,691,063	52,655	84,272	136927	117,917	94,748	1,176,184	17,128	17,267	13,902	125,288-	13,597	215,183	1540638
73	2,149,304	85,276	90,865	176141	126,569	99,573	1,031,656	17,680	18,103	15,140	55,073-	40,052	228,839	1522539
74	1,082,159	142,478	104,581	247059	144,566	109,609	717,588	18,254	18,972	16,380	73,979	104,751	242,492	1446591
75	991,682	147,806	104,581	252387	144,566	109,609	647,355	18,254	18,972	16,380	101,227	117,772	242,492	1416627
76	893,321	148,406	104,581	252987	144,566	109,609	593,309	18,254	18,972	16,380	119,126	127,181	242,492	1389889
77	908,826	147,136	104,581	251717	144,566	109,609	589,746	18,254	18,972	16,380	118,756	126,604	242,492	1385379
78	893,711	146,217	104,581	250798	144,566	109,609	590,958	18,254	18,972	16,380	118,922	126,768	242,492	1386921
79	975,650	144,867	104,581	249448	144,566	109,609	588,622	18,254	18,972	16,380	119,066	126,842	242,492	1384803
1980	981,727	210,734	127,348	338082	174,442	126,268	732,600	20,459	22,310	20,631	148,025	155,083	289,380	1689198
81	1,030,532	207,924	127,348	335272	174,442	126,268	741,585	20,459	22,310	20,631	147,825	154,796	289,380	1697696
82	1,099,398	205,476	127,348	332824	174,442	126,268	744,973	20,459	22,310	20,631	145,574	153,481	289,380	1697518
83	1,147,906	203,297	127,348	330645	174,442	126,268	736,896	20,459	22,310	20,631	151,011	156,514	289,380	1697911
84	1,127,112	202,256	127,348	329604	174,442	126,268	734,947	20,459	22,310	20,631	151,035	156,440	289,380	1695912
85	1,179,542	200,784	127,348	328132	174,442	126,268	736,007	20,459	22,310	20,631	150,046	155,730	289,380	1695273
86	1,221,140	199,746	127,348	327094	174,442	126,268	734,704	20,459	22,310	20,631	150,020	155,622	289,380	1693836
87	1,203,095	198,748	127,348	326096	174,442	126,268	740,649	20,459	22,310	20,631	149,937	155,542	289,380	1699618
88	1,240,517	197,908	127,348	325256	174,442	126,268	739,254	20,459	22,310	20,631	149,767	155,469	289,380	1697980
89	1,222,927	197,025	127,348	324373	174,442	126,268	738,031	20,459	22,310	20,631	149,684	155,394	289,380	1696599
1990	1,256,682	196,314	127,348	323662	174,442	126,268	736,848	20,459	22,310	20,631	149,580	155,341	289,380	1695259
91	1,240,101	195,567	127,348	322915	174,442	126,268	741,801	20,459	22,310	20,631	149,518	155,288	289,380	1700097
92	1,286,616	193,586	127,348	320934	174,442	126,268	762,493	20,459	22,310	20,631	142,290	151,089	289,380	1709362
93	1,286,616	193,586	127,348	320934	174,442	126,268	762,493	20,459	22,310	20,631	142,290	151,089	289,380	1709362
94	1,286,616	193,586	127,348	320934	174,442	126,268	762,493	20,459	22,310	20,631	142,290	151,089	289,380	1709362
95	1,286,616	193,586	127,348	320934	174,442	126,268	762,493	20,459	22,310	20,631	142,290	151,089	289,380	1709362
96	1,286,616	193,586	127,348	320934	174,442	126,268	762,493	20,459	22,310	20,631	142,290	151,089	289,380	1709362
97	1,286,616	193,586	127,348	320934	174,442	126,268	762,493	20,459	22,310	20,631	142,290	151,089	289,380	1709362
98	1,286,616	193,586	127,348	320934	174,442	126,268	762,493	20,459	22,310	20,631	142,290	151,089	289,380	1709362
99	1,286,616	193,586	127,348	320934	174,442	126,268	762,493	20,459	22,310	20,631	142,290	151,089	289,380	1709362
2000*	1,286,616	193,586	127,348	320934	174,442	126,268	762,493	20,459	22,310	20,631	142,290	151,089	289,380	1709362

* and thereafter for the remainder of the project repayment period.

TABLE 22 (continued)

ANNUAL MINIMUM OPERATING COSTS ALLOCATED TO TRANSPORTATION
CALIFORNIA AQUEDUCT

(in dollars)

Calendar Year	WEST BRANCH DIVISION			COASTAL DIVISION						TOTAL CALIFORNIA AQUEDUCT
	Reach 29	Reach 30	Subtotal	Reach 31	Reach 32	Reach 33	Reach 34	Reach 35	Subtotal	
1952										
53										
54										
55										
56										
57										
58										
59										
1960										
61										
62										
63										
64										
65										
66										
67										266692
68				29,395	4,650				34045	1461637
69				69,620	5,411				75031	1892911
1970				99,146	6,170				105316	2150237
71				139,986	6,864				146850	2822440
72	46,721	33,957	80678	171,837	8,798				180635	9288305
73	65,603	36,659	102262	171,699	8,798				180497	8498377
74	145,860	42,279	188139	172,428	8,798				181226	6754099
75	156,187	42,279	198466	172,274	8,798				181072	6742103
76	153,830	42,279	196109	172,159	8,798				180957	6543465
77	151,536	42,279	193815	172,066	8,798				180864	6543276
78	149,044	42,279	191323	171,984	8,798				180782	6557430
79	146,610	42,279	188889	171,925	8,798				180723	6645393
1980	184,610	51,608	236218	130,405	15,246	993,285	27,705	56,246	1222887	8329785
81	178,550	51,608	230158	130,422	15,246	976,164	27,705	56,246	1205783	8385848
82	177,346	51,608	228954	130,261	15,246	926,608	27,705	56,246	1156066	8439748
83	156,067	51,608	207675	130,080	15,246	902,005	27,705	56,246	1131282	8413440
84	151,542	51,608	203150	129,813	15,246	882,436	27,705	56,246	1111446	8407768
85	151,954	51,608	203562	129,210	15,246	864,154	27,705	56,246	1092561	8466425
86	146,954	51,608	198562	128,789	15,246	846,282	27,705	56,246	1074268	8424612
87	143,384	51,608	194992	128,406	15,246	861,692	27,705	56,246	1089295	8423514
88	143,125	51,608	194733	127,949	15,246	853,987	27,705	56,246	1081133	8453913
89	140,034	51,608	191642	127,314	15,246	846,527	27,705	56,246	1073038	8422863
1990	136,754	51,608	188362	126,713	15,246	841,275	27,705	56,246	1067185	8451884
91	133,970	51,608	185578	126,713	15,246	841,275	27,705	56,246	1067185	8431193
92	143,091	51,608	194699	126,713	15,246	841,275	27,705	56,246	1067185	8524653
93	143,091	51,608	194699	126,713	15,246	841,275	27,705	56,246	1067185	8524299
94	143,091	51,608	194699	126,713	15,246	841,275	27,705	56,246	1067185	8524228
95	143,091	51,608	194699	126,713	15,246	841,275	27,705	56,246	1067185	8524015
96	143,091	51,608	194699	126,713	15,246	841,275	27,705	56,246	1067185	8523661
97	143,091	51,608	194699	126,713	15,246	841,275	27,705	56,246	1067185	8523237
98	143,091	51,608	194699	126,713	15,246	841,275	27,705	56,246	1067185	8523095
99	143,091	51,608	194699	126,713	15,246	841,275	27,705	56,246	1067185	8522953
2000*	143,091	51,608	194699	126,713	15,246	841,275	27,705	56,246	1067185	8522741

* and thereafter for the remainder of the project repayment period.

TABLE 23

ANNUAL VARIABLE OPERATING COSTS ALLOCATED TO TRANSPORTATION
NORTH BAY AQUEDUCT

(in dollars)

Calendar Year	CALHOUN DIVISION		CORDELIA DIVISION		SONOMA DIVISION			NOVATO DIVISION	TOTAL
	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	
1952									
53									
54									
55									
56									
57									
58									
59									
1960									
61									
62									
63									
64									
65									
66									
67									
68	1,393		32,743						34136
69	2,567		39,163						41730
1970	4,899		47,616						52515
71	6,045		86,580						92625
72	11,272		130,992						142264
73	11,954		136,558						148512
74	15,854		139,304						155158
75	20,478		193,468						213946
76	20,684		199,864						220548
77	21,777		241,533						263310
78	26,736		245,934						272670
79	27,053		250,038						277091
1980	28,123		294,519						322642
81	31,077		300,828						331905
82	32,142		307,098						339240
83	32,247		312,352						344599
84	36,321		319,593						355914
85	36,580		361,965						398545
86	36,660		367,178						403838
87	40,577		408,160						448737
88	40,652		414,344						454996
89	41,684		420,516						462200
1990	41,751		420,754						462505
91	41,751		420,754						462505
92	41,751		420,754						462505
93	41,751		420,754						462505
94	41,751		420,754						462505
95	41,751		420,754						462505
96	41,751		420,754						462505
97	41,751		420,754						462505
98	41,751		420,754						462505
99	41,751		420,754						462505
2000*	41,751		420,754						462505

*and thereafter for the remainder of the repayment period.

TABLE 24

ANNUAL VARIABLE OPERATING COSTS ALLOCATED TO TRANSPORTATION
SOUTH BAY AQUEDUCT

(in dollars)

Calendar Year	LIVERMORE DIVISION		DOOLAN DIVISION	ALAMEDA DIVISION	DEL VALLE DIVISION	NILES DIVISION			SANTA CLARA DIVISION	TOTAL
	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	Reach 9	
1952										
53										
54										
55										
56										
57										
58										
59										
1960										
61										
62	74,653									74,653
63	85,299									85,299
64	187,074									187,074
65	276,803									276,803
66	399,867									399,867
67	446,656									446,656
68	422,975									422,975
69	745,665									745,665
1970	750,367									750,367
71	760,969									760,969
72	766,764									766,764
73	773,119									773,119
74	778,882									778,882
75	785,221									785,221
76	790,982									790,982
77	853,561									853,561
78	860,304									860,304
79	865,654									865,654
1980	876,264									876,264
81	883,591									883,591
82	945,398									945,398
83	951,781									951,781
84	958,145									958,145
85	967,591									967,591
86	980,141									980,141
87	1,046,219									1,046,219
88	1,058,746									1,058,746
89	1,067,180									1,067,180
1990	1,076,572									1,076,572
91	1,089,237									1,089,237
92	1,096,126									1,096,126
93	1,111,108									1,111,108
94	1,117,850									1,117,850
95	1,128,916									1,128,916
96	1,139,251									1,139,251
97	1,151,667									1,151,667
98	1,153,758									1,153,758
99	1,158,904									1,158,904
2000 *	1,164,053									1,164,053

*and thereafter for the remainder of the repayment period.

TABLE 25

ANNUAL VARIABLE OPERATING COSTS ALLOCATED TO TRANSPORTATION
CALIFORNIA AQUEDUCT

(in dollars)

Calendar Year	NORTH SAN JOAQUIN DIVISION			SAN LUIS DIVISION					
	Reach 1	Reach 2	Subtotal	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Subtotal
1952									
53									
54									
55									
56									
57									
58									
59									
1960									
61									
62									
63									
64									
65									
66									
67	412,223		412,223						
68	669,581		669,581	300,315					300,315
69	957,481		957,481	560,930					560,930
1970	1,049,773		1,049,773	536,117					536,117
71	1,169,269		1,169,269	680,793					680,793
72	1,628,550		1,628,550	1,196,229					1,196,229
73	2,197,775		2,197,775	1,591,430					1,591,430
74	2,791,190		2,791,190	1,851,861					1,851,861
75	3,244,293		3,244,293	2,143,584					2,143,584
76	3,820,417		3,820,417	2,395,597					2,395,597
77	4,173,544		4,173,544	2,495,982					2,495,982
78	4,722,296		4,722,296	2,866,972					2,866,972
79	5,068,328		5,068,328	3,004,837					3,004,837
1980	5,594,100		5,594,100	3,265,204					3,265,204
81	5,892,346		5,892,346	3,417,306					3,417,306
82	6,361,428		6,361,428	3,526,004					3,526,004
83	5,973,823		5,973,823	3,571,894					3,571,894
84	6,771,672		6,771,672	3,704,330					3,704,330
85	7,150,165		7,150,165	3,746,075					3,746,075
86	6,211,453		6,211,453	3,872,054					3,872,054
87	6,328,320		6,328,320	3,913,960					3,913,960
88	6,445,357		6,445,357	4,011,020					4,011,020
89	6,562,558		6,562,558	4,050,120					4,050,120
1990	6,679,773		6,679,773	4,176,460					4,176,460
91	6,747,178		6,747,178	4,211,835					4,211,835
92	6,742,505		6,742,505	4,211,518					4,211,518
93	6,742,859		6,742,859	4,211,518					4,211,518
94	6,742,930		6,742,930	4,211,518					4,211,518
95	6,743,142		6,743,142	4,211,518					4,211,518
96	6,743,496		6,743,496	4,211,518					4,211,518
97	6,743,992		6,743,992	4,211,518					4,211,518
98	6,744,063		6,744,063	4,211,518					4,211,518
99	6,744,275		6,744,275	4,211,518					4,211,518
2000*	6,744,417		6,744,417	4,211,518					4,211,518

*and thereafter for the remainder of the repayment period.

TABLE 25 (continued)

ANNUAL VARIABLE OPERATING COSTS ALLOCATED TO TRANSPORTATION
CALIFORNIA AQUEDUCT

(in dollars)

Calendar Year	SOUTH SAN JOAQUIN DIVISION									
	Reach 8	Reach 9	Reach 10	Reach 11	Reach 12	Reach 13	Reach 14	Reach 15	Reach 16	Subtotal
1952										
53										
54										
55										
56										
57										
58										
59										
1960										
61										
62										
63										
64										
65										
66										
67										
68										
69										
1970										
71										
72							416,766	313,723	520,868	1251357
73							592,548	470,903	781,876	1845327
74							767,163	625,714	1,039,784	2432661
75							915,037	778,496	1,293,057	2986590
76							1,054,768	937,981	1,557,275	3550024
77							1,284,458	1,100,604	1,827,624	4212686
78							1,635,901	1,243,220	2,068,466	4947587
79							1,892,710	1,493,370	2,488,386	5874466
1980							2,162,419	1,845,823	3,125,147	7133389
81							2,495,947	2,255,413	3,631,939	8383299
82							2,693,786	2,463,075	4,119,152	9276013
83							2,889,791	2,739,529	4,583,576	10212896
84							3,035,760	2,957,546	4,986,014	10979320
85							3,221,790	3,287,261	5,421,846	11930897
86							3,411,607	3,442,957	5,768,545	12623109
87							3,596,729	3,650,124	6,107,774	13354627
88							3,768,399	3,910,837	6,453,004	14132240
89							3,876,027	4,117,344	6,901,575	14894946
1990							4,066,298	4,463,185	7,247,339	15776822
91							4,249,840	4,540,436	7,595,182	16385458
92							4,246,543	4,527,148	7,589,217	16362908
93							4,246,543	4,527,148	7,589,217	16362908
94							4,246,543	4,527,148	7,589,217	16362908
95							4,246,543	4,527,148	7,589,217	16362908
96							4,246,543	4,527,148	7,589,217	16362908
97							4,246,543	4,527,148	7,589,217	16362908
98							4,246,543	4,527,148	7,589,217	16362908
99							4,246,543	4,527,148	7,589,217	16362908
2000 *							4,246,543	4,527,148	7,589,217	16362908

*and thereafter for the remainder of the repayment period.

TABLE 25 (continued)

ANNUAL VARIABLE OPERATING COSTS ALLOCATED TO TRANSPORTATION
CALIFORNIA AQUEDUCT

(in dollars)

Calendar Year	TEHACHAPI DIVISION	ANTELOPE DIVISION			EAST BRANCH DIVISION									
	Reach 17	Reach 18	Reach 19	Subtotal	Reach 20	Reach 21	Reach 22	Reach 23	Reach 24	Reach 25	Reach 26	Reach 27	Reach 28	Subtotal
1952														
53														
54														
55														
56														
57														
58														
59														
1960														
61														
62														
63														
64														
65														
66														
67														
68														
69														
1970														
71														
72	1,950,454	48,026-		48,026-			464,919				322,218-	124,244-		18457
73	3,029,983	70,192-		70,192-			715,376				535,025-	240,544-		60193-
74	4,113,688	88,077-		88,077-			932,012				748,553-	358,745-		175286-
75	5,200,246	100,980-		100,980-			1,201,093				967,721-	490,766-		257394-
76	6,418,582	143,580-		143,580-			1,408,969				1,194,620-	622,175-		407826-
77	7,786,345	189,310-		189,310-			1,592,532				1,422,250-	757,598-		587316-
78	8,639,635	234,391-		234,391-			1,842,220				1,634,005-	873,343-		665128-
79	11,507,696	293,041-		293,041-			2,027,556				1,844,738-	990,997-		808179-
1980	12,247,714	410,454-		410,454-			2,214,708				2,065,575-	1,117,183-		968050-
81	14,767,909	524,644-		524,644-			2,661,723				2,291,075-	1,250,896-		880248-
82	17,292,043	613,196-		613,196-			2,816,335				2,476,824-	1,340,581-		1001070-
83	19,820,535	716,017-		716,017-			3,236,412				2,662,261-	1,431,614-		857463-
84	20,376,329	791,976-		791,976-			3,394,361				2,836,238-	1,518,540-		960417-
85	22,845,899	869,504-		869,504-			3,530,301				3,010,200-	1,609,830-		1089729-
86	25,300,301	944,466-		944,466-			3,656,604				3,190,094-	1,699,722-		1233212-
87	25,777,346	1,021,468-		1,021,468-			4,048,659				3,373,011-	1,789,642-		1113994-
88	28,235,924	1,095,628-		1,095,628-			4,175,054				3,560,841-	1,878,569-		1264356-
89	28,711,514	1,173,745-		1,173,745-			4,303,277				3,745,758-	1,968,494-		1410975-
1990	31,173,759	1,248,034-		1,248,034-			4,430,460				3,930,654-	2,058,441-		1558635-
91	31,649,340	1,325,287-		1,325,287-			4,822,507				4,114,592-	2,147,388-		1439473-
92	31,621,825	1,324,306-		1,324,306-			4,815,815				4,116,364-	2,148,189-		1448738-
93	31,621,825	1,324,306-		1,324,306-			4,815,815				4,116,364-	2,148,189-		1448738-
94	31,621,825	1,324,306-		1,324,306-			4,815,815				4,116,364-	2,148,189-		1448738-
95	31,621,825	1,324,306-		1,324,306-			4,815,815				4,116,364-	2,148,189-		1448738-
96	31,621,825	1,324,306-		1,324,306-			4,815,815				4,116,364-	2,148,189-		1448738-
97	31,621,825	1,324,306-		1,324,306-			4,815,815				4,116,364-	2,148,189-		1448738-
98	31,621,825	1,324,306-		1,324,306-			4,815,815				4,116,364-	2,148,189-		1448738-
99	31,621,825	1,324,306-		1,324,306-			4,815,815				4,116,364-	2,148,189-		1448738-
2000*	31,621,825	1,324,306-		1,324,306-			4,815,815				4,116,364-	2,148,189-		1448738-

*and thereafter for the remainder of the repayment period.

TABLE 25 (continued)

ANNUAL VARIABLE OPERATING COSTS ALLOCATED TO TRANSPORTATION
CALIFORNIA AQUEDUCT

(in dollars)

Calendar Year	WEST BRANCH DIVISION			COASTAL DIVISION						TOTAL CALIFORNIA AQUEDUCT
	Reach 29	Reach 30	Subtotal	Reach 31	Reach 32	Reach 33	Reach 34	Reach 35	Subtotal	
1952										
53										
54										
55										
56										
57										
58										
59										
1960										
61										
62										
63										
64										
65										
66										
67										412223
68				197,587					197587	1167483
69				206,077					206077	1724488
1970				214,507					214507	1800397
71				221,778					221778	2071840
72	109,641-		109,641-	229,962					229962	6117342
73	228,072-		228,072-	238,100					238100	8544158
74	368,356-		368,356-	422,832					422832	10980513
75	373,992-		373,992-	429,986					429986	13272333
76	543,019-		543,019-	435,101					435101	15525296
77	740,365-		740,365-	441,194					441194	17592760
78	977,873-		977,873-	447,276					447276	19746374
79	1,244,439-		1,244,439-	451,335					451335	23561003
1980	1,693,489-		1,693,489-	445,307		130,470			575777	25744191
81	2,281,429-		2,281,429-	447,331		176,684			624015	29398554
82	2,512,225-		2,512,225-	449,555		243,240			692795	33021792
83	2,995,946-		2,995,946-	452,740		282,843			735583	35745305
84	3,419,421-		3,419,421-	456,045		326,412			782457	37442294
85	3,577,833-		3,577,833-	462,604		391,694			854298	40990268
86	4,069,833-		4,069,833-	468,028		323,658			791686	42551092
87	4,498,263-		4,498,263-	474,386		618,657			1093043	43833571
88	4,722,004-		4,722,004-	480,807		634,362			1115169	46857722
89	5,150,913-		5,150,913-	491,347		652,822			1144169	47627674
1990	5,611,633-		5,611,633-	501,887		670,074			1171961	50560473
91	6,049,849-		6,049,849-	501,887		670,074			1171961	51351163
92	6,048,970-		6,048,970-	501,887		670,074			1171961	51288703
93	6,048,970-		6,048,970-	501,887		670,074			1171961	51289057
94	6,048,970-		6,048,970-	501,887		670,074			1171961	51289128
95	6,048,970-		6,048,970-	501,887		670,074			1171961	51289340
96	6,048,970-		6,048,970-	501,887		670,074			1171961	51289694
97	6,048,970-		6,048,970-	501,887		670,074			1171961	51290190
98	6,048,970-		6,048,970-	501,887		670,074			1171961	51290261
99	6,048,970-		6,048,970-	501,887		670,074			1171961	51290473
2000*	6,048,970-		6,048,970-	501,887		670,074			1171961	51290615

*and thereafter for the remainder of the repayment period.

TABLE 26

PROPORTIONATE USE OF AQUEDUCT REACHES BY CONTRACTOR
SOUTH BAY AQUEDUCT

BASED ON MAXIMUM ANNUAL DELIVERIES

CONTRACTOR	LIVERMORE DIVISION		DOOLAN DIVISION	ALAMEDA DIVISION	DEL VALLE DIVISION	NILES DIVISION			SANTA CLARA DIVISION
	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	Reach 9
Alameda County FC & WCD, Zone 7	.189707	.189706		.139172	.193393	.137582			
Alameda County Water District	.199471	.199470		.214022	.204837	.231138	.275031	.041054	
Santa Clara County FC & WCD	.421705	.421704		.452475	.456749	.488195	.580905	.728385	1.000000
Uncontracted	.189117	.189120		.194331	.145021	.143085	.144064	.098530	
Excess								.132031	
TOTALS	1.000000	1.000000		1.000000	1.000000	1.000000	1.000000	1.000000	1.000000

BASED ON MAXIMUM CAPACITIES

CONTRACTOR	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	Reach 9
Alameda County FC & WCD, Zone 7	.189707	.189706		.131550		.138833			
Alameda County Water District	.199471	.199470		.177483		.213802	.254844	.062745	
Santa Clara County FC & WCD	.421705	.421704		.375226		.513161	.611666	.720782	1.000000
Uncontracted	.189117	.189120		.315741		.134204	.133490	.085802	
Excess								.130671	
TOTALS	1.000000	1.000000		1.000000		1.000000	1.000000	1.000000	1.000000

BASED ON MEAN MEASURE OF USE

CONTRACTOR	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	Reach 9
Alameda County FC & WCD, Zone 7	.189707	.189706		.135361	.193393	.138208			
Alameda County Water District	.199471	.199470		.195752	.204837	.222470	.264938	.051900	
Santa Clara County FC & WCD	.421705	.421704		.413850	.456749	.500678	.596286	.724584	1.000000
Uncontracted	.189117	.189120		.255037	.145021	.138644	.138776	.092166	
Excess								.131350	
TOTALS	1.000000	1.000000		1.000000	1.000000	1.000000	1.000000	1.000000	1.000000

TABLE 27

PROPORTIONATE USE OF AQUEDUCT REACHES BY CONTRACTOR
BASED ON MAXIMUM ANNUAL DELIVERIES - CALIFORNIA AQUEDUCT

CONTRACTOR	NORTH SAN JOAQUIN DIVISION		SAN LUIS DIVISION					SOUTH SAN JOAQUIN DIVISION									TEHACHAPI DIVISION
	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	Reach 9	Reach 10	Reach 11	Reach 12	Reach 13	Reach 14	Reach 15	Reach 16	Reach 17
SOUTH BAY AQUEDUCT																	
Alameda County F.C. & W.C.D., Zone 7	.010599																
Alameda County Water District	.011145																
Santa Clara County F.C. & W.C.D.	.023561																
Uncontracted	.010566																
SAN JOAQUIN VALLEY																	
Uncontracted	.393713	.417008	.416916	.416890	.416859	.416804	.416783	.410897	.399175	.372991	.321881	.280249	.194187	.136429	.024472	.022665	
Uncontracted Reserve	.003973	.004209	.004208	.004208	.004207	.004207	.004206	.004248									
CENTRAL COASTAL																	
Uncontracted	.022088	.023396	.023401	.023402	.023403	.023407	.023407	.023644									
SOUTHERN CALIFORNIA																	
Antelope Valley - East Kern W.A.	.034751	.036808	.036813	.036815	.036817	.036821	.036822	.037194	.039819	.041555	.044942	.047701	.053405	.057232	.064652	.064772	.066254
San Bernardino Valley M.W.D.	.026431	.027995	.028000	.028001	.028002	.028005	.028006	.028289	.030286	.031606	.034182	.036281	.040618	.043530	.049173	.049264	.050430
Metropolitan Water District	.436893	.462748	.462822	.462843	.462869	.462911	.462930	.467601	.500607	.522423	.565008	.599695	.671403	.719527	.812810	.814315	.833191
Uncontracted	.026280	.027836	.027840	.027841	.027843	.027845	.027846	.028127	.030113	.031425	.033987	.036074	.040387	.043282	.048893	.048984	.050125
TOTALS	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000

CONTRACTOR	ANTELOPE DIVISION		EAST BRANCH DIVISION									WEST BRANCH DIVISION		COASTAL DIVISION				
	Reach 18	Reach 19	Reach 20	Reach 21	Reach 22	Reach 23	Reach 24	Reach 25	Reach 26	Reach 27	Reach 28	Reach 29	Reach 30	Reach 31	Reach 32	Reach 33	Reach 34	Reach 35
SAN JOAQUIN VALLEY																		
Uncontracted														.616480	.616455			
CENTRAL COASTAL																		
Uncontracted														.383520	.383545	1.000000	1.000000	1.000000
SOUTHERN CALIFORNIA																		
Antelope Valley - East Kern W.A.	.066254	.060250	.099458	.036361	.036379	.018528	.161055											
San Bernardino Valley M.W.D.	.050430	.050932	.092090	.098652	.098698	.101367	.192293	.102599										
Metropolitan Water District	.833191	.841476	.739973	.792698	.793066	.814515	.512763	.832421	.905169	1.000000	1.000000	.978562	.969150					
Uncontracted	.050125	.047342	.068479	.072289	.071857	.065590	.133889	.064980	.094831			.021438	.030850					
TOTALS	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000

TABLE 28

PROPORTIONATE USE OF AQUEDUCT REACHES BY CONTRACTOR
BASED ON MAXIMUM CAPACITIES - CALIFORNIA AQUEDUCT

CONTRACTOR	NORTH SAN JOAQUIN DIVISION		SAN LUIS DIVISION					SOUTH SAN JOAQUIN DIVISION									TEHACHAPI DIVISION
	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	Reach 9	Reach 10	Reach 11	Reach 12	Reach 13	Reach 14	Reach 15	Reach 16	Reach 17
SOUTH BAY AQUEDUCT																	
Alameda County F.C. & W.C.D., Zone 7	.007586																
Alameda County Water District	.007977																
Santa Clara County F.C. & W.C.D.	.016864																
Uncontracted	.007562																
SAN JOAQUIN VALLEY																	
Uncontracted	.585118	.609490	.609489	.609489	.609490	.609490	.609490	.603495	.591413	.563174	.503836	.450906	.325745	.262230	.050497	.046879	
Uncontracted Reserve	.003754	.003910	.003910	.003910	.003910	.003910	.003910	.003971									
CENTRAL COASTAL																	
Uncontracted	.014901	.015523	.015523	.015523	.015523	.015523	.015523	.015761									
SOUTHERN CALIFORNIA																	
Antelope Valley - East Kern W.A.	.023602	.024585	.024585	.024585	.024585	.024585	.024585	.024962	.027070	.028941	.032872	.036379	.044671	.048879	.062907	.063147	.066254
San Bernardino Valley M.W.D.	.017964	.018713	.018713	.018713	.018713	.018713	.018713	.019000	.020605	.022029	.025021	.027691	.034002	.037205	.047883	.048065	.050430
Metropolitan Water District	.296815	.309179	.309179	.309179	.309179	.309179	.309179	.313925	.340431	.363960	.413400	.457500	.561784	.614705	.791118	.794133	.833191
Uncontracted	.017857	.018600	.018601	.018601	.018600	.018600	.018600	.018886	.020481	.021896	.024871	.027524	.033798	.036981	.047595	.047776	.050125
TOTALS	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000

CONTRACTOR	ANTELOPE DIVISION		EAST BRANCH DIVISION									WEST BRANCH DIVISION		COASTAL DIVISION				
	Reach 18	Reach 19	Reach 20	Reach 21	Reach 22	Reach 23	Reach 24	Reach 25	Reach 26	Reach 27	Reach 28	Reach 29	Reach 30	Reach 31	Reach 32	Reach 33	Reach 34	Reach 35
SAN JOAQUIN VALLEY																		
Uncontracted														.786700	.786701			
CENTRAL COASTAL																		
Uncontracted														.213300	.213299	1.000000	1.000000	1.000000
SOUTHERN CALIFORNIA																		
Antelope Valley - East Kern W.A.	.066254	.066469	.118459	.118695	.118930	.119541												
San Bernardino Valley M.W.D.	.050430	.050595	.090147	.090223	.090199	.090136		.118676	.111214									
Metropolitan Water District	.833191	.835908	.724360	.724969	.724776	.724271		.806162	.888786	1.000000	1.000000	.978562						
Uncontracted	.050125	.047028	.067034	.066113	.066095	.066052		.075162				.021438						
TOTALS	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000		1.000000	1.000000	1.000000	1.000000	1.000000		1.000000	1.000000	1.000000	1.000000	1.000000

TABLE 29

PROPORTIONATE USE OF AQUEDUCT REACHES BY CONTRACTOR
BASED ON MEAN MEASURE OF USE - CALIFORNIA AQUEDUCT

CONTRACTOR	NORTH SAN JOAQUIN DIVISION		SAN LUIS DIVISION					SOUTH SAN JOAQUIN DIVISION									TEHACHAPI DIVISION
	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	Reach 9	Reach 10	Reach 11	Reach 12	Reach 13	Reach 14	Reach 15	Reach 16	Reach 17
SOUTH BAY AQUEDUCT																	
Alameda County F.C. & W.C.D., Zone 7	.009092																
Alameda County Water District	.009561																
Santa Clara County F.C. & W.C.D.	.020212																
Uncontracted	.009064																
SAN JOAQUIN VALLEY																	
Uncontracted	.489416	.513250	.513203	.513189	.513174	.513147	.513136	.507197	.495294	.468082	.412859	.365578	.259966	.199330	.037484	.034772	
Uncontracted Reserve	.003864	.004060	.004059	.004059	.004058	.004058	.004058	.004110									
CENTRAL COASTAL																	
Uncontracted	.018495	.019459	.019462	.019463	.019463	.019466	.019465	.019702									
SOUTHERN CALIFORNIA																	
Antelope Valley - East Kern W.A.	.029176	.030696	.030699	.030700	.030701	.030703	.030704	.031078	.033444	.035248	.038907	.042040	.049038	.053056	.063780	.063960	.066254
San Bernardino Valley M.W.D.	.022198	.023354	.023356	.023357	.023358	.023359	.023360	.023644	.025446	.026818	.029602	.031986	.037310	.040368	.048528	.048664	.050430
Metropolitan Water District	.366854	.385963	.386001	.386011	.386024	.386045	.386054	.390763	.420519	.443192	.489203	.528597	.616594	.667114	.801964	.804224	.833191
Uncontracted	.022068	.023218	.023220	.023221	.023222	.023222	.023223	.023506	.025297	.026660	.029429	.031799	.037092	.040132	.048244	.048380	.050125
TOTALS	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000

CONTRACTOR	ANTELOPE DIVISION		EAST BRANCH DIVISION									WEST BRANCH DIVISION		COASTAL DIVISION				
	Reach 18	Reach 19	Reach 20	Reach 21	Reach 22	Reach 23	Reach 24	Reach 25	Reach 26	Reach 27	Reach 28	Reach 29	Reach 30	Reach 31	Reach 32	Reach 33	Reach 34	Reach 35
SAN JOAQUIN VALLEY																		
Uncontracted														.701590	.701578			
CENTRAL COASTAL																		
Uncontracted														.298410	.298422	1.000000	1.000000	1.000000
SOUTHERN CALIFORNIA																		
Antelope Valley - East Kern W.A.	.066254	.063359	.108959	.077528	.077655	.069034	.161055											
San Bernardino Valley M.W.D.	.050430	.050764	.091118	.094438	.094449	.095752	.192293	.110638										
Metropolitan Water District	.833191	.838692	.732166	.758833	.758921	.769392	.512763	.819291	.896977	1.000000	1.000000	.978562	.969150					
Uncontracted	.050125	.047185	.067757	.069201	.068975	.065822	.133889	.070071	.103023			.021438	.030850					
TOTALS	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000

TABLE 30

COMPUTATION OF PROJECTED DELTA WATER RATES

Calendar Year	PROJECT ENTITLEMENTS		INITIAL PROJECT CONSERVATION FACILITIES		INITIAL AND ADDITIONAL PROJECT CONSERVATION FACILITIES	
	Annual Deliveries (Acre-Feet)	Present Worth of Annual[1/ 2/] Deliveries	Annual[3/] Expenditures (Dollars)	Present Worth of Annual[1/] Expenditures	Annual[3/] Expenditures (Dollars)	Present Worth of Annual[1/] Expenditures
1952			172124	264976.9900	172124	264976.9900
53			316270	468156.8600	316270	468156.8600
54			306566	436339.0091	306566	436339.0091
55			181527	248432.2340	181527	248432.2340
56			1329756	1749868.1790	1329756	1749868.1790
57			6975215	8825872.1976	6975215	8825872.1976
58			9995044	12160499.2922	9995044	12160499.2922
59			11231267	13138993.8396	11231267	13138993.8396
1960			17247837	19401470.9192	17247837	19401470.9192
61			22818976	24681004.4416	22834047	24697305.2352
62			32043914	33325670.5600	32074613	33357997.5200
63	4800	4800.0000	64085179	64085179.0000	64116948	64116948.0000
64	4800	4615.3846	89217218	85785786.5385	89248983	85816329.8077
65	4800	4437.8698	95694996	88475403.1065	95727385	88505348.5577
66	4800	4267.1825	101970457	90651364.9650	102005562	90682573.1822
67	232200	198485.5332	71368861	61006401.4918	71406052	61038192.5145
68	419000	344387.4577	29497033	24244410.9917	29534766	24275424.7672
69	491800	388676.6838 4/	- 1522801	- 1203491.7501	- 1484205	- 1172988.7707
1970	569300	432621.2111	- 7034342	- 5345521.7900	- 6994534	- 5315270.9816
71	645600	471733.5963	- 10443850	- 7631218.8975	- 10403180	- 7601501.7269
72	1168100	820691.5658	- 10644327	- 7478562.9594	- 10548271	- 7411075.2879
73	1400400	946060.0620	- 11154216	- 7535388.6609	- 11058160	- 7470496.6691
74	1615000	1049073.2045	- 11013207	- 7153969.2626	- 10917151	- 7091573.1166
75	1844100	1151819.4191	- 12363225	- 7722033.8583	- 12267169	- 7662037.5641
76	2050200	1231296.9914	- 13207140	- 7931866.0360	- 13111084	- 7874177.2915
77	2247400	1297817.5011 5/	- 13811908	- 7976032.7162	- 13715852	- 7920562.7697
78	2440100	1354900.9131	- 14318831	- 7950738.5747	- 12222775	- 6786873.0822
79	2613400	1395315.6263	- 14476564	- 7729155.8754	- 8380508	- 4474421.7376
1980	2798100	1436469.6792	- 13329600	- 6843060.0179	7766456	3987090.7255
81	2938600	1450575.5964	- 14320902	- 7069199.9454	28775154	14204225.2008
82	3059600	1452215.9606	- 14255866	- 6766438.7952	33840190	16061989.8119
83	3169500	1446818.4260	- 14365596	- 6556270.4888	21730460	9917498.2789
84	3281300	1439944.6984	- 14080483	- 6178989.0744	- 3984427	- 1748500.4528
85	3386700	1429036.3080	- 14106704	- 5952399.7407	- 12784448	- 5394551.0900
86	3488900	1415538.6043	- 14746025	- 5982850.6543	- 14470025	- 5870870.1863
87	3590300	1400653.1293	- 14727125	- 5745367.7179	- 14451125	- 5637694.1909
88	3692300	1385043.7690	- 14740325	- 5529343.5782	- 14464325	- 5425811.3408
89	3789700	1366903.9861	- 14720425	- 5309498.8017	- 14444425	- 5209948.5735
1990	3889300	1348873.6862	- 15213725	- 5276371.9234	- 14937725	- 5180650.5501
91	3970200	1323972.2565	- 15444725	- 5150467.8376	- 15168725	- 5058428.0555
92	3974700	1274493.1780	- 15444725	- 4952372.9208	- 15168725	- 4863873.1303
93	3980600	1227293.2897	- 15444725	- 4761897.0392	- 15168725	- 4676801.0869
94	3983600	1180979.0824	- 15444725	- 4578747.1521	- 15168725	- 4496924.1220
95	3986000	1136240.9491	- 15444725	- 4402641.4934	- 15168725	- 4323965.5019
96	3990000	1093635.7508	- 15444725	- 4233309.1282	- 15168725	- 4157659.1364
97	3995000	1052890.5978	- 15444725	- 4070489.5464	- 15168725	- 3997749.1697
98	3996000	1012648.2210	- 15444725	- 3913932.2561	- 15168725	- 3843989.5862
99	3998000	974187.5500	- 15444725	- 3763396.4001	- 15168725	- 3696143.8329
2000	4000000	937187.3917	- 15444725	- 3618650.3847	- 15168725	- 3553984.4547
01	4000000	901141.7228	- 15444725	- 3479471.5238	- 15168725	- 3417292.7449
02	4000000	866482.4258	- 15444725	- 3345645.6959	- 15168725	- 3285858.4086
03	4000000	833156.1787	- 15444725	- 3216967.0153	- 15168725	- 3159479.2390
04	4000000	801111.7102	- 15444725	- 3093237.5147	- 15168725	- 3037960.8067
05	4000000	770299.7214	- 15444725	- 2974266.8411	- 15168725	- 2921116.1603
06	4000000	740672.8090	- 15444725	- 2859871.9626	- 15168725	- 2808765.5388
07	4000000	712185.3933	- 15444725	- 2749876.8871	- 15168725	- 2700736.0950
08	4000000	684793.6474	- 15444725	- 2644112.3915	- 15168725	- 2596861.6298
09	4000000	658455.4302	- 15444725	- 2542415.7610	- 15168725	- 2496982.3363
2010	4000000	633130.2213	- 15444725	- 2444630.5394	- 15168725	- 2400944.5542
11	4000000	608779.0590	- 15444725	- 2350606.2879	- 15168725	- 2308600.5328
12	4000000	585364.4798	- 15444725	- 2260198.3538	- 15168725	- 2219808.2047
13	4000000	562850.4613	- 15444725	- 2173267.6479	- 15168725	- 2134430.9660
14	4000000	541202.3667	- 15444725	- 2089680.4306	- 15168725	- 2052337.4673
15	4000000	520386.8910	- 15444725	- 2009308.1064	- 15168725	- 1973401.4109
16	4000000	500372.0106	- 15444725	- 1932027.0254	- 15168725	- 1897501.3566
17	4000000	481126.9333	- 15444725	- 1857718.2936	- 15168725	- 1824520.5352
18	4000000	462622.0512	- 15444725	- 1786267.5900	- 15168725	- 1754346.6685
19	4000000	444828.8954	- 15444725	- 1717564.9904	- 15168725	- 1686871.7966
2020	4000000	427720.0917	- 15444725	- 1651504.7985	- 15168725	- 1621992.1121
21	4000000	411269.3190	- 15444725	- 1587985.3831	- 15168725	- 1559607.8001
22	4000000	395451.2682	- 15444725	- 1526909.0222	- 15168725	- 1499622.8847
23	4000000	380241.6041	- 15444725	- 1468181.7522	- 15168725	- 1441945.0815
24	4000000	365616.9270	- 15444725	- 1411713.2232	- 15168725	- 1386485.6553
25	4000000	351554.7375	- 15444725	- 1357416.5608	- 15168725	- 1333159.2839
26	4000000	338033.4014	- 15444725	- 1305208.2313	- 15168725	- 1281883.9288
27	4000000	325032.1168	- 15444725	- 1255007.9149	- 15168725	- 1232580.6989
28	4000000	312530.8815	- 15444725	- 1206738.3797	- 15168725	- 1185173.7489
29	4000000	300510.4630	- 15444725	- 1160325.3631	- 15168725	- 1139590.1432
2030	4000000	288952.3683	- 15444725	- 1115697.4665	- 15168725	- 1095759.7531
31	4000000	277838.8156	- 15444725	- 1072786.0255	- 15168725	- 1053615.1472
32	4000000	267152.7073	- 15444725	- 1031525.0245	- 15168725	- 1013091.4877
33	4000000	256877.6032	- 15444725	- 991850.9851	- 15168725	- 974126.4305
34	4000000	246997.6954	- 15444725	- 953702.8703	- 15168725	- 936660.0293
2035	4000000	237497.7840	- 15444725	- 917021.9906	- 15168725	- 900634.6435
Repayment Period Totals	234714200	55378542.5034	- 419157572	275095445.4851	- 236415992	359102864.3846

Delta Water Rate Calculation

1st Rate (thru 1969) $3.50000000/acre-foot as provided in Article 22.

2nd Rate (1970 thru 1977 to first capital expenditure for construction of the Middle Fork Eel River Facilities).

Present Worth Net Expenditures during entire repayment period:

Prior Delta Water Charges		- 3,323,845.3906
Initial Project Conservation Facilities Annual Expenditures		275,095,445.4851
	Total	271,771,600.0945
Present Worth Entitlements (1970 thru remainder of repayment period)		54,428,872.3938
Delta Water Rate		$4.99315140/acre-foot

3rd Rate (1978 thru remainder of repayment period).

Present Worth Net Expenditures during entire repayment period:

Prior Delta Water Charges, 1st rate		- 3,323,845.3906
Prior Delta Water Charges, 2nd rate		- 36,954,880.4162
Initial and Additional Project Conservation Facilities Annual Expenditures		359,102,864.3846
	Total	318,824,424.5006
Present Worth Entitlements (1978 thru remainder of repayment period)		47,027,758.8425
Delta Water Rate		$6.77948825/acre-foot

Notes:

1/ Present Worths based on an interest rate of 4% per annum.

2/ Present Worth of Annual Deliveries may be considered as the present worth of the Delta Water Charge, assuming the Delta Water Rate equivalent to $1/acre-foot.

3/ Reduced by revenues derived from the sale or other disposal of electrical energy incurred during the respective year.

4/ Subtotal thru 1969: 949,670.1116

5/ Subtotal thru 1977: 8,350,783.6629

TABLE 31

AMORTIZATION OF COSTS ALLOCATED TO CONSERVATION

(in dollars unless otherwise shown)

Calendar Year	1 Project Entitlements (acre-feet)	2 Applicable Delta Water Rate ($/acre-foot)	3 Delta Water Charge (2) x (1)	4 Total Expenditures Incurred During the Year	5 Net Yearly Expenditure (4) - (3)	6 Interest on Prior Year's Balance	7 Total Expenditures With Interest, Unreimbursed
1952				172124	172124		172124
53				316270	316270	6885	495279
54				306566	306566	19811	821656
55				181527	181527	32866	1036049
56				1329756	1329756	41442	2407247
57				6975215	6975215	96290	9478752
58				9995044	9995044	379150	19852946
59				11231267	11231267	794118	31878331
1960				17247837	17247837	1275133	50401301
61				22834047	22834047	2016052	75251400
62				32074613	32074613	3010056	110336069
63	4800	3.50000000	16800	64116948	64100148	4413443	178849660
64	4800	3.50000000	16800	89248983	89232183	7153986	275235830
65	4800	3.50000000	16800	95727385	95710585	11009433	381955848
66	4800	3.50000000	16800	102005562	101988762	15278234	499222844
67	232200	3.50000000	812700	71406052	70593352	19968914	589785110
68	419000	3.50000000	1466500	29534766	28068266	23591404	641444780
69	491800	3.50000000	1721300	- 1484205	- 3205505	25657791	663897066
1970	569300	4.99315140	2842601	- 6994534	- 9837135	26555883	680615814
71	645600	4.99315140	3223579	- 10403180	- 13626759	27224633	694213688
72	1168100	4.99315140	5832500	- 10548271	- 16380771	27768548	705601464
73	1400400	4.99315140	6992409	- 11058160	- 18050569	28224059	715774953
74	1615000	4.99315140	8063940	- 10917151	- 18981091	28630998	725424861
75	1844100	4.99315140	9207870	- 12267169	- 21475039	29016994	732966816
76	2050200	4.99315140	10236959	- 13111084	- 23348043	29318673	738937446
77	2247400	4.99315140	11221608	- 13715852	- 24937460	29557498	743557483
78	2440100	6.77948825	16542629	- 12222775	- 28765404	29742299	744534378
79	2613400	6.77948825	17717515	- 8380508	- 26098023	29781375	748217731
1980	2798100	6.77948825	18969686	7766456	- 11203230	29928709	766943210
81	2938600	6.77948825	19922204	28775154	8852950	30677728	806473888
82	3059600	6.77948825	20742522	33840190	13097668	32258956	851830511
83	3169500	6.77948825	21487588	21730460	242872	34073220	886146604
84	3281300	6.77948825	22245535	- 3984427	- 26229962	35445864	895362506
85	3386700	6.77948825	22960093	- 12784648	- 35744741	35814500	895432265
86	3488900	6.77948825	23652957	- 14470025	- 38122982	35817291	893126574
87	3590300	6.77948825	24340397	- 14451125	- 38791522	35725063	890060116
88	3692300	6.77948825	25031904	- 14464325	- 39496229	35602405	886166291
89	3789700	6.77948825	25692227	- 14444425	- 40136652	35446652	881476291
1990	3889300	6.77948825	26367464	- 14937725	- 41305189	35259052	875430154
91	3970200	6.77948825	26915924	- 15168725	- 42084649	35017206	868362711
92	3974700	6.77948825	26946432	- 15168725	- 42115157	34734508	860982062
93	3980600	6.77948825	26986431	- 15168725	- 42155156	34439282	853266189
94	3983600	6.77948825	27006769	- 15168725	- 42175494	34130648	845221342
95	3986000	6.77948825	27023040	- 15168725	- 42191765	33808854	836838430
96	3990000	6.77948825	27050158	- 15168725	- 42218883	33473537	828093085
97	3995000	6.77948825	27084056	- 15168725	- 42252781	33123723	818964027
98	3996000	6.77948825	27090835	- 15168725	- 42259560	32758561	809463028
99	3998000	6.77948825	27104394	- 15168725	- 42273119	32378521	799568431
2000	4000000	6.77948825	27117953	- 15168725	- 42286678	31982737	789264490
01	4000000	6.77948825	27117953	- 15168725	- 42286678	31570580	778548391
02	4000000	6.77948825	27117953	- 15168725	- 42286678	31141936	767403649
03	4000000	6.77948825	27117953	- 15168725	- 42286678	30696146	755813117
04	4000000	6.77948825	27117953	- 15168725	- 42286678	30232525	743758964
05	4000000	6.77948825	27117953	- 15168725	- 42286678	29750359	731222644
06	4000000	6.77948825	27117953	- 15168725	- 42286678	29248906	718184872
07	4000000	6.77948825	27117953	- 15168725	- 42286678	28727395	704625589
08	4000000	6.77948825	27117953	- 15168725	- 42286678	28185024	690523934
09	4000000	6.77948825	27117953	- 15168725	- 42286678	27620957	675858214
2010	4000000	6.77948825	27117953	- 15168725	- 42286678	27034329	660605864
11	4000000	6.77948825	27117953	- 15168725	- 42286678	26424235	644743421
12	4000000	6.77948825	27117953	- 15168725	- 42286678	25789737	628246480
13	4000000	6.77948825	27117953	- 15168725	- 42286678	25129859	611089661
14	4000000	6.77948825	27117953	- 15168725	- 42286678	24443586	593246569
15	4000000	6.77948825	27117953	- 15168725	- 42286678	23729863	574689754
16	4000000	6.77948825	27117953	- 15168725	- 42286678	22987590	555390666
17	4000000	6.77948825	27117953	- 15168725	- 42286678	22215627	535319615
18	4000000	6.77948825	27117953	- 15168725	- 42286678	21412785	514445722
19	4000000	6.77948825	27117953	- 15168725	- 42286678	20577829	492736872
2020	4000000	6.77948825	27117953	- 15168725	- 42286678	19709475	470159669
21	4000000	6.77948825	27117953	- 15168725	- 42286678	18806387	446679378
22	4000000	6.77948825	27117953	- 15168725	- 42286678	17867175	422259875
23	4000000	6.77948825	27117953	- 15168725	- 42286678	16890395	396863592
24	4000000	6.77948825	27117953	- 15168725	- 42286678	15874544	370451458
25	4000000	6.77948825	27117953	- 15168725	- 42286678	14818058	342982838
26	4000000	6.77948825	27117953	- 15168725	- 42286678	13719314	314415474
27	4000000	6.77948825	27117953	- 15168725	- 42286678	12576619	284705415
28	4000000	6.77948825	27117953	- 15168725	- 42286678	11388217	253806953
29	4000000	6.77948825	27117953	- 15168725	- 42286678	10152278	221672553
2030	4000000	6.77948825	27117953	- 15168725	- 42286678	8866902	188252777
31	4000000	6.77948825	27117953	- 15168725	- 42286678	7530111	153496211
32	4000000	6.77948825	27117953	- 15168725	- 42286678	6139848	117349381
33	4000000	6.77948825	27117953	- 15168725	- 42286678	4693975	79756678
34	4000000	6.77948825	27117953	- 15168725	- 42286678	3190267	40660267
2035	4000000	6.77948825	27117953	- 15168725	- 42286678	1626411	0
Repayment Period Totals	234714200		1566816234	-236415992	-1803232226	1803232229	

TABLE 32

SUMMARY OF ESTIMATED ANNUAL DELTA WATER CHARGES

(in dollars)

Calendar Year	FEATHER RIVER SERVICE AREA (Uncontracted)	NORTH BAY AQUEDUCT (Uncontracted)	SOUTH BAY AQUEDUCT					CALIFORNIA AQUEDUCT							TOTAL
			Alameda Co. FC & WCD, Zone 7	Alameda Co Water District	Santa Clara County FC & WCD	Uncontracted	Total	Unallocated Reserve (Uncontracted)	SAN JOAQUIN VALLEY (Uncontracted)	CENTRAL COASTAL AREA (Uncontracted)	SOUTHERN CALIFORNIA: Metropolitan Water District of Southern California	SOUTHERN CALIFORNIA: San Bernardino Valley Municipal Water District	SOUTHERN CALIFORNIA: Antelope Valley East Kern Water Agency	SOUTHERN CALIFORNIA: Uncontracted	SOUTHERN CALIFORNIA: Total	
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63	16800	0	0	0	0	0	0	0	0	0	0	0	0	0	16800
64	16800	0	0	0	0	0	0	0	0	0	0	0	0	0	16800
65	16800	0	0	0	0	0	0	0	0	0	0	0	0	0	16800
66	16800	0	0	0	0	0	0	0	0	0	0	0	0	0	16800
67	429450	0	21700	50050	308000	3500	383250	0	0	0	0	0	0	0	812700
68	450100	4550	26250	52500	308000	3500	390250	0	621600	0	0	0	0	0	1466500
69	470750	5950	30800	54250	308000	3500	396550	0	848050	0	0	0	0	0	1721300
1970	701038	24966	49932	80889	439397	4993	575211	0	1541386	0	0	0	0	0	2842601
71	730498	41942	55923	84884	439397	6990	587194	0	1863943	0	0	0	0	0	3223577
72	760457	116840	61915	89377	439397	8988	599677	0	3426301	0	551244	74897	99863	203221	929225	5832500
73	788918	142804	67907	93871	439397	10985	612160	0	4005007	0	993138	84884	124829	240669	1443520	6992409
74	818378	168769	73899	97866	439397	12982	624144	0	4492838	0	1434533	95869	149795	279617	1959814	8063943
75	847837	264637	79890	102360	439397	14979	636626	0	4984663	0	1876427	105855	174760	317066	2474108	9207871
76	877297	296593	85882	106354	439397	16977	648610	0	5426058	0	2318320	115841	199726	354514	2988401	10236959
77	906756	328549	91874	110848	439397	18974	661093	0	5820017	0	2760714	125827	224692	393960	3505193	11221608
78	1270476	489479	132878	156606	596595	28474	914553	0	8411311	0	4348363	184402	338974	585070	5456809	16542628
79	1310475	533546	141013	162030	596595	31186	930824	0	8787573	0	4947671	198639	372872	635916	6155098	17717516
1980	1350474	576257	149149	168131	596595	33897	947772	101692	9134683	13559	5547655	212198	406769	678626	6845248	18969685
81	1416235	621001	155928	176267	596595	37287	966077	101692	9261459	20338	6147640	226435	440667	720659	7535401	19922203
82	1481996	665746	162708	184402	596595	40677	984382	101692	9405862	40677	6549664	264400	477954	770150	8062168	20742523
83	1547079	710490	169487	192537	596595	44067	1002686	101692	9484504	61015	6951687	302365	515241	810826	8580119	21487585
84	1612840	755235	176267	200673	596595	47456	1020991	101692	9561791	91523	7353711	340330	552528	854893	9101462	22245534
85	1678601	799980	183046	208808	596595	57626	1046075	101692	9623484	152538	7755735	378973	589815	833199	9557722	22960092
86	1744362	842012	189826	217622	596595	74574	1078617	101692	9684499	203385	8158636	416261	627103	796590	9998390	23652957
87	1810123	886079	196605	225757	596595	84744	1103701	101692	9744837	254231	8561138	454904	664390	759302	10439734	24340397
88	1864359	928790	203385	233892	596595	101692	1135564	101692	9805852	315246	8963161	493547	701677	722015	10880400	25031903
89	1864359	972179	210164	242028	596595	111862	1160649	101692	9866190	406769	9365185	531512	738964	684728	11320389	25692227
1990	1864359	1016923	216944	250163	596595	122031	1185733	101692	9928561	508462	9767887	570155	776251	647441	11761734	26367464
91	1864359	1016923	230503	260332	596595	138302	1225732	101692	9995678	508462	10169233	610154	813539	610154	12203080	26915926
92	1864359	1016923	244062	270502	596595	141013	1252172	101692	9999746	508462	10169233	610154	813539	610154	12203080	26946434
93	1864359	1016923	257621	280671	596595	157284	1292171	101692	9999746	508462	10169233	610154	813539	610154	12203080	26986433
94	1864359	1016923	271180	284739	596595	159996	1312510	101692	9999746	508462	10169233	610154	813539	610154	12203080	27006772
95	1864359	1016923	271180	284739	596595	176267	1328781	101692	9999746	508462	10169233	610154	813539	610154	12203080	27023043
96	1864359	1016923	271180	284739	596595	203385	1355899	101692	9999746	508462	10169233	610154	813539	610154	12203080	27050161
97	1864359	1016923	271180	284739	596595	237282	1389796	101692	9999746	508462	10169233	610154	813539	610154	12203080	27084058
98	1864359	1016923	271180	284739	596595	244062	1396576	101692	9999746	508462	10169233	610154	813539	610154	12203080	27090838
99	1864359	1016923	271180	284739	596595	257621	1410135	101692	9999746	508462	10169233	610154	813539	610154	12203080	27104397
2000	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
01	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
02	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
03	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
04	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
05	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
06	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
07	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
08	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
09	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
2010	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
11	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
12	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
13	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
14	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
15	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
16	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
17	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
18	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
19	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
2020	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
21	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
22	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
23	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
24	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
25	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
26	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
27	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
28	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
29	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
2030	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
31	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
32	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
33	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
34	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956
2035	1864359	1016923	271180	284739	596595	271180	1423694	101692	9999746	508462	10169233	610154	813539	610154	12203080	27117956

TABLE 33

SUMMARY OF ALLOCATIONS OF CAPITAL COSTS OF TRANSPORTATION FACILITIES

(In dollars)

Calendar Year	FEATHER RIVER SERVICE AREA (Uncontracted)	NORTH BAY AQUEDUCT (Uncontracted)	SOUTH BAY AQUEDUCT: Alameda Co. FC & WCD, Zone 7	Alameda Co. Water District	Santa Clara County FC & WCD	Uncontracted	Total	CALIFORNIA AQUEDUCT: Unallocated Reserve (Uncontracted)	SAN JOAQUIN VALLEY (Uncontracted)	CENTRAL COASTAL AREA (Uncontracted)	SOUTHERN CALIFORNIA: Metropolitan Water District of Southern California	San Bernardino Valley Municipal Water District	Antelope Valley East Kern Water Agency	Uncontracted	Total	TOTAL
1952	0	0	103	147	399	89	738	97	15698	2180	73813	4896	4600	3995	87304	106017
53	0	0	382	569	1718	368	3037	257	44594	7673	241612	16052	14957	13039	285660	341221
54	0	0	974	1548	5084	1059	8665	311	55135	11820	299026	19679	19058	16337	354100	430031
55	0	0	1176	1924	6550	1356	11006	156	27292	6727	138354	8992	9163	7680	164189	209370
56	0	0	13941	23111	85324	16640	139016	206	48634	9335	224231	14354	15509	12675	266769	463960
57	0	103510	31609	52460	460224	37812	582105	314	94457	24922	592585	35636	37425	30959	656605	1461913
58	0	210955	70838	85769	533450	74254	764311	602	186286	52645	857089	54710	59046	48346	1019191	2233990
59	0	119957	130077	141250	401049	128758	801134	2716	506537	97972	1282408	78950	87554	71676	1520588	3048904
1960	0	100309	362260	395385	993092	357022	2107759	3759	668616	116878	2418748	166245	155864	133631	2874488	5871809
61	0	105190	581818	639068	1471114	588345	3280345	5289	861464	133862	6712783	376680	370405	317826	7777694	12163844
62	0	39640	526952	673138	2099920	600145	3900155	23139	3317660	255365	14769757	815379	868963	734803	17188902	24724861
63	0	836281	751038	1586144	9901479	1312409	13551070	91934	12263231	610578	24133888	1415496	1616127	1311639	28477150	55430244
64	0	756781	1117502	1774732	9786635	1426407	14105276	160824	21356533	1237188	34577237	1986372	2396003	1924758	40884370	78660972
65	0	2442415	852198	909992	2108451	663623	4533664	201037	27927382	1868902	44535476	2503982	3105956	2489477	52634391	89607791
66	0	3793496	63547	70986	128419	36034	298986	192589	31426346	2070151	57437760	3112318	3917559	3176085	67643722	105425290
67	0	3825368	28184	31897	54512	14672	129265	120213	22239026	1685327	76757197	4562499	4947709	4228703	90496108	118495307
68	0	2339712	5335	6038	10318	2777	24468	37610	7131334	1052600	101251768	6051401	5188387	5000615	117492171	128077895
69	0	545583	33415	35380	73395	31853	174043	2929	3162706	801987	109718637	6452102	5111098	5236152	126517989	131205237
1970	0	1374128	7900	8941	15280	4113	36234	2921	5208034	507544	69296101	4478745	4030717	3761808	81569371	88698232
71	0	1951244	9907	11212	19161	5157	45437	3663	3600128	305349	26487840	1655816	1793106	1505243	31442005	37347826
72	0	1749500	9907	11212	19161	5157	45437	3663	1300030	397978	17401497	743955	800857	740808	19687117	23183725
73	0	984000	9907	11212	19161	5157	45437	3663	958570	301294	14889778	762276	879824	747383	17279261	19572225
74	0	105500	9907	11212	19161	5157	45437	3663	700506	481758	12364352	779722	957674	753113	14854861	16191725
75	0	0	11437	12945	22122	5954	52458	4229	683333	783468	8869146	552939	687924	534728	10644737	12168225
76	0	1500	12974	14683	25093	6754	59504	4797	676418	529687	5025757	292614	246774	186674	5751819	7023725
77	0	27000	16281	18426	31490	8476	74673	6020	777033	8582540	4626850	255941	71264	53904	5007959	14475225
78	0	111000	16751	18959	32400	8720	76830	6194	784534	**17297872**	2453708	136443	46769	35375	2672295	**20948725**
79	0	85500	11913	13483	23042	6201	54639	4405	557934	9343349	418214	25306	33261	25157	501938	10547765
1980	0	0	8376	9479	16200	4360	38415	3097	392266	420324	294034	17792	23385	17687	352898	1207000
81	0	0	8376	9479	16200	4360	38415	3097	392266	35324	329016	21810	23385	17687	391898	861000
82	0	7500	5068	5736	9803	2638	23245	1874	237367	8970	798184	82006	14150	10704	905044	1184000
83	0	112500	6369	7208	12319	3315	29211	2355	298299	355273	1394153	147975	17783	13451	1573362	2371000
84	0	105000	6845	7747	13239	3563	31394	2531	320567	1087114	825567	81763	19110	14454	940894	2487500
85	0	0	32359	34186	71354	31303	169202	742	93968	1502551	70436	4262	5602	4237	84537	1851000
86	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
89	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
91	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
93	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
96	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2030	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2035	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 34

SUMMARY OF ANNUAL CAPITAL COST COMPONENTS
TRANSPORTATION CHARGE

(in dollars)

Calendar Year	FEATHER RIVER SERVICE AREA (Uncontracted)	NORTH BAY AQUEDUCT (Uncontracted)	SOUTH BAY AQUEDUCT					CALIFORNIA AQUEDUCT								TOTAL
			Alameda Co. FC & WCD, Zone 7	Alameda Co. Water District	Santa Clara County FC & WCD	Uncontracted	Total	Unallocated Reserve (Uncontracted)	SAN JOAQUIN VALLEY (Uncontracted)	CENTRAL COASTAL AREA (Uncontracted)	SOUTHERN CALIFORNIA: Metropolitan Water District of Southern California	SOUTHERN CALIFORNIA: San Bernardino Valley Municipal Water District	SOUTHERN CALIFORNIA: Antelope Valley East Kern Water Agency	SOUTHERN CALIFORNIA: Uncontracted	SOUTHERN CALIFORNIA: Total	
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63	0	0	84383	98844	302511	0	485738	0	0	0	1341245	77745	80147	0	1499137	1984375
64	0	57354	119344	172679	763427	154543	1209993	0	0	65898	2464682	143637	155378	131627	2895324	4228569
65	0	92582	171364	255293	1218997	220943	1866597	13863	0	123489	4074259	236103	266912	221225	4798499	6895039
66	0	206277	211034	297625	1317146	251835	2077640	23221	0	210487	6147395	352641	411495	337110	7248641	9766266
67	0	382865	213992	300929	1323124	253512	2091557	32186	0	306853	8821134	497520	593858	484957	10397469	13210930
68	0	560937	215304	302414	1325662	254195	2097575	37782	1017802	385305	12394197	709905	824175	681804	14610081	18709482
69	0	669851	215552	102695	1326142	254324	2098713	39533	1388587	434304	17107487	991599	1065695	914583	20079364	24710352
1970	0	695248	217107	304342	1329559	255807	2106815	39669	1769114	471637	22214912	1291946	1303618	1158327	25968803	31051286
71	0	759214	217475	304758	1330270	255998	2108501	39805	2139326	495263	25440752	1500432	1491249	1333440	29765873	35307982
72	0	850045	217936	305280	1331162	256238	2110616	39976	2932595	509477	26673766	1577511	1574718	1403510	31229505	38672214
73	0	931485	218397	305802	1332054	256478	2112731	40147	4596817	528003	27483809	1612142	1611998	1437995	32145944	40355127
74	0	977290	218858	306324	1332946	256718	2114846	40318	5156737	542028	28176931	1647626	1652954	1472786	32950297	41781516
75	0	982201	219319	306846	1333838	256958	2116961	40489	5721240	564454	28752494	1683922	1697534	1507844	33641794	43067139
76	0	982201	219851	307449	1334868	257235	2119403	40686	6227861	600925	29165354	1709661	1729557	1532736	34137308	44108384
77	0	982271	220455	308132	1336036	257549	2122172	40909	6680034	625582	29399304	1723282	1741044	1541426	34405056	44856024
78	0	983528	221213	308990	1337502	257944	2125649	41189	7110429	1025101	29614685	1735196	1744361	1543935	34638177	45924073
79	0	988695	221993	309873	1339010	258350	2129226	41477	7428497	1271392	29728905	1741547	1746538	1545582	34762572	46621859
1980	0	992675	222548	310501	1340083	258639	2131771	41682	7721922	1706327	29746372	1742725	1748086	1546753	34785936	47380313
81	0	992675	222938	310942	1340837	258842	2133559	41826	7829095	1725893	29762059	1743553	1749175	1547576	34802363	47525411
82	0	992675	223328	311383	1341591	259045	2135347	41970	7951170	1727537	29777375	1744568	1750264	1548399	34820606	47669305
83	0	993024	223564	311650	1342047	259168	2136429	42057	8017652	1727955	29814531	1748385	1750923	1548897	34862736	47779853
84	0	998261	223860	311986	1342620	259322	2137788	42167	8082987	1744493	29879429	1755273	1751751	1549523	34935976	47941672
85	0	1003149	224179	312347	1343236	259488	2139250	42285	8135141	1759098	29917860	1759079	1752641	1550196	34979776	48094699
86	0	1003149	225685	313938	1346558	260945	2147126	42320	8186722	1865042	29921139	1759277	1752902	1550393	34983711	48228070
87	0	1003149	225685	313938	1346558	260945	2147126	42320	8237730	1865042	29921139	1759277	1752902	1550393	34983711	48279078
88	0	1003149	225685	313938	1346558	260945	2147126	42320	8289311	1865042	29921139	1759277	1752902	1550393	34983711	48330659
89	0	1003149	225685	313938	1346558	260945	2147126	42320	8340318	1865042	29921139	1759277	1752902	1550393	34983711	48381666
1990	0	1003149	225685	313938	1346558	260945	2147126	42320	8393045	1865042	29921139	1759277	1752902	1550393	34983711	48434393
91	0	1003149	225685	313938	1346558	260945	2147126	42320	8449784	1865042	29921139	1759277	1752902	1550393	34983711	48491132
92	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
93	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
94	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
95	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
96	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
97	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
98	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
99	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
2000	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
01	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
02	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
03	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
04	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
05	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
06	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
07	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
08	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
09	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
2010	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
11	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
12	0	1003149	225685	313938	1346558	260945	2147126	42320	8453223	1865042	29921139	1759277	1752902	1550393	34983711	48494571
13	0	1003149	141302	215094	1044047	260945	1661388	42320	8453223	1865042	28579894	1681532	1672755	1550393	33484574	46509696
14	0	945795	106341	141259	583131	106402	937133	42320	8453223	1799144	27456457	1615640	1597524	1418766	32088387	44266002
15	0	910567	54321	58645	127561	40002	280529	28457	8453223	1741553	25846880	1523174	1485990	1329168	30185212	41599541
16	0	796872	14651	16313	29412	9110	69486	19099	8453223	1654555	23773744	1406636	1341407	1213283	27735070	38728305
17	0	620284	11693	13009	23434	7433	55569	10134	8453223	1558189	21100005	1261757	1159044	1065436	24586242	35283641
18	0	442212	10381	11524	20896	6750	49551	4538	8453223	1479737	17526942	1049372	928727	868589	20373630	30802891
19	0	333298	10133	11243	20416	6621	48413	2787	8453223	1430738	12813652	767678	687207	635810	14904347	25172806
2020	0	307901	8578	9596	16999	5138	40311	2651	8453223	1393405	7706227	467331	449284	392066	9014908	19212399
21	0	243935	8210	9180	16288	4947	38625	2515	8453223	1369779	4480387	258845	261653	216953	5217838	15325915
22	0	153104	7749	8658	15396	4707	36510	2344	8453223	1355565	3247373	181766	178184	146883	3754206	13754952
23	0	71664	7288	8136	14504	4467	34395	2173	8453223	1337039	2437330	147135	140904	112398	2837767	12736261
24	0	25859	6827	7614	13612	4227	32280	2002	8453223	1323014	1744208	111651	99948	77607	2033414	11869792
25	0	20948	6366	7092	12720	3987	30165	1831	8453223	1300588	1168645	75355	55368	42549	1341917	11148672
26	0	20948	5834	6489	11690	3710	27723	1634	8453223	1264117	755785	49616	23345	17657	846403	10614048
27	0	20878	5230	5806	10522	3396	24954	1411	8453223	1239460	521835	35995	11858	8967	578655	10318581
28	0	19621	4472	4968	9056	3001	21477	1131	8453223	839941	306454	24081	8541	6458	345534	9680927
29	0	14454	3692	4065	7548	2595	17900	843	8453223	593650	192234	17730	6364	4811	221139	9301209
2030	0	10474	3137	3437	6475	2306	15355	638	8453223	158715	172767	16552	4816	3640	197775	8836180
31	0	10474	2747	2996	5721	2103	13567	494	8453223	139149	159080	15724	3727	2817	181348	8798255
32	0	10474	2357	2555	4967	1900	11779	350	8453223	137505	143764	14709	2638	1994	163105	8776436
33	0	10125	2121	2288	4511	1777	10697	263	8453223	137087	106608	10892	1979	1496	120975	8732370
34	0	4888	1825	1952	3938	1623	9338	153	8453223	120549	41710	4004	1151	870	47735	8635886
2035	0	0	1506	1591	3322	1457	7876	35	8453223	69944	3279	198	261	197	3935	8535013

TABLE 35

SUMMARY OF ANNUAL MINIMUM OPERATING COMPONENTS
TRANSPORTATION CHARGE

(in dollars)

Calendar Year	FEATHER RIVER SERVICE AREA (Uncontracted)	NORTH BAY AQUEDUCT (Uncontracted)	SOUTH BAY AQUEDUCT					CALIFORNIA AQUEDUCT								TOTAL
			Alameda Co. FC & WCD, Zone 7	Alameda Co. Water District	Santa Clara County FC & WCD	Uncontracted	Total	Unallocated Reserve (Uncontracted)	SAN JOAQUIN VALLEY (Uncontracted)	CENTRAL COASTAL AREA (Uncontracted)	SOUTHERN CALIFORNIA					
											Metropolitan Water District of Southern California	San Bernardino Valley Municipal Water District	Antelope Valley East Kern Water Agency	Uncontracted	Total	
61	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0
62	0	0	14798	15559	0	0	30357	0	0	0	0	0	0	0	0	30357
63	0	0	15354	16145	34131	0	65630	0	0	0	0	0	0	0	0	65630
64	0	0	15853	19351	54936	18115	108255	0	0	0	0	0	0	0	0	108255
65	0	0	16834	20737	68319	19410	125300	0	0	0	0	0	0	0	0	125300
66	0	0	25163	30186	93632	27124	176105	0	0	0	0	0	0	0	0	176105
67	0	0	28393	33875	100891	29157	192316	1036	130894	4957	98335	5951	7821	5915	118022	447225
68	0	138498	30485	36375	105874	30186	202920	4851	730205	33404	558563	33798	44423	33600	670384	1780262
69	0	147358	35050	41371	116752	34268	227441	6330	949148	52721	714028	43204	56787	42954	856973	2239971
1970	0	150445	36201	42704	120293	35342	234540	6923	1065558	64604	820321	49639	65123	49233	984316	2506386
71	0	149995	36402	42945	120789	35470	235606	7593	1198204	80209	1241009	87358	100298	78162	1506827	3178434
72	0	229085	40151	47188	128110	37461	252910	10414	1756116	103807	6070799	414341	496255	390110	7371505	9723837
73	0	230119	39710	46694	127238	37199	250841	10076	1703271	102146	5483269	372367	437679	344830	6638145	8934598
74	0	232014	38130	44902	124195	36998	243625	8847	1521768	96473	4247371	280370	312918	249068	5089727	7192454
75	0	231450	37751	44477	123442	36172	241842	8624	1518130	95360	4253363	277253	308396	245148	5084160	7179566
76	0	230848	37768	44493	123488	36201	241950	8546	1504089	94954	4106454	266184	293937	233606	4900181	6980568
77	0	231381	38104	44844	124245	36552	243745	8489	1497920	94651	4111668	266478	294542	233979	4906667	6982853
78	0	231193	38297	45059	124634	36677	244667	8577	1510942	95046	4111253	266657	294698	234056	4906664	6997089
79	0	230697	38229	44988	124485	36611	244313	8555	1509569	94928	4189652	271194	300748	238554	4996148	7084210
1980	0	231193	38661	45456	125272	36811	246180	9056	1547996	1164099	4669204	304623	331844	264743	5570414	8768932
81	0	230930	38598	45411	125168	36759	245936	9057	1550231	1146987	4726535	308903	337076	268663	5641277	8824418
82	0	230595	39103	45958	126242	37177	248480	9125	1560016	1097703	4802915	313726	343558	273576	5733775	8879694
83	0	230236	38645	45445	125334	36905	246329	8965	1540523	1072282	4818396	315612	345676	274639	5754323	8852658
84	0	230140	38948	45792	125902	37030	247672	9104	1558177	1053299	4812720	315447	345548	274425	5748140	8846532
85	0	230434	38980	45836	125940	37007	247763	9136	1562941	1034991	4872207	319069	350391	278109	5819776	8905041
86	0	230141	38208	44969	124415	36558	244150	8891	1532186	1015820	4881089	319846	351476	278806	5831217	8862405
87	0	230537	38459	45231	124984	36822	245496	8868	1529562	1031007	4868862	319607	350895	278352	5817716	8863186
88	0	230278	38327	45090	124701	36706	244824	8855	1527996	1023099	4902260	321571	353565	280353	5857749	8892801
89	0	230074	38213	44967	124455	36608	244243	8829	1524512	1015330	4885537	320682	352468	279485	5838192	8861120
1990	0	229769	38106	44853	124227	36517	243703	8819	1523409	1009850	4914933	322596	355050	281320	5873899	8889449
91	0	229769	37939	44672	123868	36373	242852	8793	1520316	1009722	4899791	322085	354158	280632	5856666	8868118
92	0	229769	38007	44750	124008	36418	243183	8824	1525978	1009873	4971232	326776	360337	285713	5944058	8961685
93	0	229769	38010	44751	124014	36422	243197	8823	1525805	1009866	4971103	326768	360326	285706	5943903	8961363
94	0	229769	38059	44804	124125	36472	243460	8822	1525770	1009865	4971076	326767	360324	285704	5943871	8961557
95	0	229769	38046	44789	124095	36459	243389	8821	1525666	1009861	4970998	326762	360318	285700	5943778	8961284
96	0	229769	37979	44719	123949	36396	243043	8820	1525493	1009854	4970868	326754	360308	285691	5943621	8960600
97	0	229769	37898	44632	123768	36315	242613	8818	1525285	1009847	4970712	326745	360295	285683	5943435	8959767
98	0	229769	37878	44612	123726	36297	242513	8818	1525216	1009844	4970661	326741	360291	285679	5943372	8959532
99	0	229769	37849	44581	123660	36268	242358	8817	1525147	1009841	4970609	326738	360287	285676	5943310	8959242
2000	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
01	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
02	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
03	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
04	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
05	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
06	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
07	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
08	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
09	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
2010	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
11	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
12	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
13	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
14	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
15	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
16	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
17	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
18	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
19	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
2020	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
21	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
22	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
23	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
24	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
25	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
26	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
27	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
28	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
29	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
2030	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
31	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
32	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
33	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
34	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879
2035	0	229769	37818	44549	123592	36238	242197	8816	1525043	1009837	4970531	326734	360281	285671	5943217	8958879

TABLE 36

SUMMARY OF ANNUAL VARIABLE OPERATING COMPONENTS
TRANSPORTATION CHARGE

(in dollars)

Calendar Year	FEATHER RIVER SERVICE AREA (Uncontracted)	NORTH BAY AQUEDUCT (Uncontracted)	SOUTH BAY AQUEDUCT					CALIFORNIA AQUEDUCT							TOTAL
			Alameda Co. FC & WCD, Zone 7	Alameda Co. Water District	Santa Clara County FC & WCD	Uncontracted	Total	Unallocated Reserve (Uncontracted)	SAN JOAQUIN VALLEY (Uncontracted)	CENTRAL COASTAL AREA (Uncontracted)	SOUTHERN CALIFORNIA: Metropolitan Water District of Southern California	SOUTHERN CALIFORNIA: San Bernardino Valley Municipal Water District	SOUTHERN CALIFORNIA: Antelope Valley East Kern Water Agency	SOUTHERN CALIFORNIA: Uncontracted	SOUTHERN CALIFORNIA: Total	
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	4171	70482	0	0	74653	0	0	0	0	0	0	0	74653
63	0	0	10609	74690	0	0	85299	0	0	0	0	0	0	0	85299
64	0	0	15622	70690	100762	0	187074	0	0	0	0	0	0	0	187074
65	0	0	16411	68563	188182	3647	276803	0	0	0	0	0	0	0	276803
66	0	0	20848	80891	293958	4170	399867	0	0	0	0	0	0	0	399867
67	0	0	48630	112164	690241	7844	858879	0	0	0	0	0	0	0	858879
68	0	34136	45822	91644	537644	6109	681219	0	909239	0	0	0	0	0	1624594
69	0	41730	81611	143746	816104	9273	1050734	0	1419419	0	0	0	0	0	2511883
1970	0	52515	89901	145639	791126	8990	1035656	0	1515108	0	0	0	0	0	2603279
71	0	92625	99150	150496	779039	12394	1041079	0	1791730	0	0	0	0	0	2925434
72	0	142264	99515	143654	706236	14446	963851	0	2602882	0	1799406	285961	366142	865864	3317373	7026370
73	0	148512	110387	152593	714269	17856	995105	0	3226406	0	3257714	336819	465425	1035808	5095766	9465789
74	0	155158	121366	160729	721638	21321	1025054	0	3900955	0	4681353	387170	563696	1201167	6833386	11914553
75	0	213946	130555	167272	718048	24479	1040354	0	4312511	0	6236964	435450	659311	1372964	8704689	14271500
76	0	220548	140937	174531	721068	27859	1064395	0	4750020	0	7707901	484334	765238	1544390	10501863	16536826
77	0	263310	157019	189446	750957	32428	1129850	0	4960152	0	9214740	534660	876952	1729967	12356319	18709631
78	0	272670	167444	197344	751787	35881	1152456	0	5471781	0	10550664	580620	970380	1880777	13982441	20879348
79	0	277091	176167	202424	745324	38960	1162875	0	5673948	0	13469009	691585	1189613	2239627	17589834	24703748
1980	0	322642	186852	210633	747405	42466	1187356	54009	5999080	144234	14808653	740496	1300795	2385832	19235776	26943097
81	0	331905	193987	219289	742209	46388	1201873	54043	6123670	197310	17610967	860269	1512163	2721850	22705249	30614050
82	0	339240	211928	240184	777069	52982	1282163	55151	6321248	284609	20135765	1045571	1750456	3092227	26024019	34306430
83	0	344599	213534	242575	751639	55518	1263266	51519	6044968	342309	22353562	1247089	1971876	3422497	28995024	37041685
84	0	355914	225466	256684	763114	60702	1305966	54621	6375692	417396	23173758	1378812	2101372	3592822	30246764	38756353
85	0	398545	233213	266035	760100	73419	1332767	55100	6460747	540980	25934503	1594827	2368619	3670316	33568265	42356404
86	0	403838	228465	261918	718032	89754	1298169	49684	5979826	508798	27745459	1776732	2590531	3580034	35694756	43935071
87	0	448737	243849	280006	739956	105107	1368918	49110	5957979	845342	28611226	1930747	2723604	3392864	36658441	45328527
88	0	454996	248572	285858	729145	124286	1387861	48801	5958172	909717	31148702	2150787	2990403	3322025	39611917	48371464
89	0	462200	253583	292030	719851	134972	1400436	48183	5913892	997753	31823458	2277351	3126698	3107083	40334590	49157054
1990	0	462505	258672	298283	711351	145503	1413809	47968	5922852	1090274	34235392	2508469	3403133	3015148	43162142	52099550
91	0	462505	269542	304424	697640	161726	1433332	47326	5900269	1087066	34964324	2662100	3545283	2800700	43972407	52902905
92	0	462505	282027	312580	689399	162949	1446955	47265	5896247	1086763	34910389	2658437	3541371	2797402	43907599	52847334
93	0	462505	293585	319853	679883	179242	1472563	47219	5891745	1086534	34905810	2658162	3541005	2797127	43902104	52862670
94	0	462505	306754	322092	674858	180985	1484689	47195	5889416	1086416	34903442	2658021	3540815	2796984	43899262	52869483
95	0	462505	306135	321442	673498	198988	1500063	47177	5887621	1086325	34901616	2657911	3540669	2796874	43897070	52880761
96	0	462505	303913	318690	667729	227635	1517567	47147	5884633	1086173	34898577	2657729	3540426	2796693	43893425	52891450
97	0	462505	300279	315292	660612	262744	1538927	47109	5880930	1085985	34894812	2657503	3540125	2796466	43888906	52904362
98	0	462505	299574	314552	659061	269616	1542803	47101	5880179	1085946	34894048	2657457	3540064	2796421	43887990	52906524
99	0	462505	298369	313287	656412	283450	1551518	47086	5878708	1085871	34892552	2657367	3539944	2796331	43886194	52911882
2000	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
01	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
02	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
03	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
04	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
05	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
06	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
07	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
08	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
09	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
2010	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
11	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
12	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
13	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
14	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
15	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
16	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
17	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
18	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
19	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
2020	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
21	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
22	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
23	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
24	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
25	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
26	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
27	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
28	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
29	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
2030	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
31	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
32	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
33	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
34	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173
2035	0	462505	297186	312046	653811	297186	1560229	47071	5877209	1085795	34891027	2657276	3539822	2796239	43884364	52917173

TABLE 37

SUMMARY OF ANNUAL TRANSPORTATION CHARGES

(in dollars)

Calendar Year	FEATHER RIVER SERVICE AREA (Uncontracted)	NORTH BAY AQUEDUCT (Uncontracted)	SOUTH BAY AQUEDUCT					CALIFORNIA AQUEDUCT								TOTAL
			Alameda Co. FC & WCD, Zone 7	Alameda Co. Water District	Santa Clara County FC & WCD	Uncontracted	Total	Unallocated Reserve (Uncontracted)	SAN JOAQUIN VALLEY (Uncontracted)	CENTRAL COASTAL AREA (Uncontracted)	SOUTHERN CALIFORNIA					
											Metropolitan Water District of Southern California	San Bernardino Valley Municipal Water District	Antelope Valley East Kern Water Agency	Uncontracted	Total	
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	18969	86041	0	0	105010	0	0	0	0	0	0	0	0	105010
63	0	0	110946	189679	336642	0	636667	0	0	0	1341245	77745	80147	0	1499137	2135804
64	0	57354	150819	262720	919125	172658	1505322	0	0	65898	2464682	143637	155378	131627	2895324	4523898
65	0	92582	204609	344593	1479498	244000	2268700	13863	0	123489	4074259	236103	266912	221225	4798499	7297133
66	0	206277	257045	408702	1704736	283129	2653612	23221	0	210487	6147395	352641	411495	337110	7248641	10342238
67	0	382865	291015	446968	2114256	290513	3142752	33222	130894	311810	8919469	503471	601679	490872	10515491	14517034
68	0	733571	291611	430433	1969180	290490	2981714	42633	2657246	418709	12952760	743703	868598	715404	15280465	22114338
69	0	858939	332213	487812	2258998	297865	3376888	45863	3757154	487025	17821515	1034803	1222482	957537	20936337	29462206
1970	0	898208	343209	492685	2240978	300139	3377011	46592	4349780	536241	23035233	1341585	1368741	1207560	26953119	36160851
71	0	1001834	353027	498199	2230098	303862	3385186	47398	5129260	575472	26681761	1587790	1591547	1411602	31272700	41411850
72	0	1221994	357602	496122	2165508	308145	3327377	50390	8291593	613284	34543971	2277813	2437115	2659484	41918383	55422421
73	0	1310116	368494	505089	2173561	311533	3358677	50223	9526494	630149	36224792	2321328	2515102	2818633	43879855	58755914
74	0	1364462	378354	511955	2178779	314437	3383525	49165	10579460	638501	37105655	2315166	2529568	2923021	44873410	60888523
75	0	1427597	387625	518595	2175328	317609	3399157	49113	11551881	659814	39242821	2396625	2665241	3125956	47430643	64518205
76	0	1433597	398556	526473	2179424	321295	3425748	49232	12481970	695879	40979709	2460179	2788732	3310732	49539552	67625778
77	0	1476962	415578	542422	2211238	326529	3495767	49398	13138106	720233	42725712	2524420	2912538	3505372	51668042	70548508
78	0	1487391	426954	551393	2213923	330502	3522772	49766	14093152	1120147	44276602	2582473	3009439	3658768	53527282	73800510
79	0	1496483	436389	557285	2208819	333921	3536414	50032	14612014	1366320	47383566	2704326	3236899	4023763	57348554	78409817
1980	0	1546510	448041	566590	2212760	337916	3565307	104747	15268998	3014654	49226229	2787844	3380725	4197328	59592126	83092342
81	0	1555510	455523	575642	2208214	341989	3581368	104926	15502996	3070190	52099661	2912725	3598414	4538089	63148889	86963879
82	0	1562510	474359	597525	2244902	349204	3665990	106246	15832434	3109849	54716055	3103865	3844278	4914202	66578400	90855429
83	0	1567859	475743	599670	2219020	351591	3646024	102541	15603143	3142546	56986489	3311086	4068475	5246033	69612083	93674196
84	0	1584315	488274	614462	2231636	357054	3691426	105892	16016856	3215188	57865907	3449532	4198671	5416770	70930880	95544557
85	0	1632128	496372	624218	2229276	369914	3719780	106521	16158829	3371069	60724570	3672975	4471651	5498621	74367817	99356144
86	0	1637128	492358	620825	2189005	387257	3689445	100895	15698734	3389660	62547687	3857855	4694909	5699233	76509684	101025946
87	0	1682423	507993	639175	2211498	402874	3761540	100298	15725271	3741391	63401227	4009631	4827401	5221609	77459868	102470791
88	0	1688423	512584	644886	2200404	421937	3779811	99976	15775479	3797858	65972101	4231635	5096870	5152771	80453377	105594924
89	0	1695423	517481	650935	2190864	432525	3791805	99332	15778722	3878125	66630134	4357310	5232068	4936921	81156433	106399840
1990	0	1695423	522463	657074	2182136	442965	3804638	99107	15839306	3965166	69071464	4590342	5511085	4846861	84019752	109423392
91	0	1695423	533166	663034	2168066	459044	3823310	98439	15870369	3961830	69785254	4743462	5652343	4631725	84812784	110262155
92	0	1695423	545719	671268	2159965	460312	3837264	98409	15875448	3961678	69802760	4744490	5654610	4633508	84835368	110303590
93	0	1695423	557280	678542	2150455	476609	3862886	98362	15870773	3961442	69798052	4744207	5654233	4633226	84829718	110318604
94	0	1695423	570498	680834	2145541	478402	3875275	98337	15868409	3961323	69795657	4744065	5654041	4633081	84826844	110325611
95	0	1695423	569866	680169	2144151	496992	3890578	98318	15866510	3961228	69793753	4743950	5653889	4632967	84824559	110336616
96	0	1695423	567177	677347	2138236	524976	3907736	98287	15863349	3961069	69790584	4743760	5653636	4632777	84820757	110346621
97	0	1695423	563862	673862	2130998	560004	3928666	98247	15859438	3960874	69786663	4743525	5653322	4632542	84816052	110358700
98	0	1695423	563137	673102	2129345	566858	3932442	98239	15858618	3960832	69785848	4743475	5653257	4632493	84815073	110360627
99	0	1695423	561903	671806	2126630	580663	3941002	98223	15857078	3960754	69784300	4743382	5653133	4632400	84813215	110365695
2000	0	1695423	560689	670533	2123961	594369	3949552	98207	15855475	3960674	69782697	4743287	5653005	4632303	84811292	110370623
01	0	1695423	560689	670533	2123961	594369	3949552	98207	15855475	3960674	69782697	4743287	5653005	4632303	84811292	110370623
02	0	1695423	560689	670533	2123961	594369	3949552	98207	15855475	3960674	69782697	4743287	5653005	4632303	84811292	110370623
03	0	1695423	560689	670533	2123961	594369	3949552	98207	15855475	3960674	69782697	4743287	5653005	4632303	84811292	110370623
04	0	1695423	560689	670533	2123961	594369	3949552	98207	15855475	3960674	69782697	4743287	5653005	4632303	84811292	110370623
05	0	1695423	560689	670533	2123961	594369	3949552	98207	15855475	3960674	69782697	4743287	5653005	4632303	84811292	110370623
06	0	1695423	560689	670533	2123961	594369	3949552	98207	15855475	3960674	69782697	4743287	5653005	4632303	84811292	110370623
07	0	1695423	560689	670533	2123961	594369	3949552	98207	15855475	3960674	69782697	4743287	5653005	4632303	84811292	110370623
08	0	1695423	560689	670533	2123961	594369	3949552	98207	15855475	3960674	69782697	4743287	5653005	4632303	84811292	110370623
09	0	1695423	560689	670533	2123961	594369	3949552	98207	15855475	3960674	69782697	4743287	5653005	4632303	84811292	110370623
2010	0	1695423	560689	670533	2123961	594369	3949552	98207	15855475	3960674	69782697	4743287	5653005	4632303	84811292	110370623
11	0	1695423	560689	670533	2123961	594369	3949552	98207	15855475	3960674	69782697	4743287	5653005	4632303	84811292	110370623
12	0	1695423	560689	670833	2123961	594369	3949552	98207	15855475	3960674	69782697	4743287	5653005	4632303	84811292	110370623
13	0	1695423	476306	571689	1821450	594369	3463814	98207	15855475	3960674	68441452	4665542	5572858	4632303	83312155	108385748
14	0	1638069	441345	497854	1360534	439826	2739559	98207	15855475	3894776	67318015	4599650	5497627	4500676	81915968	106142054
15	0	1602841	389325	415240	904964	373426	2082955	84344	15855475	3837185	65708438	4507184	5386093	4411078	80012793	103475593
16	0	1489146	349655	372908	806815	342534	1871912	74986	15855475	3750187	63635302	4390646	5241510	4295193	77562651	100604357
17	0	1312558	346697	369604	800837	340857	1857995	66021	15855475	3653821	60961563	4245767	5059147	4147346	74413823	97159693
18	0	1134486	345385	368119	798299	340174	1851977	60425	15855475	3575369	57388500	4033382	4828830	3950499	70201211	92678943
19	0	1025572	345137	367838	797819	340045	1850839	58674	15855475	3526370	52675210	3751688	4587310	3717720	64731928	87048858
2020	0	1000175	345582	366191	794402	338562	1842737	58538	15855475	3489037	47567785	3451341	4349287	3473976	58842489	81088451
21	0	996209	343214	365775	793691	338371	1841051	58402	15855475	3465411	44341945	3242855	4161756	3298863	55049419	77201967
22	0	845378	342753	365253	792799	338131	1838936	58231	15855475	3451197	43108931	3165776	4078287	3228793	53581787	75631004
23	0	763938	342292	364731	791907	337891	1836821	58060	15855475	3432671	42298888	3131145	4041007	3194308	52665348	74612313
24	0	718133	341831	364209	791015	337651	1834706	57889	15855475	3418646	41605766	3095661	4000051	3159517	51860995	73745844
25	0	713222	341370	363687	790123	337411	1832591	57718	15855475	3396220	41030203	3059365	3955471	3124459	51169498	73024724
26	0	713222	340838	363084	789093	337134	1830149	57521	15855475	3359749	40617343	3033626	3923448	3099567	50673984	72490100
27	0	713152	340234	362401	787925	336820	1827380	57298	15855475	3335092	40383393	3020005	3911961	3090877	50406236	72194633
28	0	711895	339476	361543	786459	336425	1823903	57018	15855475	2935573	40168012	3008091	3908644	3088368	50173115	71556979
29	0	706728	338696	360660	784951	336019	1820326	56730	15855475	2689282	40093792	3001740	3906667	3086721	50048720	71177261
2030	0	702748	338141	360032	783878	335730	1817781	56525	15855475	2254347	40036325	3000562	3904919	3085550	50025356	70712232
31	0	702748	337751	359591	783124	335527	1815993	56381	15855475	2234781	40020638	2999734	3903830	3084727	50008929	70674307
32	0	702748	337361	359150	782370	335324	1814205	56237	15855475	2233137	40005322	2998719	3902741	3083904	49990686	70652488
33	0	702399	337125	358888	781914	335201	1813123	56150	15855475	2232719	39968166	2994902	3902082	3083406	49948556	70608422
34	0	697162	336829	358547	781341	335047	1811764	56040	15855475	2216181	39903268	2988014	3901254	3082780	49875316	70511938
2035	0	692274	336510	358186	780725	334881	1810302	55922	15855475	2165576	39864837	2984208	3900364	3082107	49831516	70411065

TABLE 38

SUMMARY OF ANNUAL TOTAL WATER CHARGES

(in dollars)

Calendar Year	FEATHER RIVER SERVICE AREA (Uncontracted)	NORTH BAY AQUEDUCT (Uncontracted)	SOUTH BAY AQUEDUCT					CALIFORNIA AQUEDUCT								TOTAL
			Alameda Co. FC & WCD, Zone 7	Alameda Co. Water District	Santa Clara County FC & WCD	Uncontracted	Total	Unallocated Reserve (Uncontracted)	SAN JOAQUIN VALLEY (Uncontracted)	CENTRAL COASTAL AREA (Uncontracted)	SOUTHERN CALIFORNIA					
											Metropolitan Water District of Southern California	San Bernardino Valley Municipal Water District	Antelope Valley East Kern Water Agency	Uncontracted	Total	
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	18969	86041	0	0	105010	0	0	0	0	0	0	0	0	105010
63	16800	0	110346	189679	336642	0	636667	0	0	0	1341245	77745	80147	0	1499137	2152804
64	16800	57354	150819	262720	919125	172656	1505322	0	0	65898	2464682	143637	155378	131627	2895324	4540698
65	16800	92582	204609	344593	1475498	244000	2268700	13863	0	123489	4074259	236103	266912	221225	4798499	7313935
66	16800	206277	251045	408702	1704736	283129	2659612	23221	0	210487	6147395	352641	411495	337110	7248641	10359038
67	429450	382865	312715	497018	2422256	294013	3526002	33222	130894	311810	8919469	503471	601679	490872	10515491	15329734
68	450100	738121	317861	482933	2277180	293990	3371964	42633	3278846	418709	12952760	743703	868598	715404	15280465	23580838
69	470750	864889	363013	542062	2566998	301365	3773438	45863	4605204	487025	17821515	1034803	1122482	957537	20936337	31183506
1970	701038	923174	393141	573574	2680375	305132	3952222	46592	5891166	536241	23035233	1341585	1368741	1207560	26953119	39003752
71	730498	1043776	408950	583083	2669495	310852	3972380	47398	6993203	575472	26681761	1587790	1591547	1411602	31272700	44635427
72	760457	1338234	419517	588499	2604905	317133	3927054	50390	11717894	613284	35095215	2352710	2536978	2862705	42847608	61254921
73	788918	1452920	436401	598960	2612958	322518	3970837	50223	13531501	630149	37217930	2405212	2639931	3059302	45323375	65747923
74	818378	1533231	452253	609821	2618176	327419	4007669	49165	15072298	638501	38540188	2411035	2679363	3202638	46833224	68952466
75	847837	1692234	467515	620955	2614725	332588	4035783	49113	16536544	659814	41119248	2502480	2840001	3443022	49904751	73726076
76	877297	1730190	484438	632827	2618821	338272	4074358	49232	17908028	695879	43298029	2576020	2988458	3665246	52527753	77862737
77	906756	1805511	507452	653270	2650635	345503	4156860	49398	18958123	720233	45486426	2650247	3137230	3899332	55173235	81770116
78	1270476	1976870	559832	707999	2810518	358976	4437325	49766	22504463	1120147	48624965	2766875	3348413	4243838	58984091	90343138
79	1310475	2030029	577402	719315	2805414	365107	4467238	50032	23399587	1366320	52331237	2902965	3609771	4659679	63503652	96127333
1980	1350474	2122767	597190	734721	2809355	371813	4513079	206439	24403681	3028213	54773884	3000042	3787494	4875954	66437374	102062027
81	1416235	2176511	611451	753909	2804809	379276	4547445	206618	24764455	3090528	58247901	3139160	4039081	5258748	70684290	106886082
82	1481996	2228256	637067	781927	2841497	389881	4650372	207938	25238296	3150526	61265719	3368265	4322232	5684352	74640568	111597952
83	1547079	2278349	645230	792207	2815615	395658	4648710	204233	25087647	3203561	63938176	3613451	4583716	6056859	78192202	115161781
84	1612840	2339550	664541	815135	2828231	404510	4712417	207584	25578647	3306711	65219618	3789862	4751199	6271663	80032342	117790091
85	1678601	2432108	679418	833026	2825871	427540	4765855	208213	25782313	3523607	68480305	4051948	5061466	6331820	83925539	122316236
86	1744362	2479140	682184	838447	2785600	461831	4768062	202587	25383233	3593045	70706123	4274116	5322012	6205823	86508074	124678503
87	1810123	2568502	704598	864932	2808093	487618	4865241	201990	25470108	3995622	71962365	4464535	5491791	5980911	87899602	126811188
88	1864359	2617213	715969	878778	2796999	523629	4915375	201668	25581331	4113104	74935262	4725182	5798547	5874786	91333777	130626827
89	1864359	2667602	727645	892963	2787459	544387	4952454	201024	25644912	4284894	75995319	4888822	5971032	5621649	92476822	132092067
1990	1864359	2712346	739407	907237	2778731	564996	4990371	200799	25767867	4470628	78839351	5160497	6287336	5494302	95781486	135790886
91	1864359	2712346	763669	923366	2764661	597346	5049042	200131	25866047	4470292	79954487	5353616	6465882	5241879	97015864	137178081
92	1864359	2712346	789781	941770	2756560	601325	5089436	200101	25875194	4470140	79971993	5354644	6468149	5243662	97038448	137250024
93	1864359	2712346	814901	959213	2747050	633893	5155057	200054	25870519	4469904	79967285	5354361	6467772	5243380	97032798	137305037
94	1864359	2712346	841678	965573	2742136	638398	5187785	200029	25868155	4469785	79964890	5354219	6467580	5243235	97029924	137332383
95	1864359	2712346	841046	964908	2740746	672659	5219359	200010	25866256	4469690	79962986	5354104	6467428	5243121	97027639	137359659
96	1864359	2712346	838357	962086	2734831	728361	5263635	199979	25863095	4469531	79959817	5353914	6467175	5242931	97023837	137396782
97	1864359	2712346	835042	958601	2727533	797286	5318462	199939	25859184	4469336	79955896	5353679	6466861	5242696	97019132	137442758
98	1864359	2712346	834317	957841	2725940	810920	5329018	199931	25858364	4469294	79955081	5353629	6466796	5242647	97018153	137451465
99	1864359	2712346	833083	956545	2723225	838284	5351137	199915	25856824	4469216	79953533	5353536	6466672	5242554	97016295	137470092
2000	1864359	2712346	831869	955272	2720556	865549	5373246	199899	25855221	4469136	79951930	5353441	6466544	5242457	97014372	137488579
01	1864359	2712346	831869	955272	2720556	865549	5373246	199899	25855221	4469136	79951930	5353441	6466544	5242457	97014372	137488579
02	1864359	2712346	831869	955272	2720556	865549	5373246	199899	25855221	4469136	79951930	5353441	6466544	5242457	97014372	137488579
03	1864359	2712346	831869	955272	2720556	865549	5373246	199899	25855221	4469136	79951930	5353441	6466544	5242457	97014372	137488579
04	1864359	2712346	831869	955272	2720556	865549	5373246	199899	25855221	4469136	79951930	5353441	6466544	5242457	97014372	137488579
05	1864359	2712346	831869	955272	2720556	865549	5373246	199899	25855221	4469136	79951930	5353441	6466544	5242457	97014372	137488579
06	1864359	2712346	831869	955272	2720556	865549	5373246	199899	25855221	4469136	79951930	5353441	6466544	5242457	97014372	137488579
07	1864359	2712346	831869	955272	2720556	865549	5373246	199899	25855221	4469136	79951930	5353441	6466544	5242457	97014372	137488579
08	1864359	2712346	831869	955272	2720556	865549	5373246	199899	25855221	4469136	79951930	5353441	6466544	5242457	97014372	137488579
09	1864359	2712346	831869	955272	2720556	865549	5373246	199899	25855221	4469136	79951930	5353441	6466544	5242457	97014372	137488579
2010	1864359	2712346	831869	955272	2720556	865549	5373246	199899	25855221	4469136	79951930	5353441	6466544	5242457	97014372	137488579
11	1864359	2712346	831869	955272	2720556	865549	5373246	199899	25855221	4469136	79951930	5353441	6466544	5242457	97014372	137488579
12	1864359	2712346	831869	955272	2720556	865549	5373246	199899	25855221	4469136	79951930	5353441	6466544	5242457	97014372	137488579
13	1864359	2712346	747486	856428	2418045	865549	4887508	199899	25855221	4469136	78610685	5275696	6386397	5242457	95515235	135503704
14	1864359	2654992	712525	782593	1957129	711006	4163253	199899	25855221	4403238	77487248	5209804	6311166	5110830	94119048	133260010
15	1864359	2619764	660505	699979	1501539	644606	3506649	186036	25855221	4348647	75877671	5117338	6199632	5021232	92215873	130593549
16	1864359	2506069	620835	657647	1403410	613714	3295606	176678	25855221	4258649	73804535	5000800	6055049	4905347	89765731	127722313
17	1864359	2329481	617877	654343	1397432	612037	3281689	167713	25855221	4162263	71130796	4855921	5872686	4757500	86616903	124277649
18	1864359	2151409	616565	652858	1394894	611354	3275671	162117	25855221	4083831	67557733	4643536	5642369	4560653	82404291	119796899
19	1864359	2042495	616317	652577	1394414	611225	3274533	160366	25855221	4034832	62844443	4361842	5400849	4327874	76935008	114166814
2020	1864359	2017098	614762	650930	1390997	609742	3266431	160230	25855221	3997499	57737018	4061495	5162926	4084130	71045569	108206407
21	1864359	1953132	614394	650514	1390286	609551	3264745	160094	25855221	3973873	54511178	3853009	4975295	3909017	67248499	104319923
22	1864359	1862301	613933	649992	1389394	609311	3262630	159923	25855221	3959659	53278164	3775930	4891826	3838947	65784867	102748960
23	1864359	1780861	613472	649470	1388502	609071	3260515	159752	25855221	3941133	52468121	3741299	4854546	3804462	64868428	101730269
24	1864359	1735056	613011	648948	1387610	608831	3258400	159581	25855221	3927108	51774999	3705815	4813590	3769671	64044075	100863800
25	1864359	1730145	612550	648426	1386718	608591	3256285	159410	25855221	3904682	51199436	3669519	4769010	3734613	63372578	100142680
26	1864359	1730145	612018	647823	1385688	608314	3253843	159213	25855221	3868211	50786576	3643780	4736987	3709721	62877064	99608056
27	1864359	1730075	611414	647140	1384520	608000	3251074	158990	25855221	3843554	50552626	3630159	4725500	3701031	62609316	99312589
28	1864359	1728818	610656	646282	1383054	607605	3247597	158710	25855221	3444035	50337245	3618245	4722183	3698522	62376195	98674935
29	1864359	1723651	609876	645399	1381546	607199	3244020	158422	25855221	3197744	50223025	3611894	4720006	3696875	62251800	98295217
2030	1864359	1719671	609321	644771	1380473	606910	3241475	158217	25855221	2762809	50203558	3610716	4718458	3695704	62228436	97830188
31	1864359	1719671	608931	644330	1379719	606707	3239687	158073	25855221	2743243	50189871	3609888	4717369	3694881	62212009	97792263
32	1864359	1719671	608541	643889	1378965	606504	3237899	157929	25855221	2741599	50174555	3608873	4716280	3694058	62193766	97770444
33	1864359	1719322	608305	643622	1378509	606381	3236817	157842	25855221	2741181	50137399	3605056	4715621	3693560	62151636	97726378
34	1864359	1714085	608009	643286	1377936	606227	3235458	157732	25855221	2724643	50072501	3598168	4714793	3692934	62078396	97629896
2035	1864359	1709197	607690	642925	1377320	606061	3233996	157614	25855221	2674038	50034070	3594362	4713903	3692261	62034596	97529021

TABLE 39

EQUIVALENT UNIT CANALSIDE CHARGES

(in dollars per acre-foot)

PROJECT SERVICE AREA & CONTRACTOR	TRANSPORTATION CHARGE				DELTA WATER CHARGE	TOTAL EQUIVALENT UNIT CHARGE
	Capital Cost Component	Minimum Operating Component	Variable Operating Component	TOTAL		
Feather River Area						
Uncontracted	0	0	0	0	6.20	6.20
North Bay Area						
Uncontracted	9.53	2.30	3.37	15.20	6.61	21.81
South Bay Area						
Alameda Co. FC & WCD, Zone 7	8.75	1.59	7.79	18.13	6.22	24.35
Alameda Co. Water District	9.50	1.46	7.44	18.40	5.50	23.90
Santa Clara Co. FC & WCD	14.51	1.41	7.75	23.67	5.52	29.19
Uncontracted	16.91	2.50	7.64	27.05	6.65	33.70
Composite, South Bay Area	12.88	1.55	7.68	22.11	5.73	27.84
San Joaquin Valley						
Uncontracted	5.73	1.26	4.19	11.18	6.41	17.59
Southern California						
Metropolitan Water District of Southern California	29.58	4.65	22.18	56.41	6.66	63.07
San Bernardino Valley MWD	30.99	5.46	28.28	64.73	6.64	71.37
Antelope Valley - East Kern WA	21.87	4.26	27.48	53.61	6.63	60.24
Uncontracted	18.57	3.26	28.26	50.10	6.51	56.61
Composite, Southern California	28.37	4.56	23.23	56.16	6.64	62.80
Central Coastal Area						
Uncontracted	49.39	19.68	15.70	84.77	6.78	91.55
COMPOSITE, ALL AREAS	16.30	2.93	12.44	31.67	6.48	38.15

Notes: (1) The equivalent transportation unit charge is herein defined as that rate, which when applied to each acre-foot of delivery during the project repayment period, will produce a sum at the end of the period equivalent to those total charges required under a water supply contract, with interest accounted for at the project interest rate.

(2) The equivalent Delta Water Charge is herein defined as that rate, which when applied to the total estimated annual deliveries during the project repayment period, will produce a sum at the end of the period equivalent to the application of:

(a) $3.50/acre-foot for the deliveries through 1969;

(b) $4.99/acre-foot for the deliveries for 1970 through 1977; and

(c) $6.78/acre-foot for the deliveries for 1978 through the remainder of the project repayment period.

(3) The Bureau Water Charges of the South Bay Aqueduct are not included.

TABLE 40

ANNUAL NET OPERATING REVENUES

(in dollars)

Calendar Year	CONSERVATION NET OPERATING REVENUES	TRANSPORTATION NET OPERATING REVENUES	DRAINAGE NET OPERATING REVENUES	TOTAL NET OPERATING REVENUES
1962	- 6,021	- 47,627		- 53,648
63	10,755	1,969,569		1,980,324
64	10,442	4,227,091		4,237,533
65	10,320	6,893,310		6,903,630
66	10,172	9,764,188		9,774,360
67	- 454,393	13,208,809		12,754,416
68	-1,708,530	18,707,298	1,412,417	18,411,185
69	12,324,474	24,708,383	1,739,478	38,772,335
1970	13,908,343	31,048,990	1,739,478	46,696,811
71	14,641,027	35,305,682	1,739,478	51,686,187
72	17,091,127	38,670,512	1,739,478	57,501,117
73	20,003,225	40,352,832	1,739,478	62,095,535
74	21,970,950	41,779,214	2,237,749	65,987,913
75	24,055,696	43,064,837	2,736,020	69,856,553
76	25,748,299	44,106,082	2,736,020	72,590,401
77	26,551,516	44,853,722	2,736,020	74,141,258
78	31,680,859	45,921,771	2,736,020	80,338,650
79	32,751,980	46,619,557	2,736,020	82,107,557
1980	33,660,385	47,378,011	2,757,200	83,795,596
81	34,532,105	47,523,109	2,757,200	84,812,414
82	35,173,389	47,667,003	2,757,200	85,597,592
83	36,073,181	47,747,551	2,757,200	86,577,932
84	36,562,017	47,939,370	2,757,200	87,258,587
85	37,135,796	48,092,397	2,757,200	87,985,393
86	38,122,982	48,225,768	2,781,965	89,130,715
87	38,791,522	48,276,776	2,781,965	89,850,263
88	39,496,228	48,328,357	2,781,965	90,606,550
89	40,136,652	48,379,263	2,781,965	91,297,880
1990	41,305,189	48,432,091	2,781,965	92,519,245
91	42,084,651	48,488,830	2,781,965	93,355,446
92	42,115,159	48,492,269	2,781,965	93,389,393
93	42,155,158	48,492,269	2,781,965	93,429,392
94	42,175,497	48,492,269	2,781,965	93,449,731
95	42,191,768	48,492,269	2,781,965	93,466,002
96	42,218,886	48,492,269	2,781,965	93,493,120
97	42,252,783	48,492,269	2,781,965	93,527,017
98	42,259,563	48,492,269	2,781,965	93,533,797
99	42,273,122	48,492,269	2,781,965	93,547,356
2000	42,286,681	48,492,269	2,781,965	93,560,915
01	42,286,681	48,492,269	2,781,965	93,560,915
02	42,286,681	48,492,269	2,781,965	93,560,915
03	42,286,681	48,492,269	2,781,965	93,560,915
04	42,286,681	48,492,269	2,781,965	93,560,915
05	42,286,681	48,492,269	2,781,965	93,560,915
06	42,286,681	48,492,269	2,781,965	93,560,915
07	42,286,681	48,492,269	2,781,965	93,560,915
08	42,286,681	48,492,269	2,781,965	93,560,915
09	42,286,681	48,492,269	2,781,965	93,560,915
2010	42,286,681	48,492,269	2,781,965	93,560,915
11	42,286,681	48,492,269	2,781,965	93,560,915
12	42,286,681	48,492,269	2,781,965	93,560,915
13	42,286,681	46,507,394	2,781,965	91,576,040
14	42,286,681	44,263,700	2,781,965	89,332,346
15	42,286,681	41,597,239	2,781,965	86,665,885
16	42,286,681	38,726,003	2,781,965	83,794,649
17	42,286,681	35,281,339	2,781,965	80,349,985
18	42,286,681	30,800,589	1,369,547	74,456,817
19	42,286,681	25,170,504	1,042,487	68,499,672
2020	42,286,681	19,210,097	1,042,487	62,539,265
21	42,286,681	15,323,613	1,042,487	58,652,781
22	42,286,681	13,752,650	1,042,487	57,081,818
23	42,286,681	12,733,959	1,042,487	56,063,127
24	42,286,681	11,867,490	544,216	54,698,387
25	42,286,681	11,146,370	45,945	53,478,996
26	42,286,681	10,611,746	45,945	52,944,372
27	42,286,681	10,316,279	45,945	52,648,905
28	42,286,681	9,678,625	45,945	52,011,251
29	42,286,681	9,298,907	45,945	51,631,533
2030	42,286,681	8,833,878	24,765	51,145,324
31	42,286,681	8,795,953	24,765	51,107,399
32	42,286,681	8,774,134	24,765	51,085,580
33	42,286,681	8,730,068	24,765	51,041,514
34	42,286,681	8,633,584	24,765	50,945,030
2035	42,286,681	8,532,711	24,765	50,844,157
TOTALS	2,551,636,790	2,524,557,227	139,098,249	5,215,292,266

TABLE 41

COMPARATIVE RESULTS OF FINANCING METHODS

(in millions of dollars)

Item	Original Financing Program	Modified Financing Program	Difference Due to Modified Financing Program
Borrowing from General Fund	75*	None	- 75
Balance of authorized but unissued general obligation bonds -			
Available if needed for completion of initial State Water Facilities	33	234	+201
Available for State Water Facilities plus additional facilities	192	413	+221
Balance of revenues available for additional facilities after replayment of California Water Fund	1,093	1,063	- 30
Total bond issues -			
General obligation bonds	1,558	1,337	-221
Revenue bonds	None	327	+327
Maximum annual issue -			
General obligation bonds	170	140	- 30
Revenue bonds	None	85	+ 85

* Occurs during the period 1963-70.

TABLE 42

MODIFIED FINANCING PROGRAM

(in thousands of dollars)

Calendar year	State construction expenditures (a)	Financing			General obligation bond service (d)	Applicable to general obligation bond service		Remainder of net revenues	
		California Water Fund (b)	Revenue bond proceeds (c)	General obligation bond issues		Net revenues	Federal reimbursement (Oroville) (e)	Paid into California Water Fund	Balance (f)
Through 1960	100,769								
1961	6,052	6,052	0	0	0	0	0	0	0
1962	59,292	59,292	0	0	0	0(g)	0	0	0
1963	139,681	65,441	0	125,000	5,000(g)	5,000(g)	0	0	0
1964	189,362	9,000	62,749	125,000	10,000	5,571	4,429	0	0
1965	205,141	9,000	68,362	135,000	15,400	8,339	7,061	0	0
1966	243,567	9,000	71,975	135,000	20,800	11,496	9,304	0	0
1967	221,179	9,000	64,222	140,000	26,400	16,934	9,466	0	0
1968	174,962	9,000	0	140,000	32,000	22,865	9,135	0	0
1969	152,730	9,000	0	140,000	37,600	29,219	8,381	0	0
1970	105,114	9,000	0	95,987	41,439	35,192	6,247	0	0
10 years 1961-1970	1,497,080	193,785	267,308	1,035,987	188,639	134,616	54,023	0	0
1971	50,937	9,000	0	41,937	43,117	39,080	4,037	0	0
1972	35,419	9,000	0	26,419	45,426	44,070	1,356	0	0
1973	43,477	9,000	0	34,477	48,057	46,779	1,278	0	0
1974	42,851	9,000	0	33,851	50,764	49,576	1,188	0	0
1975	26,990	9,000	0	17,990	52,835	52,049	786	0	0
1976	21,642	9,000	0	12,642	54,744	53,784	960	0	0
1977	18,217	10,409	0	7,808	56,458	55,495	2,372	1,409	0
1978	24,736	12,144	0	12,592	58,364	61,508	0	3,144	0
1979	18,002	12,783	0	5,219	59,535	63,318	0	3,783	0
1980	23,978	13,352	0	10,626	60,380	64,732	0	4,352	0
10 years 1971-1980	306,249	102,688	0	203,561	529,680	530,391	11,977	12,688	0
1981	44,246	12,848	0	31,398	61,900	65,748	0	3,848	0
1982	49,455	11,748	0	37,707	63,754	66,502	0	2,748	0
1983	38,687	11,350	0	27,337	65,187	67,537	0	2,350	0
1984	12,820	11,790	0	1,030	65,408	68,198	0	2,790	0
1985	3,774	3,774	0	0	65,535	68,928	0	3,393	0
1986	0	0	0	0	65,613	70,020	0	4,407	0
1987	0	0	0	0	65,739	70,740	0	5,001	0
1988	0	0	0	0	65,791	71,496	0	5,705	0
1989	0	0	0	0	65,898	72,188	0	6,290	0
1990	0	0	0	0	66,212	73,411	0	7,199	0
10 years 1981-1990	148,982	51,510	0	97,472	651,037	694,768	0	43,731	0
10 years 1991-2000	0	0	0	0	668,448	743,383	0	74,935	0
10 years 2001-2010	0	0	0	0	668,742	875,112	0	206,370	0
10 years 2011-2020	0	0	0	0	432,861	802,742	0	10,259	359,622
10 years 2021-2030	0	0	0	0	78,987	536,587	0	0	457,600
5 years 2031-2035	0	0	0	0	4,775	250,629	0	0	245,854
75 years 1961-2035	1,952,311	347,983	267,308	1,337,020	3,223,169	4,568,228	66,000	347,983	1,063,076
Through 1960	100,769								
Total	2,053,080								

Notes: (a) Construction expenditures as shown treat expenditures from California Water Fund under prior appropriations as having been expended prior to 1961. Construction expenditures include $66,000,000 on account of Oroville flood control.

(b) Includes net revenues paid into California Water Fund during 1977 through 1985, inclusive, and applied therefrom to State construction expenditures.

(c) See Table 44 for information regarding the revenue bonds, including the annual amounts of revenue bond service and net revenues applicable thereto.

(d) See Table 43.

(e) Federal reimbursement moneys held in reserve and used for general obligation bond service.

(f) The balances of net revenues as shown above reflect principally the accumulation, in the rate formulas, of interest on construction expenditures through 1960 and from the California Water Fund thereafter.

(g) Net revenues for 1962 and 1963 combined exceed 1963 general obligation bond service. For the purpose of this table, amounts of general obligation bond service are calculated on an annual basis although the amount for 1963 will in actuality be less, by reason of the issuance of bonds after midyear in 1963.

TABLE 43

PROJECTION OF SERVICE ON GENERAL OBLIGATION BONDS

(in thousands of dollars)

Calendar Year	Bond Issues*	Bonds Outstanding Beginning of Year	Bond Service**		
			Interest	Bond Retirements	Total
1963	125,000	125,000	5,000	0	5,000
64	125,000	250,000	10,000	0	10,000
65	135,000	385,000	15,400	0	15,400
66	135,000	520,000	20,800	0	20,800
67	140,000	660,000	26,400	0	26,400
68	140,000	800,000	32,000	0	32,000
69	140,000	940,000	37,600	0	37,600
1970	95,987	1,035,987	41,439	0	41,439
71	41,937	1,077,924	43,117	0	43,117
72	26,419	1,104,343	44,173	1,253	45,426
73	34,477	1,137,567	45,500	2,557	48,057
74	33,851	1,168,861	46,751	4,013	50,764
75	17,990	1,182,838	47,308	5,527	52,835
76	12,642	1,189,953	47,594	7,150	54,744
77	7,808	1,190,611	47,618	8,840	56,458
78	12,592	1,194,363	47,767	10,597	58,364
79	5,219	1,188,985	47,553	11,982	59,535
1980	10,626	1,187,629	47,499	12,881	60,380
81	31,398	1,206,146	48,239	13,661	61,900
82	37,707	1,230,192	49,199	14,555	63,754
83	27,337	1,242,974	49,715	15,472	65,187
84	1,030	1,228,532	49,136	16,272	65,408
85	0	1,212,260	48,486	17,049	65,535
86	0	1,195,211	47,800	17,813	65,613
87	0	1,177,398	47,088	18,651	65,739
88	0	1,158,747	46,340	19,451	65,791
89	0	1,139,296	45,572	20,326	65,898
1990	0	1,118,970	44,756	21,456	66,212
91	0	1,097,514	43,893	22,696	66,589
92	0	1,074,818	42,982	23,881	66,863
93	0	1,050,937	42,039	24,835	66,874
94	0	1,026,102	41,040	25,834	66,874
95	0	1,000,268	40,009	26,865	66,874
96	0	973,403	38,931	27,943	66,874
97	0	945,460	37,820	29,055	66,875
98	0	916,405	36,660	30,215	66,875
99	0	886,190	35,452	31,423	66,875
2000	0	854,767	34,200	32,675	66,875
01	0	822,092	32,894	33,981	66,875
02	0	788,111	31,531	35,344	66,875
03	0	752,767	30,119	36,755	66,874
04	0	716,012	28,649	38,225	66,874
05	0	677,787	27,120	39,754	66,874
06	0	638,033	25,539	41,335	66,874
07	0	596,698	23,878	42,996	66,874
08	0	553,702	22,168	44,706	66,874
09	0	508,996	20,378	46,496	66,874
2010	0	462,500	18,518	48,356	66,874
11	0	414,144	16,584	50,290	66,874
12	0	363,854	14,573	52,301	66,874
13	0	311,553	12,485	48,136	60,621
14	0	263,417	10,553	43,816	54,369
15	0	219,601	8,801	38,816	47,617
16	0	180,785	7,249	33,616	40,865
17	0	147,169	5,902	27,961	33,863
18	0	119,208	4,785	22,076	26,861
19	0	97,132	3,897	15,962	19,859
2020	0	81,170	3,265	11,793	15,058
21	0	69,377	2,787	10,172	12,959
22	0	59,205	2,377	9,261	11,638
23	0	49,944	2,010	7,904	9,914
24	0	42,040	1,695	6,526	8,221
25	0	35,514	1,429	5,892	7,321
26	0	29,622	1,193	5,496	6,689
27	0	24,126	975	5,322	6,297
28	0	18,804	756	4,911	5,667
29	0	13,893	561	4,845	5,406
2030	0	9,048	365	4,510	4,875
31	0	4,538	180	3,124	3,304
32	0	1,414	56	1,363	1,419
33	0	51	1	51	52
34	0	0	0	0	0
2035	0	0	0	0	0
Total	1,237,020		1,886,149	1,337,020	3,223,169

* Bonds are assumed to be issued at the beginning of the respective years. In practice the annual amounts will doubtless vary from those assumed herein and may be issued in more than one installment.

** Amounts of bond service as shown herein have been rounded upward slightly to conform with Table 42.

TABLE 44

PROJECTION OF NET REVENUES FOR, AND SERVICE ON, REVENUE BONDS

(in thousands of dollars)

Calendar Year	Net revenues from Oroville power			Adjusted net revenues from firm power (a)	Bonds outstanding beginning of year (b)	Interest	Bond retirements				Total bond service (e)
	Firm (unadjusted)	Secondary	Total (unadjusted)				Fixed (c)	Additional from firm power revenues	Additional from bond reserve fund interest (d)	Additional from secondary power revenues	
1969	11,910	813	12,723	16,292	327,000	13,898	2,416	0	325	813	17,452
1970	12,820	813	13,633	16,292	323,446	13,746	2,519	27	347	813	17,452
1971	13,476	813	14,289	16,292	319,740	13,589	2,626	77	347	813	17,452
1972	13,460	813	14,273	16,292	315,877	13,425	2,737	130	347	813	17,452
1973	13,953	2,325	16,278	16,292	311,850	13,254	2,854	184	347	2,325	18,964
1974	15,453	1,851	17,304	16,292	306,140	13,011	2,975	306	347	1,851	18,490
1975	16,953	1,377	18,330	16,292	300,661	12,778	3,101	413	347	1,377	18,016
1976	17,717	1,464	19,181	16,292	295,423	12,555	3,233	504	347	1,464	18,103
1977	17,717	1,464	19,181	16,292	289,875	12,320	3,371	601	347	1,464	18,103
1978	17,717	1,464	19,181	16,292	284,092	12,074	3,514	704	347	1,464	18,103
1979	17,717	1,464	19,181	16,292	278,063	11,818	3,663	811	347	1,464	18,103
1980	17,673	1,464	19,137	16,292	271,778	11,551	3,819	922	347	1,464	18,103
1981	17,673	1,464	19,137	16,292	265,226	11,272	3,981	1,039	347	1,464	18,103
1982	17,673	1,464	19,137	16,292	258,395	10,982	4,150	1,160	347	1,464	18,103
1983	17,673	1,464	19,137	16,292	251,274	10,679	4,327	1,286	347	1,464	18,103
1984	17,673	1,464	19,137	16,292	243,850	10,364	4,511	1,417	347	1,464	18,103
1985	17,673	1,464	19,137	16,292	236,111	10,035	4,702	1,555	347	1,464	18,103
1986	17,673	1,464	19,137	16,292	228,043	9,692	4,902	1,698	237	1,464	18,103
1987	17,673	1,464	19,137	16,292	219,632	9,334	5,111	1,847	347	1,464	18,103
1988	17,673	1,464	19,137	16,292	210,863	8,962	5,328	2,002	347	1,464	18,103
1989	17,673	1,464	19,137	16,292	201,722	8,573	5,554	2,165	347	1,464	18,103
1990	17,673	1,464	19,137	16,292	192,192	8,168	5,790	2,334	347	1,464	18,103
1991	17,673	1,464	19,137	16,292	182,257	7,746	6,036	2,510	347	1,464	18,103
1992	17,673	1,464	19,137	16,292	171,900	7,306	6,293	2,693	347	1,464	18,103
1993	17,673	1,464	19,137	16,292	161,103	6,847	6,560	2,885	347	1,464	18,103
1994	17,673	1,464	19,137	16,292	149,847	6,368	6,839	3,085	347	1,464	18,103
1995	17,673	1,464	19,137	16,292	138,112	5,870	7,130	3,292	347	1,464	18,103
1996	17,673	1,464	19,137	16,292	125,879	5,350	7,433	3,509	347	1,464	18,103
1997	17,673	1,464	19,137	16,292	113,126	4,808	7,749	3,735	347	1,464	18,103
1998	17,673	1,464	19,137	16,292	99,831	4,243	8,078	3,971	347	1,464	18,103
1999	17,673	1,464	19,137	16,292	85,971	3,654	8,422	4,216	347	1,464	18,103
2000	17,673	1,464	19,137	16,292	71,522	3,040	8,779	4,473	347	1,464	18,103
2001	17,673	1,464	19,137	16,292	56,459	2,400	9,153	4,739	347	1,464	18,103
2002	17,673	1,464	19,137	16,292	40,756	1,732	9,542	5,018	347	1,464	18,103
2003	17,673	1,464	19,137	16,292	24,385	1,036	9,947	193	14,245	0	25,421
2004	17,673	1,464	19,137	16,292	0	0	10,370	0	0	0	0
2005	17,673	1,464	19,137	16,292	0	0	10,811	0	0	0	0
2006	17,673	1,464	19,137	16,292	0	0	11,270	0	0	0	0
2007	17,673	1,464	19,137	16,292	0	0	11,749	0	0	0	0
2008	17,673	1,464	19,137	16,292	0	0	12,249	0	0	0	0
2009	17,673	1,464	19,137	16,292	0	0	12,769	0	0	0	0
2010	17,673	1,464	19,137	16,292	0	0	13,312	0	0	0	0
2011	17,673	1,464	19,137	16,292	0	0	13,878	0	0	0	0
2012	17,673	1,464	19,137	16,292	0	0	14,467	0	0	0	0
2013	17,673	1,464	19,137	16,292	0	0	28,980	0	0	0	0
Totals	769,775	64,437	834,212	733,140		312,480	327,000	65,501	26,021	48,333	639,480

Notes: (a) Adjusted net revenues from firm power are taken at level annual amounts under power contract which, discounted to present worth, are equivalent to the amounts shown in the first column, similarly discounted.
For this purpose, a rate of 6% is taken as representative of the approximate over-all cost of money for a private utility.

(b) Bond issues sold, and proceeds applied, as follows:

(in thousands of dollars)

	1964	1965	1966	1967	Total
Amount of issue	85,000	85,000	85,000	72,000	327,000
Deduct:					
Interest to 1969	18,063	14,450	10,837	6,210	49,470
Bond reserve fund (interest for an additional year)	3,613	3,613	3,613	3,060	13,899
Preliminary expenses and obligations	2,750	750	750	750	5,000
	24,426	18,813	15,200	9,930	68,369
Balance	60,574	66,187	69,800	62,070	258,631
Add: estimated interest earned on bond proceeds	2,175	2,175	2,175	2,152	8,677
Net proceeds for construction	62,749	68,362	71,975	64,222	267,308

Bonds are assumed to be issued at the beginning of the respective years and estimated interest earned on bond proceeds is based on assumption that other applicable construction monies are expended prior to such proceeds.

(c) Fixed bond retirements are calculated to produce level annual bond service to maturity, excluding final retirements out of the bond reserve fund and excluding the effect of additional bond retirements. On account of additional bond retirements as shown above, all of the bonds would be retired in the year 2003, with total fixed retirements through that year aggregating $187,145,000.

(d) Additional bond retirements from bond reserve fund interest are taken at 2-1/2 percent of the amount of said fund, except that for 1969 a minor portion of said interest is deemed to be applied toward fixed retirements, and for the year 2003 the amount of additional bond retirements reflects the application of said fund thereto.

(e) Total bond service as shown for the years through 2002 equals the sum of adjusted net revenues from firm power of $16,292,000 plus bond reserve fund interest of $347,000 and net revenues from secondary power. The calculation does not reflect premiums which would be applicable to bond retirements by redemption or discounts which would be applicable to bond retirements by purchase at less than the principal amount.

TABLE 45

FINANCIAL ANALYSIS BY SEGMENTS

Remainder or Deficit (-) of Net Revenues After General Obligation Bond Service

(in thousands of dollars)

Calendar Year	If Financed Solely by General Obligation Bonds						Adjustments		Net Total Under Original Financing Program	Remainder of Net Revenues				
										Under Original Financing Program (c)			Under Modified Financing Program (e)	
	Conservation	Oroville Power	Transportation	San Joaquin Drain	Non-utility (a)	Total	California Water Fund	Advance Bond Sales		Paid into or Advanced from (-) General Fund (b)	Paid into California Water Fund	Balance (d)	Paid into California Water Fund	Balance
1961	- 50	- 92	- 76	- 3	- 21	- 242	242	0	0	0	0	0	0	0
1962	- 539	- 709	- 20	- 5	- 126	- 1,399	2,426	0	0(f)	0	0	0	0	0
1963	- 1,835	- 1,961	- 190	- 6	- 373	- 4,365	5,231	- 3,957	- 1,200(f)	- 1,200	0	0	0	0
1964	- 3,792	- 3,573	- 881	- 10	- 656	- 8,912	5,591	- 4,107	- 7,428	- 7,428	0	0	0	0
1965	- 5,938	- 5,256	- 1,697	- 10	- 989	- 13,890	5,951	- 3,521	- 11,460	- 11,460	0	0	0	0
1966	- 8,107	- 7,167	- 2,756	- 572	- 1,395	- 19,997	6,311	- 1,416	- 15,102	- 15,102	0	0	0	0
1967	- 9,335	- 9,208	- 3,024	- 428	- 1,813	- 23,808	6,671	- 51	- 17,188	- 17,188	0	0	0	0
1968	- 10,764	- 10,087	- 2,397	160	- 2,264	- 25,352	7,031	0	- 18,321	- 18,321	0	0	0	0
1969	- 11,108	3,924	- 1,474	324	- 2,760	- 11,094	7,391	0	- 3,703	- 3,703	0	0	0	0
1970	- 10,608	4,810	258	324	- 3,259	- 8,475	7,812	0	- 663	- 663	0	0	0	0
10 years 1961-1970	- 62,076	- 29,319	- 12,257	- 226	- 13,656	-117,534	54,657	- 13,052	- 75,065	- 75,065	0	0	0	0
1971	- 10,691	5,311	2,329	324	- 3,789	- 6,516	8,719	0	2,203	2,203	0	0	0	0
1972	- 8,581	4,982	3,366	323	- 4,312	- 4,222	9,781	- 991	4,568	4,568	0	0	0	0
1973	- 8,243	6,583	3,348	143	- 4,833	- 3,002	10,231	- 1,029	6,200	6,200	0	0	0	0
1974	- 7,958	7,188	3,158	214	- 5,436	- 2,834	10,681	- 882	6,965	6,965	0	0	0	0
1975	- 7,545	7,735	2,779	322	- 6,027	- 2,736	11,132	- 355	8,041	8,041	0	0	0	0
1976	- 7,173	8,256	2,205	181	- 6,620	- 3,151	11,582	- 13	8,418	8,418	0	0	0	0
1977	- 6,621	8,177	1,251	111	- 6,817	- 3,899	12,032	0	8,133	8,133	0	0	1,409	0
1978	- 1,699	8,177	- 19	111	- 6,977	- 407	12,482	0	12,075	12,075	0	0	3,144	0
1979	- 935	8,176	- 601	104	- 7,114	- 370	12,932	0	12,562	12,562	0	0	3,783	0
1980	- 891	8,132	- 571	114	- 7,253	- 469	13,382	0	12,913	12,913	0	0	4,352	0
10 years 1971-1980	- 60,337	72,717	17,245	1,947	- 59,178	- 27,606	112,954	- 3,270	82,078	82,078	0	0	12,688	0
1981	- 1,762	8,132	- 694	114	- 7,368	- 1,578	13,833	0	12,255	12,255	0	0	3,848	0
1982	- 3,071	8,132	- 825	7	- 7,481	- 3,238	14,283	0	11,045	11,045	0	0	2,748	0
1983	- 3,655	8,132	- 946	- 100	- 7,610	- 4,179	14,784	0	10,605	9,344	1,261	0	2,350	0
1984	- 3,605	8,132	- 996	- 100	- 7,732	- 4,301	15,387	0	11,086	0	11,086	0	2,790	0
1985	- 3,112	8,132	- 996	- 108	- 7,854	- 3,938	15,628	0	11,690	0	11,690	0	3,393	0
1986	- 2,140	8,132	- 1,049	- 96	- 7,875	- 3,028	15,718	0	12,690	0	12,690	0	4,407	0
1987	- 1,501	8,132	- 1,207	- 96	- 7,884	- 2,556	15,808	0	13,252	0	13,252	0	5,001	0
1988	- 863	8,132	- 1,262	- 101	- 7,887	- 1,981	15,899	0	13,918	0	13,918	0	5,705	0
1989	- 448	8,132	- 1,222	- 101	- 7,890	- 1,529	15,989	0	14,460	0	14,460	0	6,290	0
1990	285	8,132	- 1,176	- 101	- 7,890	- 750	16,079	0	15,329	0	15,329	0	7,199	0
10 years 1981-1990	- 19,872	81,320	- 10,373	- 682	- 77,471	- 27,078	153,408	0	126,330	32,644	93,686	0	43,731	0
10 years 1991-2000	2,788	81,320	- 12,113	-1,052	- 78,900	- 7,957	163,907	0	155,950	0	155,950	0	74,935	0
10 years 2001-2010	3,030	81,320	- 12,240	-1,070	- 78,900	- 7,860	164,377	0	156,517	0	79,003	77,514	206,370	0
10 years 2011-2020	80,346	148,385	40,444	647	- 61,829	207,993	96,103	16,322	320,418	0	0	320,418	10,259	359,622
10 years 2021-2030	145,553	191,370	79,737	288	- 10,373	406,575	42,692	0	449,267	0	0	449,267	0	457,600
5 years 2031-2035	107,873	95,685	38,028	17	0	241,603	4,155	0	245,758	0	0	245,758	0	245,854
75 years 1961-2035	197,305	722,798	128,471	- 131	-380,307	668,136	792,253	0	1,461,253	39,657	328,639	1,092,957	347,983	1,063,076

Notes: (a) Non-utility segment consists of Davis-Grunsky program and expenditures for recreation, fish and wildlife.

(b) Advances from General Fund during period 1963 through 1970 aggregate $75,065,000. Payments into General Fund consist of repayment of these advances plus simple interest thereon in the aggregate amount of $39,657,000.

(c) Remainder of net revenues under original financing program corresponds in the aggregate to the "Net Total Under Original Financing Program" shown in the last preceding column.

(d) The balances of net revenues reflect principally the accumulation, in the rate formulas, of interest on construction expenditures through 1960 and from the California Water Fund thereafter.

(e) See Table 42.

(f) The 1962 and 1963 amounts have been adjusted by an aggregate of $864,000 in order to preserve comparability with the net revenues for those years as explained in note (g) to Table 42.

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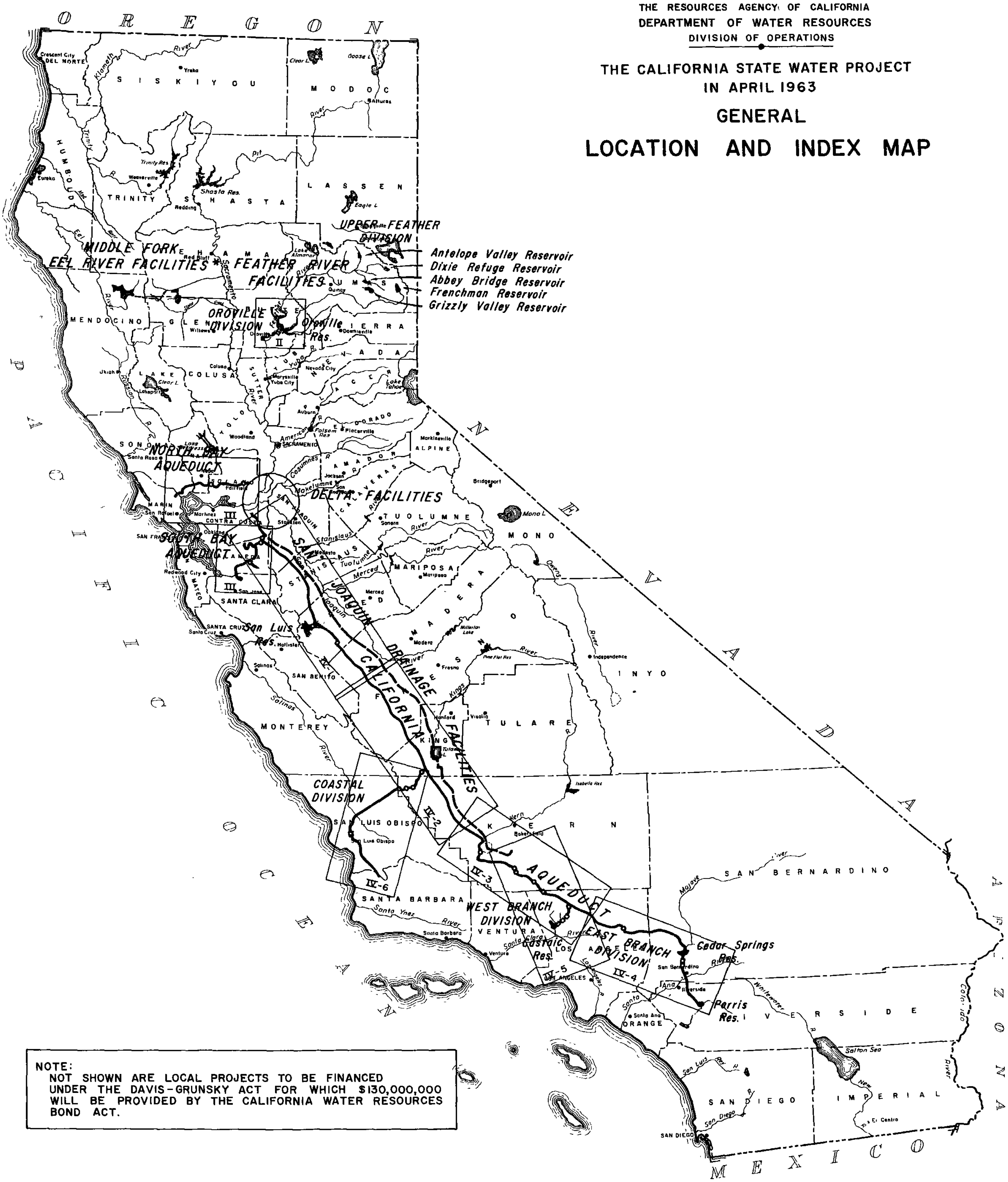
THE CALIFORNIA STATE WATER PROJECT IN APRIL 1963

GENERAL

LOCATION AND INDEX MAP



NOTE:
NOT SHOWN ARE LOCAL PROJECTS TO BE FINANCED UNDER THE DAVIS-GRUNSKY ACT FOR WHICH $130,000,000 WILL BE PROVIDED BY THE CALIFORNIA WATER RESOURCES BOND ACT.

* ESTIMATED ADDITIONAL CONSERVATION FACILITY REQUIRED FOR WATER SUPPLY

PLATE II

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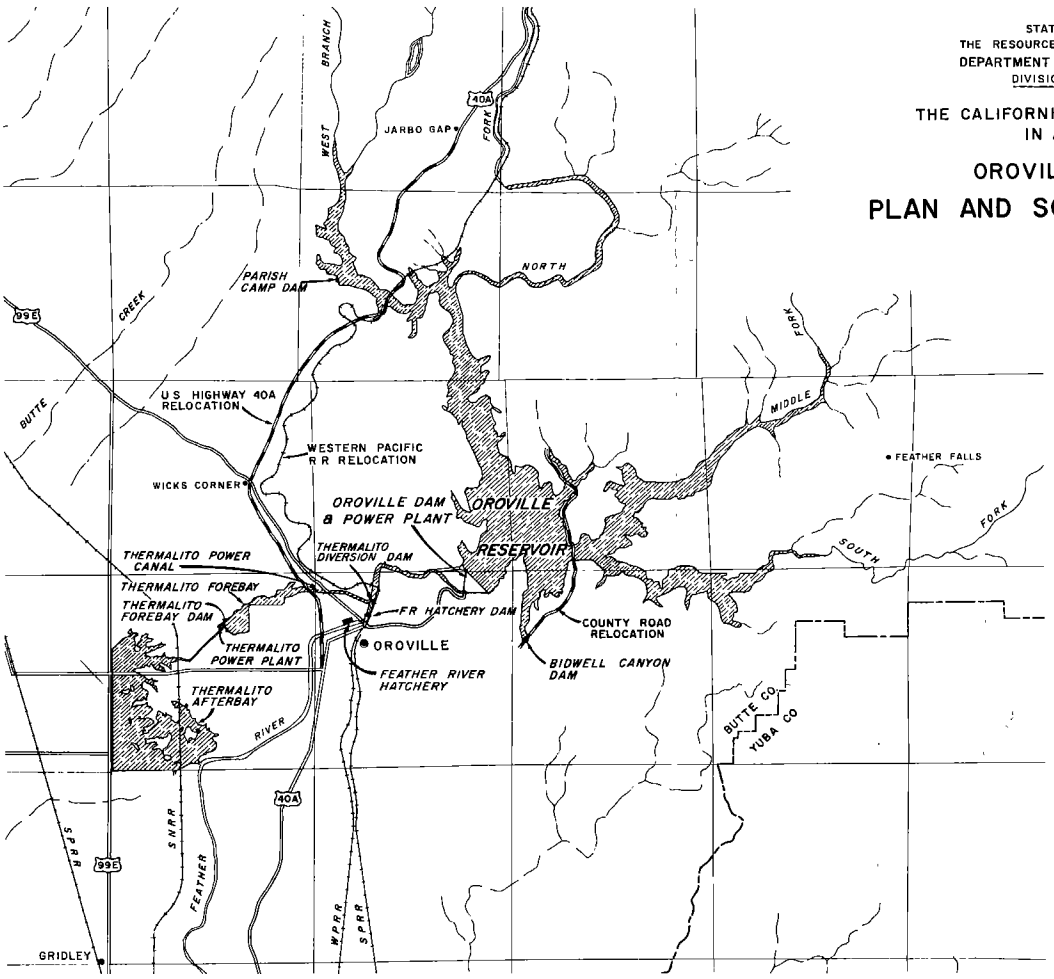
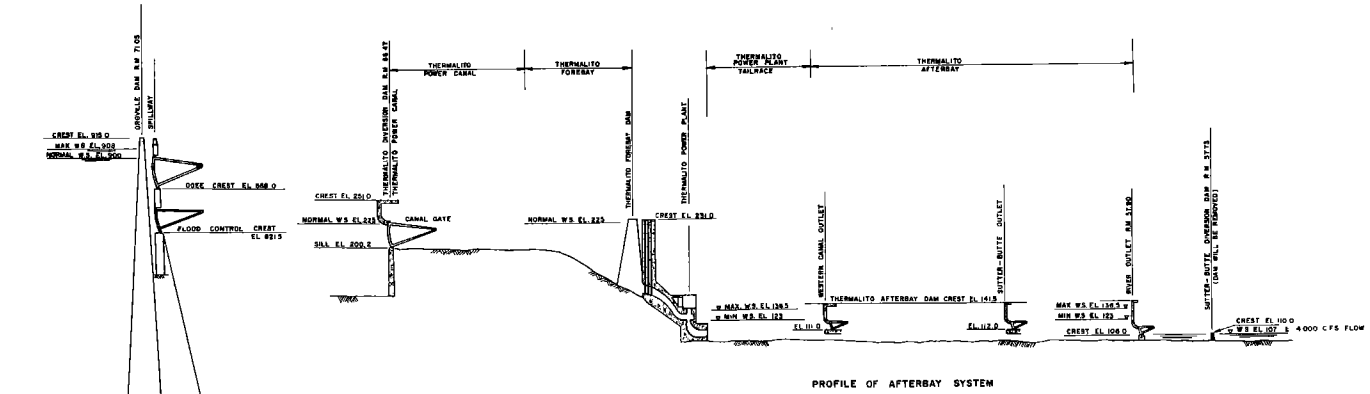
DIVISION OF OPERATIONS

THE CALIFORNIA STATE WATER PROJECT
IN APRIL 1963

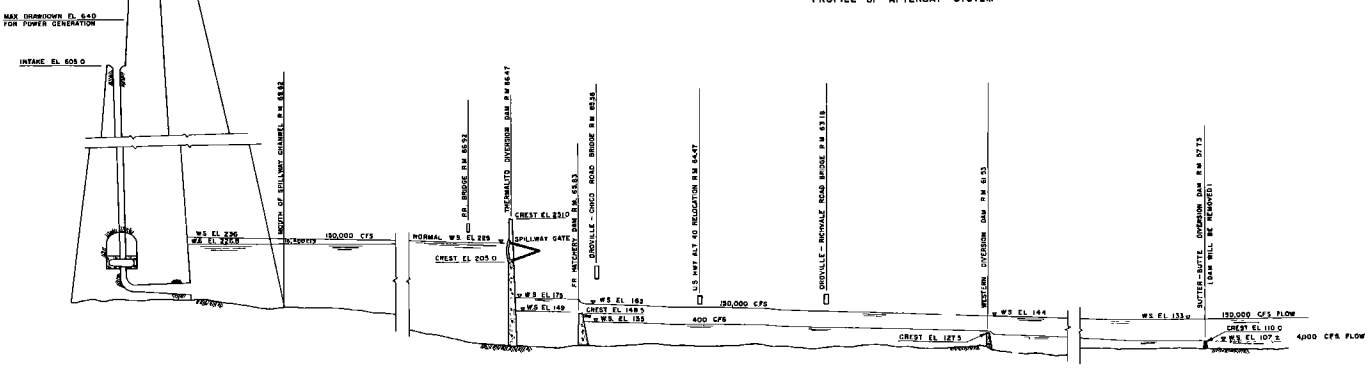
OROVILLE DIVISION
PLAN AND SCHEMATIC DIAGRAM



PLAN



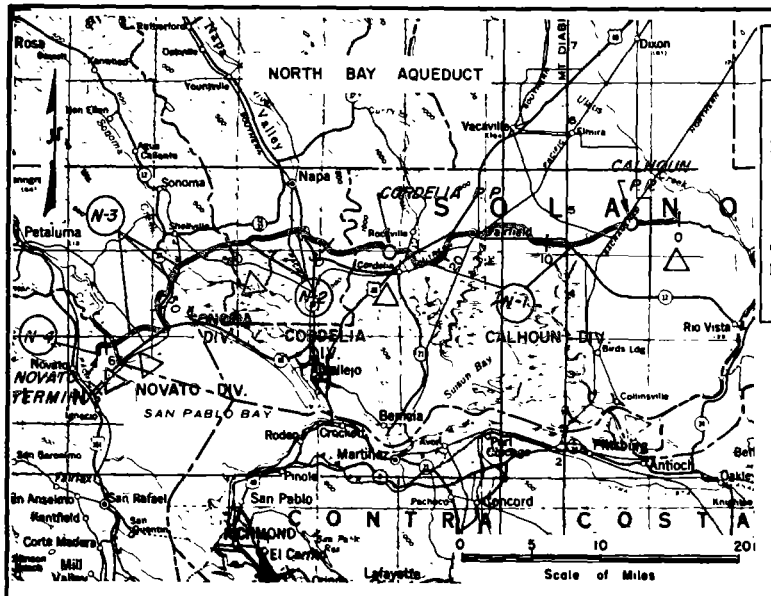
PROFILE OF AFTERBAY SYSTEM



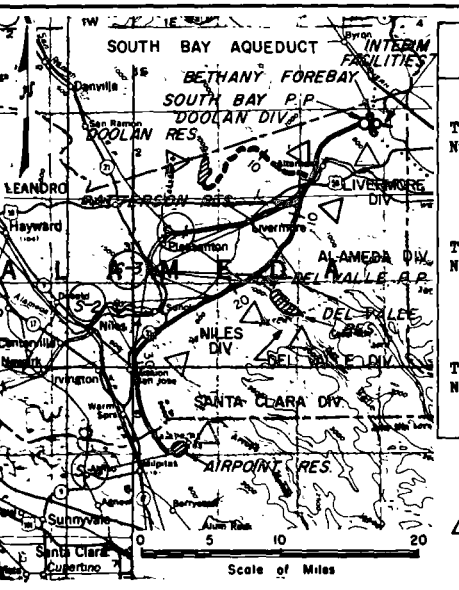
PROFILE OF RIVER CHANNEL

NOTE ELEVATIONS SHOWN REFER TO U.S.C.&G.S. DATUM 1929 ADJUSTMENT
RIVER MILE 00 IS AT MOUTH OF FEATHER RIVER

SCHEMATIC DIAGRAM

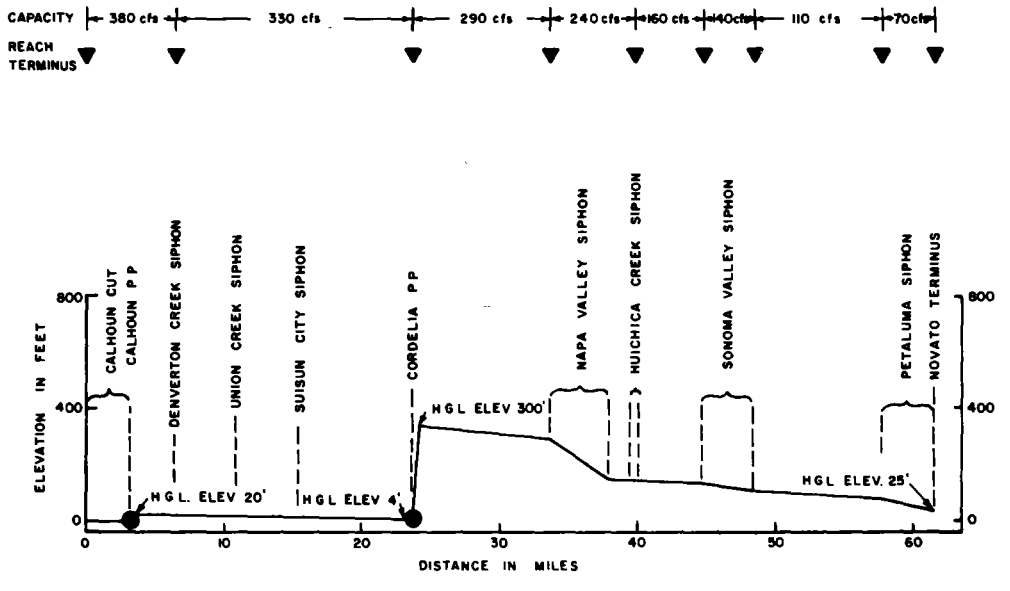


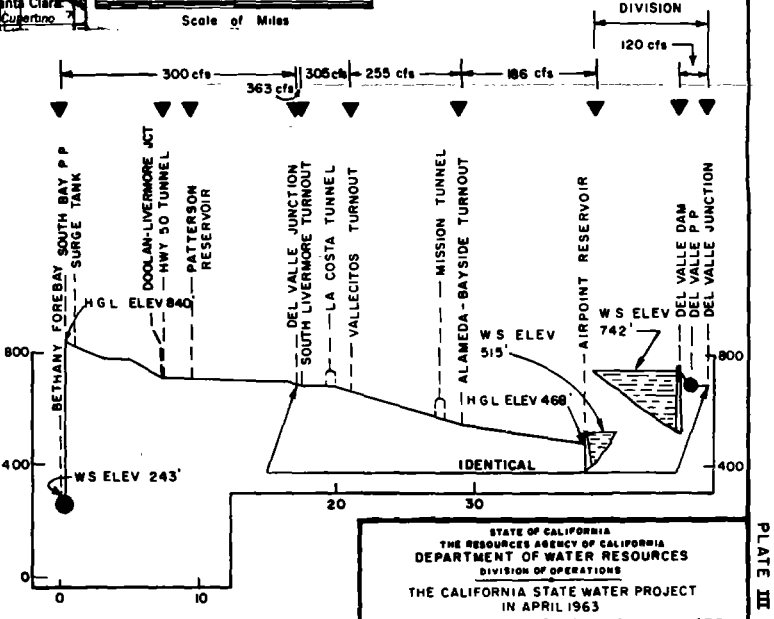
MAXIMUM ANNUAL WATER DELIVERIES IN ACRE-FEET		
	Uncontracted	
Turnout Number	N-1	N-2
	36,700	50,000
	Uncontracted	
Turnout Number	N-3	N-4
	28,000	35,300



MAXIMUM ANNUAL WATER DELIVERIES IN ACRE-FEET		
	Alameda Co. F.C. & W.C.D. Zone 7	
Turnout Number	S-1	
	40,000	
	Alameda Co. Water District	Uncontracted
Turnout Number	S-2	S-3
	42,000	50,000
	Santa Clara Co. F.C.& W.C.D.	
Turnout Number	S-4	
	88,000	

△ DIVISION TERMINUS





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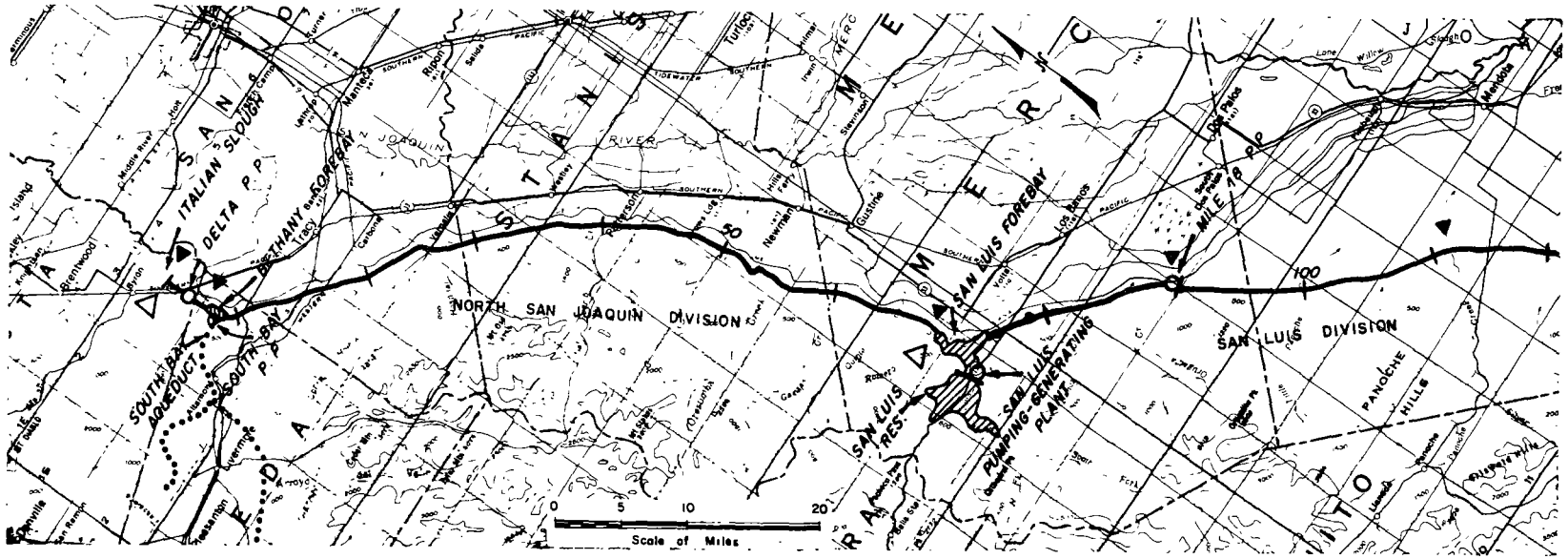
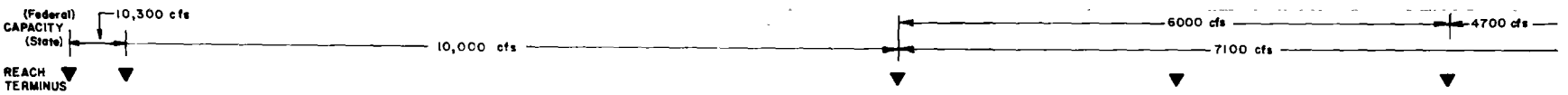
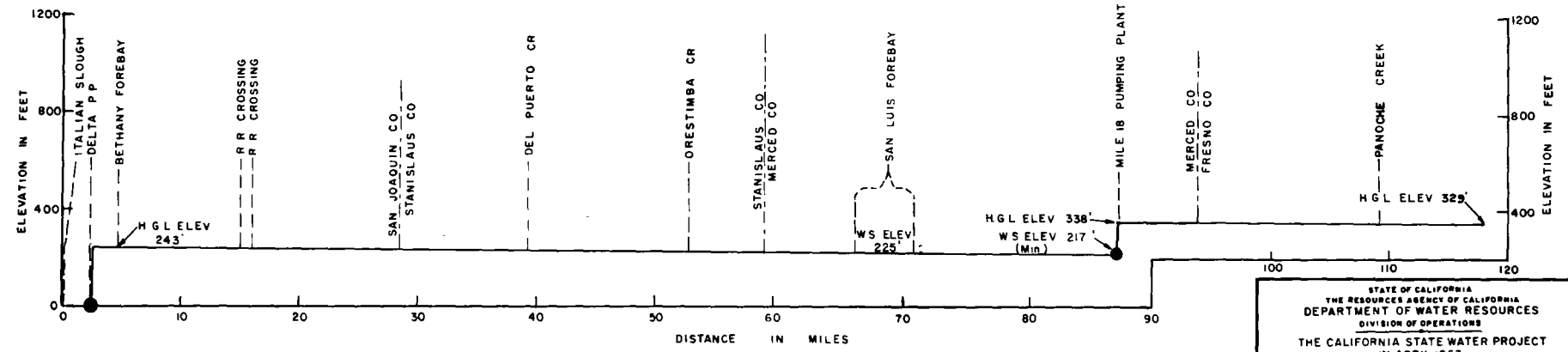
NORTH AND SOUTH BAY AQUEDUCTS
PLAN AND PROFILE

PLATE III







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THE CALIFORNIA STATE WATER PROJECT
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CALIFORNIA AQUEDUCT
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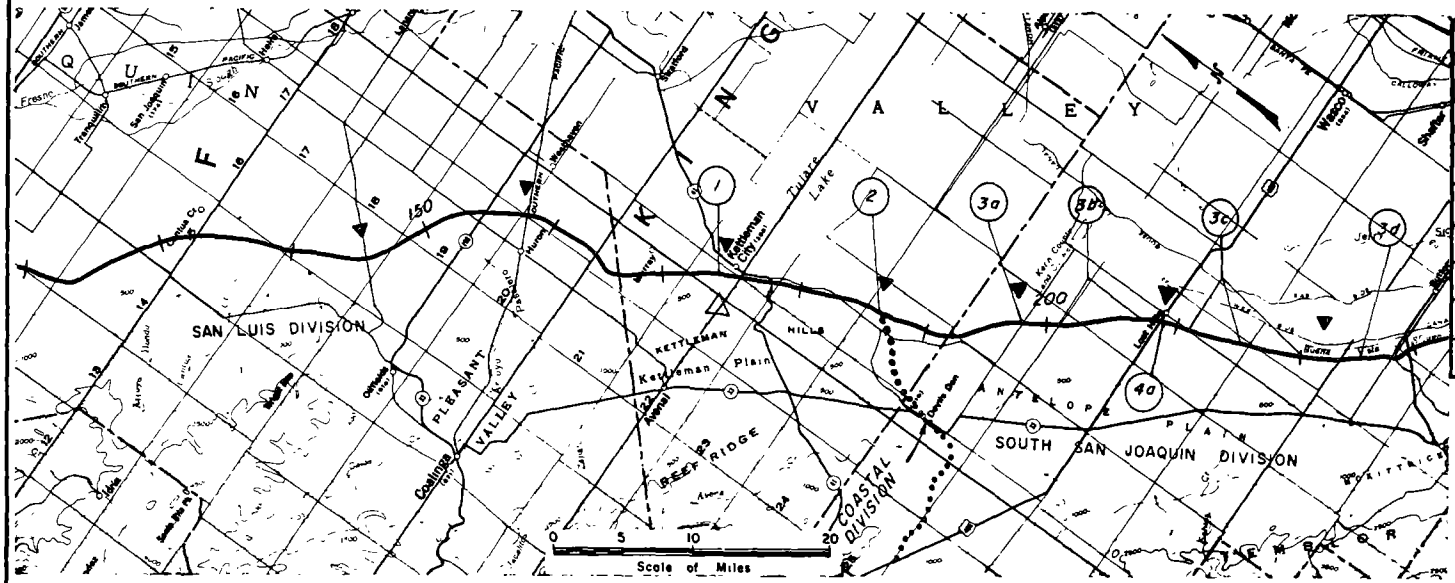
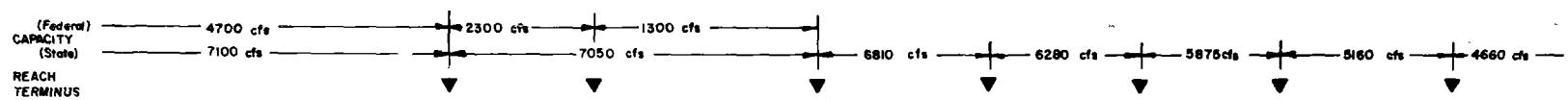
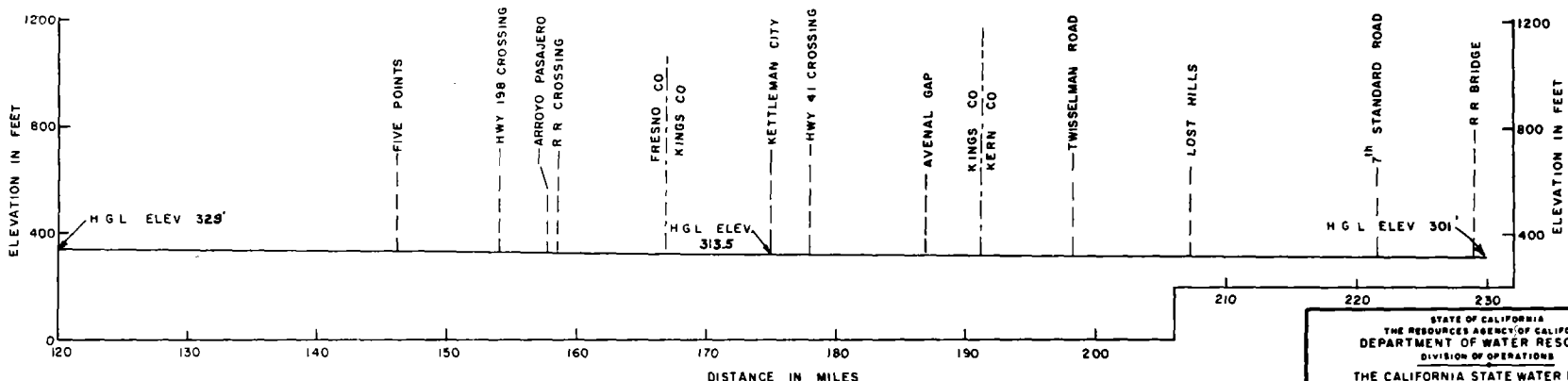
PLATE IX

SHEET 1 OF 6



ESTIMATED MAXIMUM ANNUAL WATER DELIVERIES		
Turnout Number	Contractor	Delivery Ac. ft./Yr.
1	Uncontracted	35,500
2	"	15,000
3a	"	137,400
3b	"	77,700
3c	"	168,100
3d	"	60,700
4a	"	159,600





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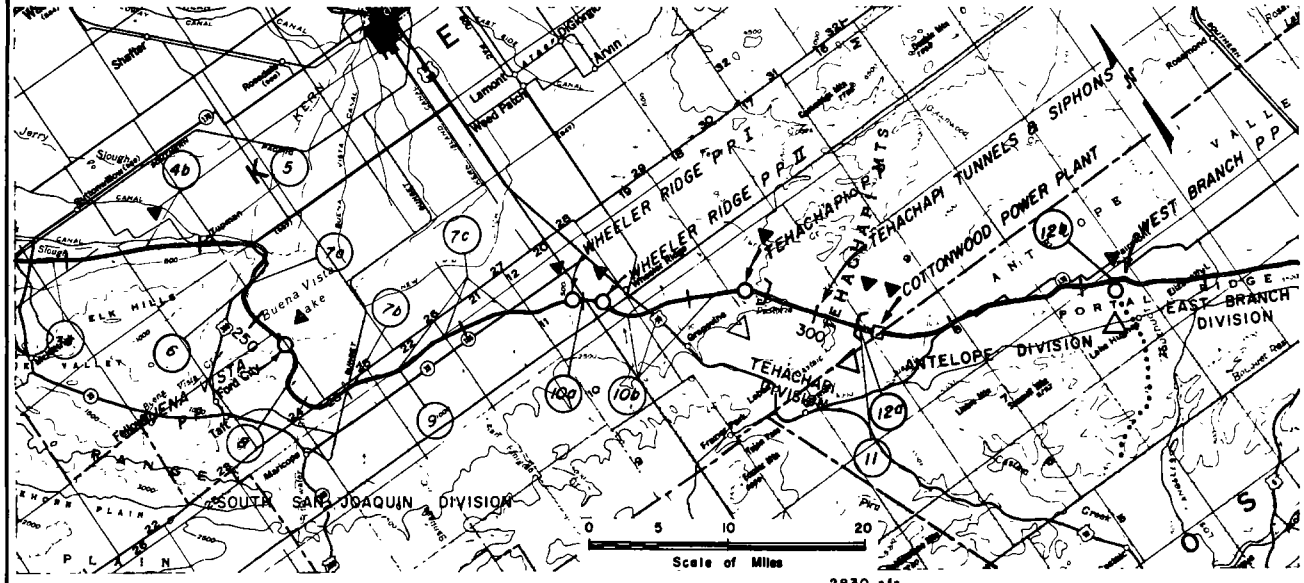
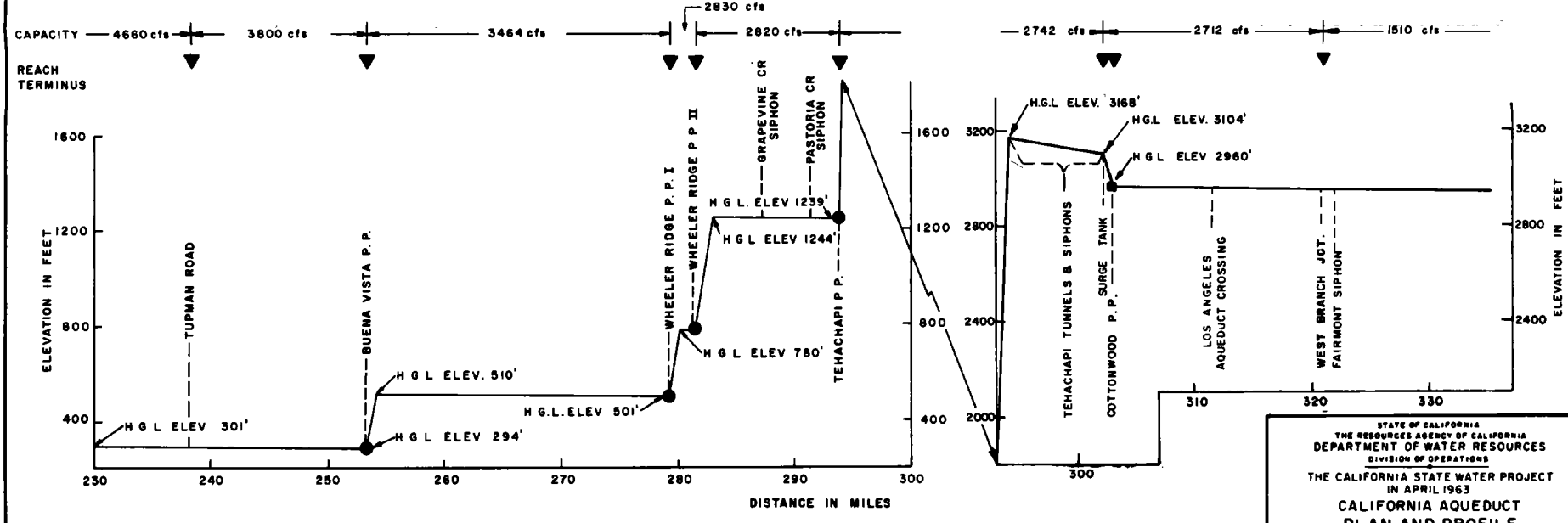


ESTIMATED MAXIMUM ANNUAL WATER DELIVERIES		
Turnout Number	Contractor	Delivery Ac. ft./Yr.
3e	Uncontracted	35,800
4b	"	195,200
5	"	136,000
6	"	20,000
7a	"	6,800
7b	"	47,700
7c	"	163,800
8	"	10,300
9	"	37,800
10a	"	3,700
10b	"	45,200
11	"	4,000
12a	Antelope Valley-East Kern W.A.	14,000
12b	"	11,000

△ DIVISION TERMINUS
▼ REACH TERMINUS



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THE CALIFORNIA STATE WATER PROJECT
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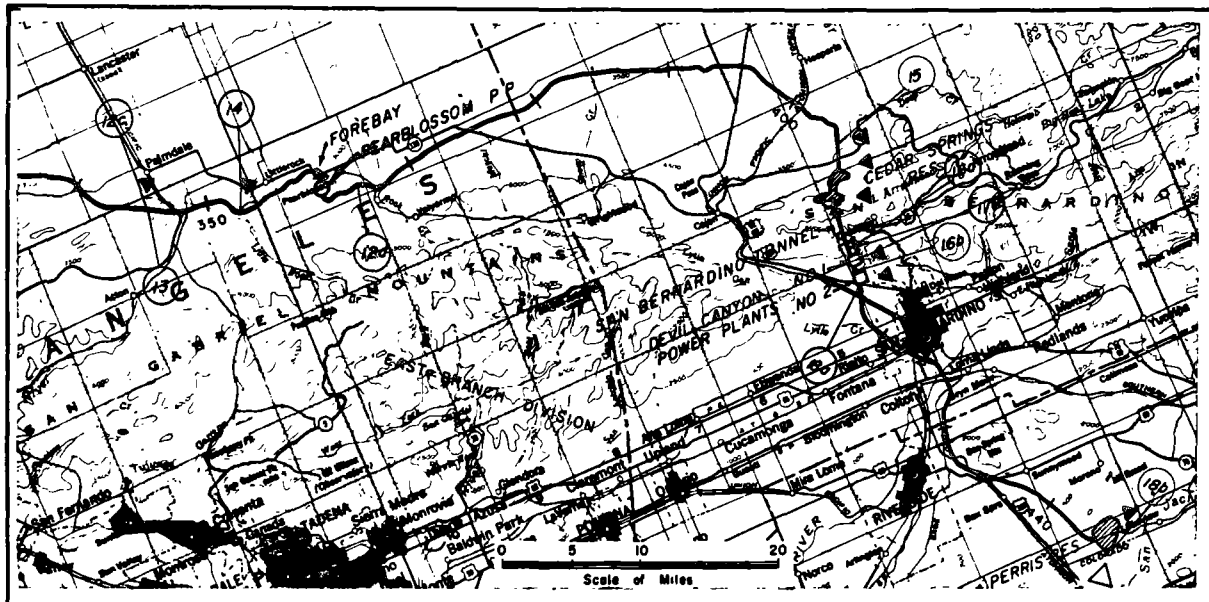
CALIFORNIA AQUEDUCT
PLAN AND PROFILE

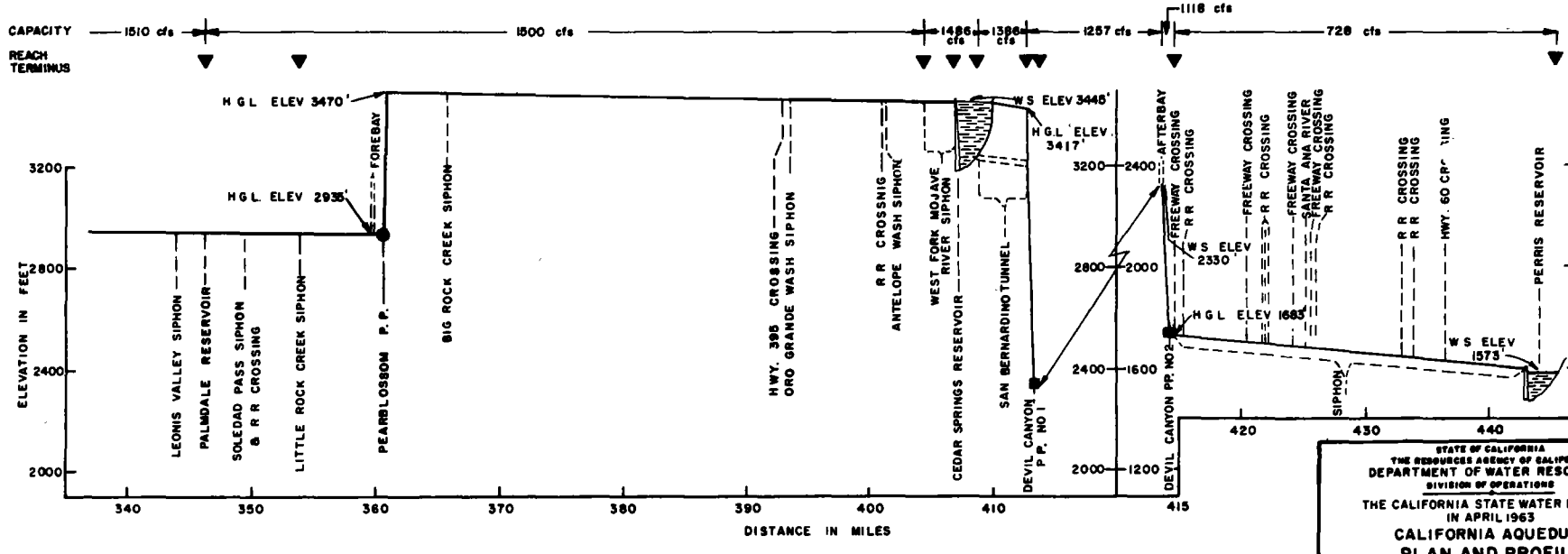
PLATE IV

SHEET 3 OF 6



ESTIMATED MAXIMUM ANNUAL WATER DELIVERIES		
Turnout Number	Contractor	Delivery Ac. ft./Yr.
12c	Antelope Valley - East Kern Water Agency	75,500
12d	"	19,500
13	Uncontracted	1,000
14	"	500
15	"	8,500
16a	San Bernardino Valley M.W.D.	13,500
16b	"	76,500
17	Uncontracted	57,000
18a	Metropolitan Water District of So. Calif.	240,000
18b	"	480,000

△ DIVISION TERMINUS
▼ REACH TERMINUS



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THE CALIFORNIA STATE WATER PROJECT
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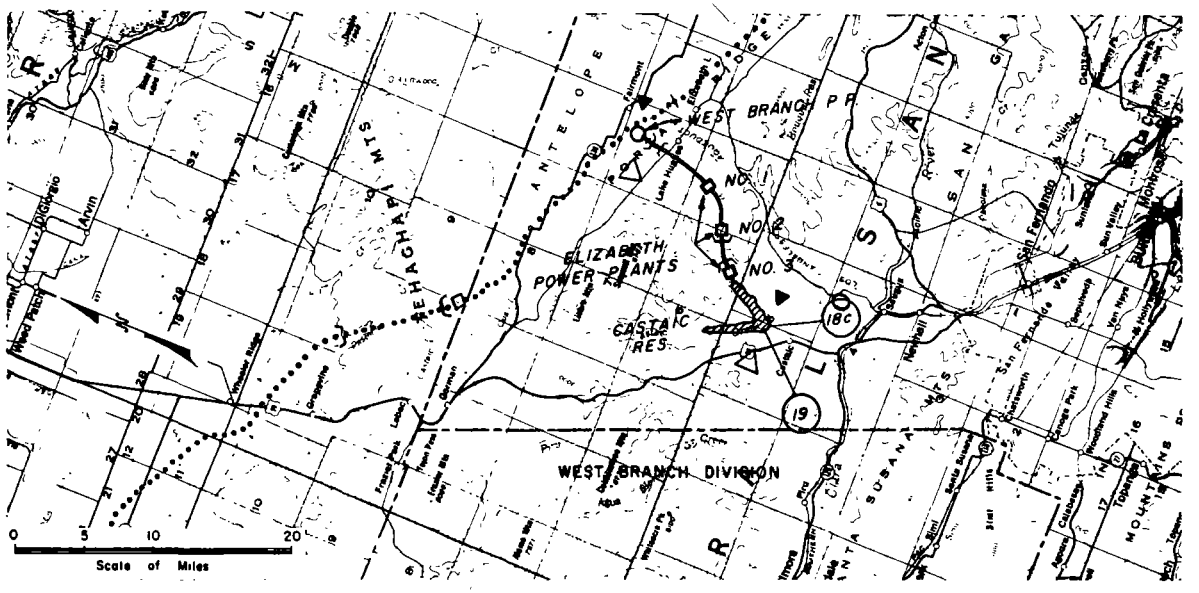
CALIFORNIA AQUEDUCT
PLAN AND PROFILE

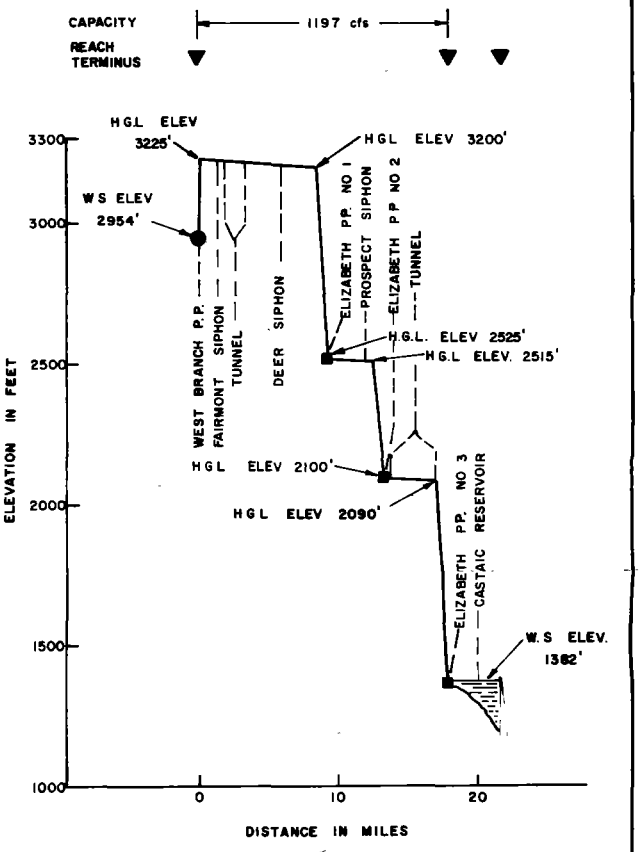
PLATE 2B

SHEET 4 OF 6



△ DIVISION TERMINUS

▼ REACH TERMINUS



ESTIMATED MAXIMUM ANNUAL WATER DELIVERIES		
Turnout Number	Contractor	Delivery Ac. ft./Yr.
18c	Metropolitan Water District of So. Calif.	780,000
19	Uncontracted	17,000

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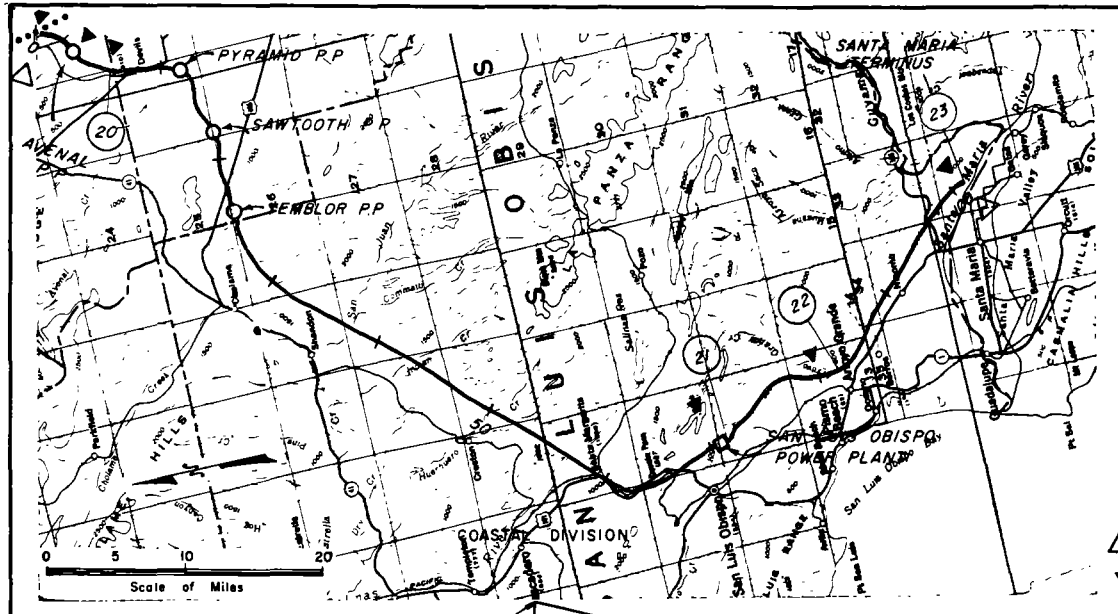
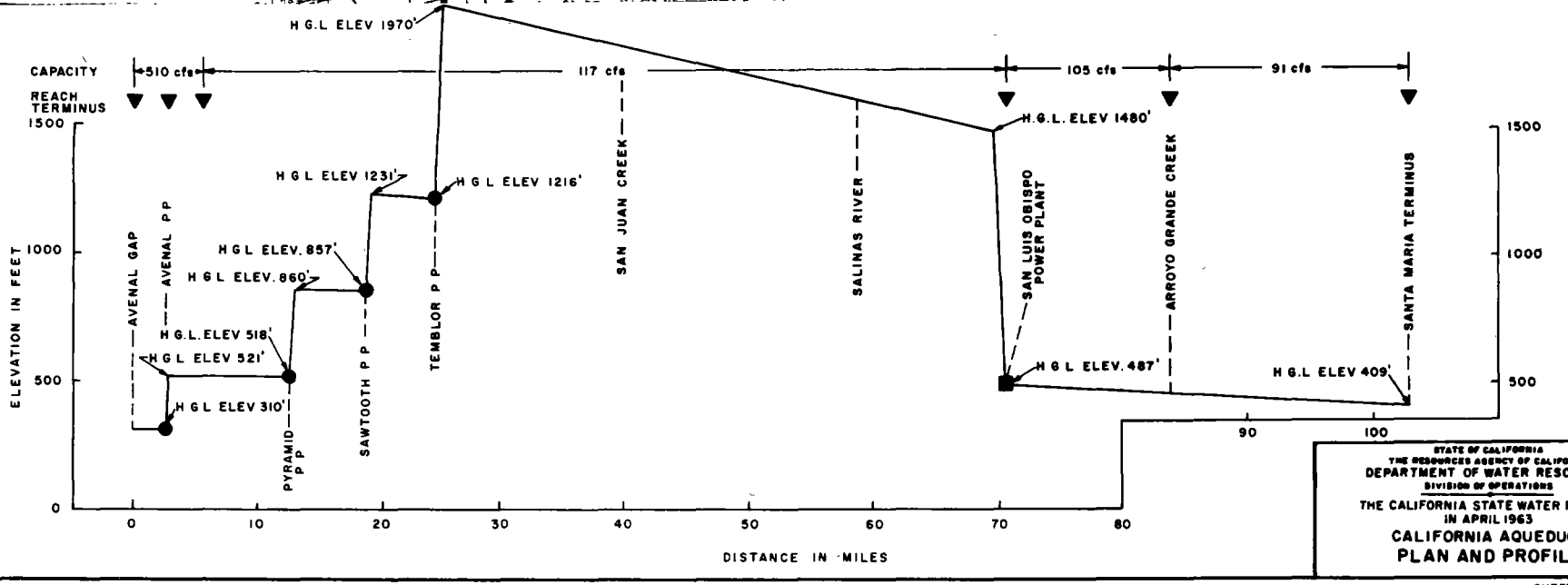
CALIFORNIA AQUEDUCT
PLAN AND PROFILE

PLATE IX



ESTIMATED MAXIMUM ANNUAL WATER DELIVERIES		
Turnout Number	Contractor	Delivery Ac. ft./Yr.
20	Uncontracted	133,700
21	"	10,000
22	"	5,000
23	"	60,000

△ DIVISION TERMINUS
▼ REACH TERMINUS



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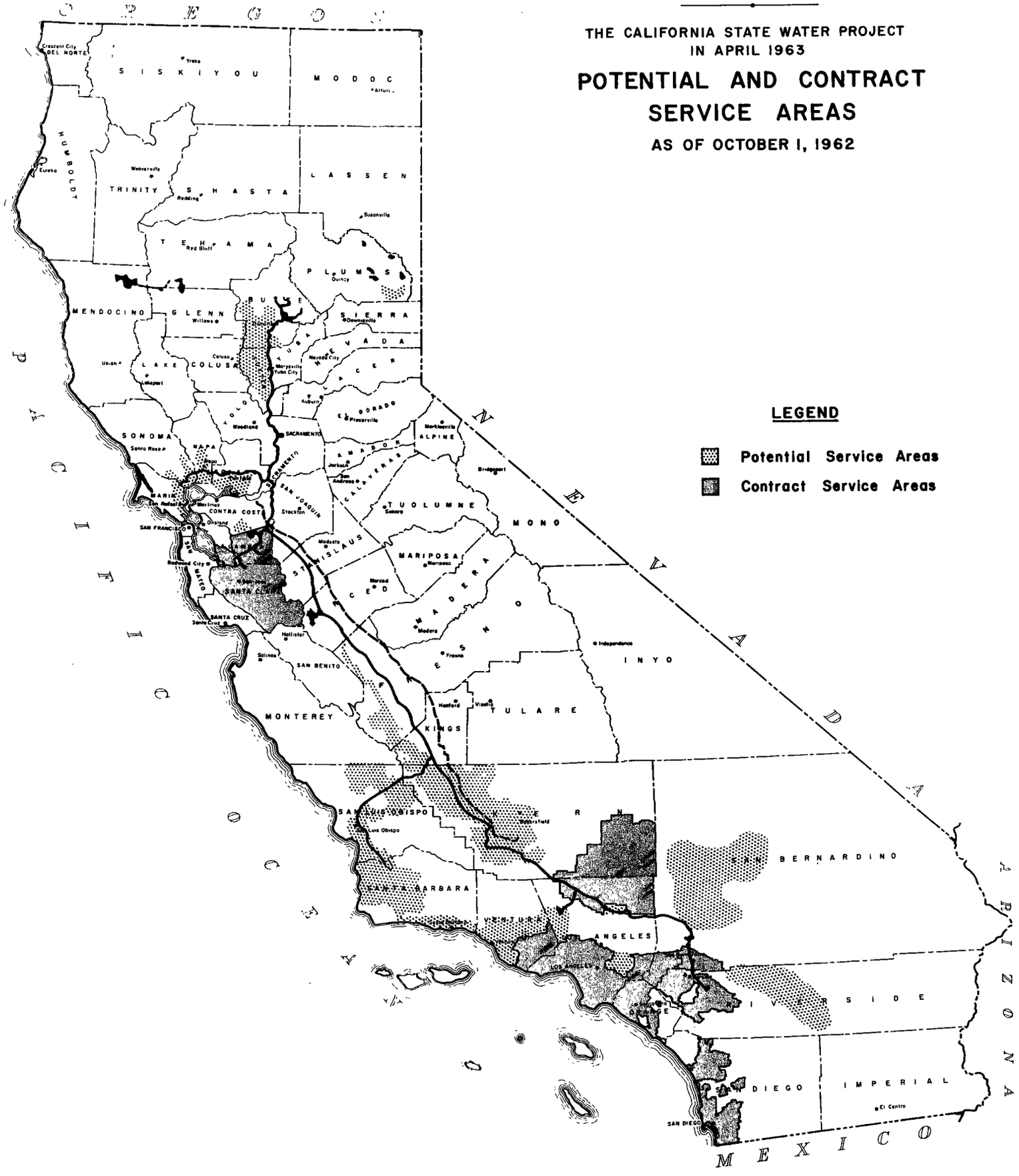
DEPARTMENT OF WATER RESOURCES
DIVISION OF OPERATIONS

THE CALIFORNIA STATE WATER PROJECT
IN APRIL 1963

POTENTIAL AND CONTRACT SERVICE AREAS

AS OF OCTOBER 1, 1962



LEGEND

- Potential Service Areas
- Contract Service Areas

SOURCES OF FUNDS FOR CONSTRUCTION

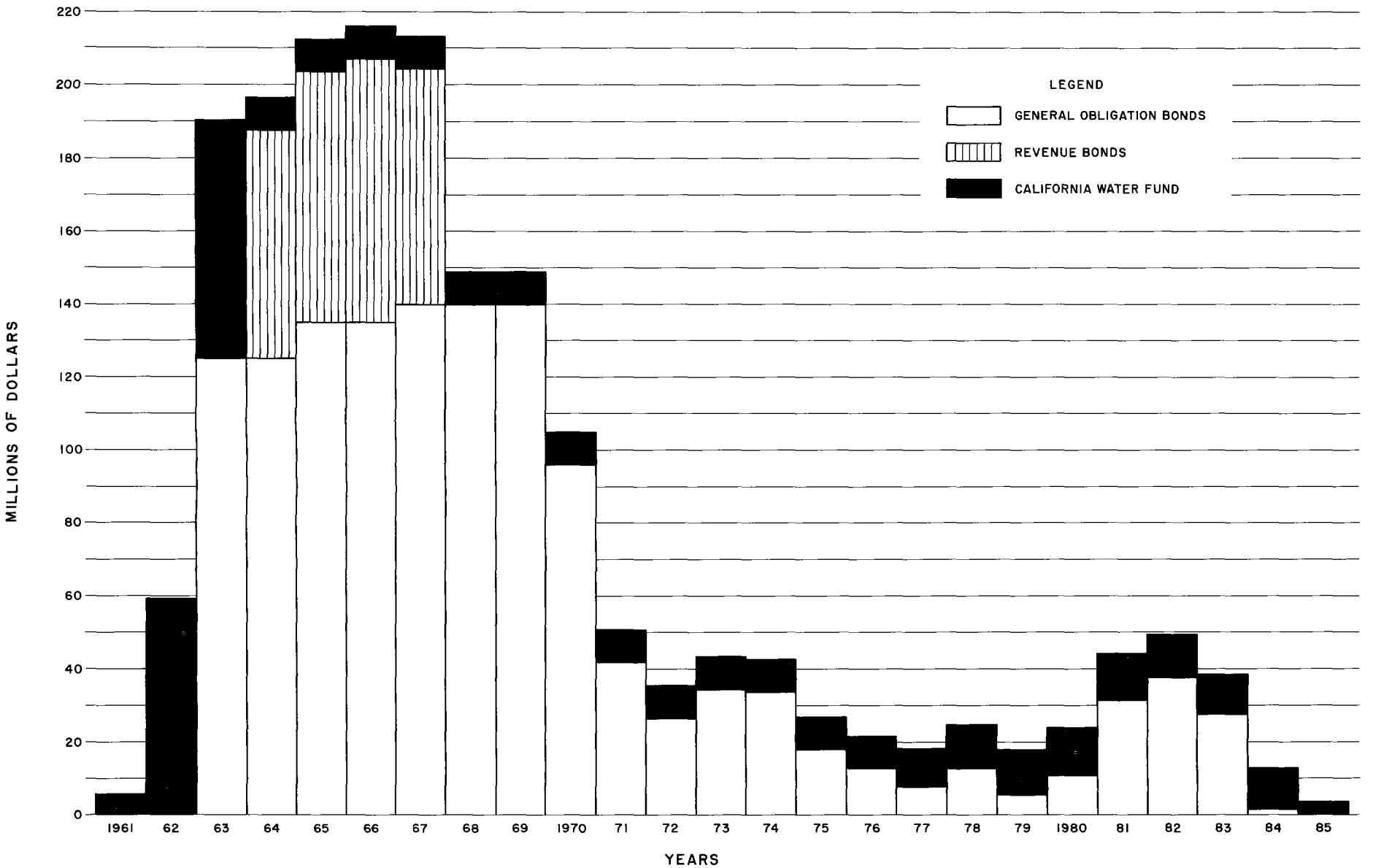


PLATE VI

ANNUAL CAPITAL EXPENDITURES

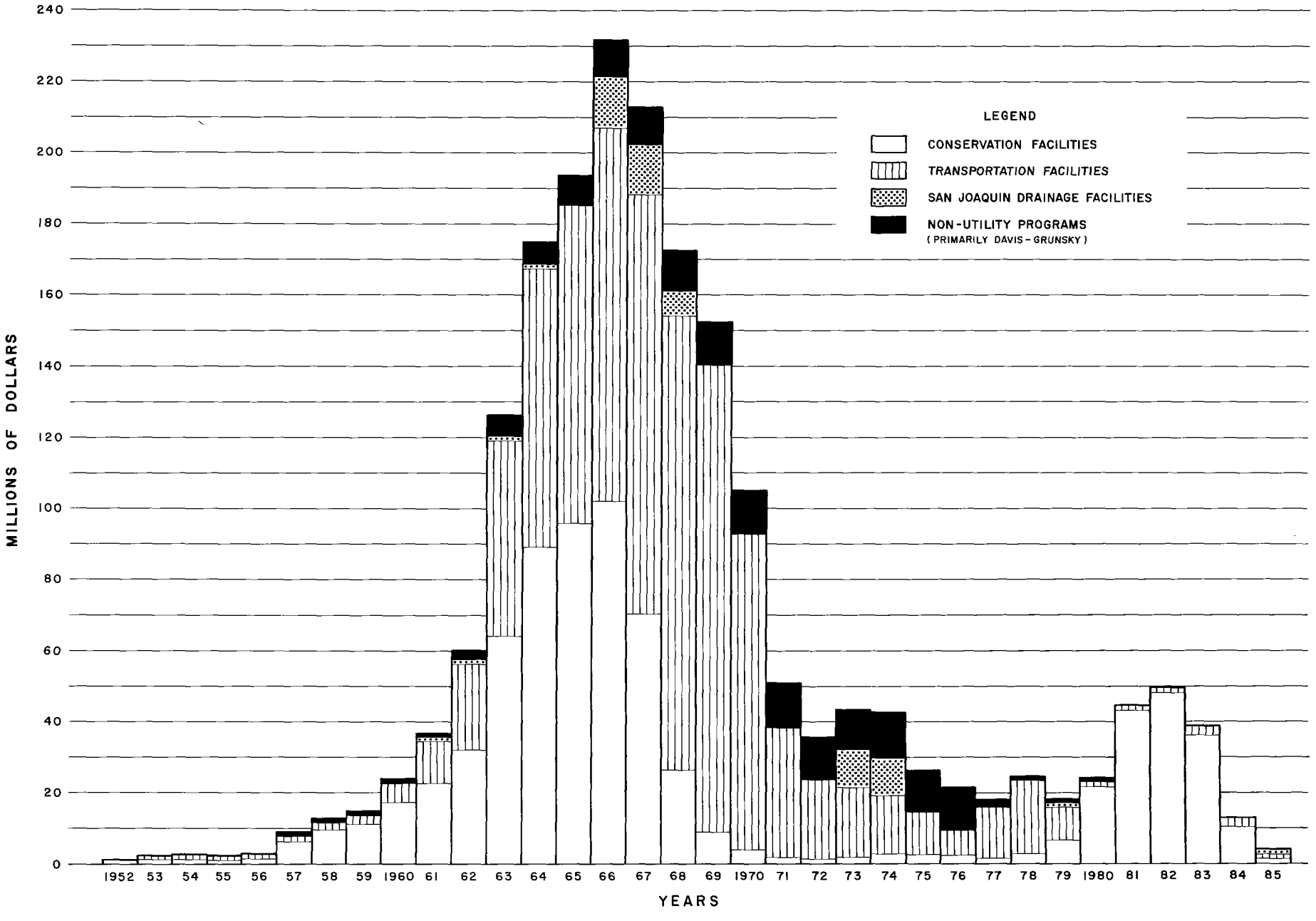
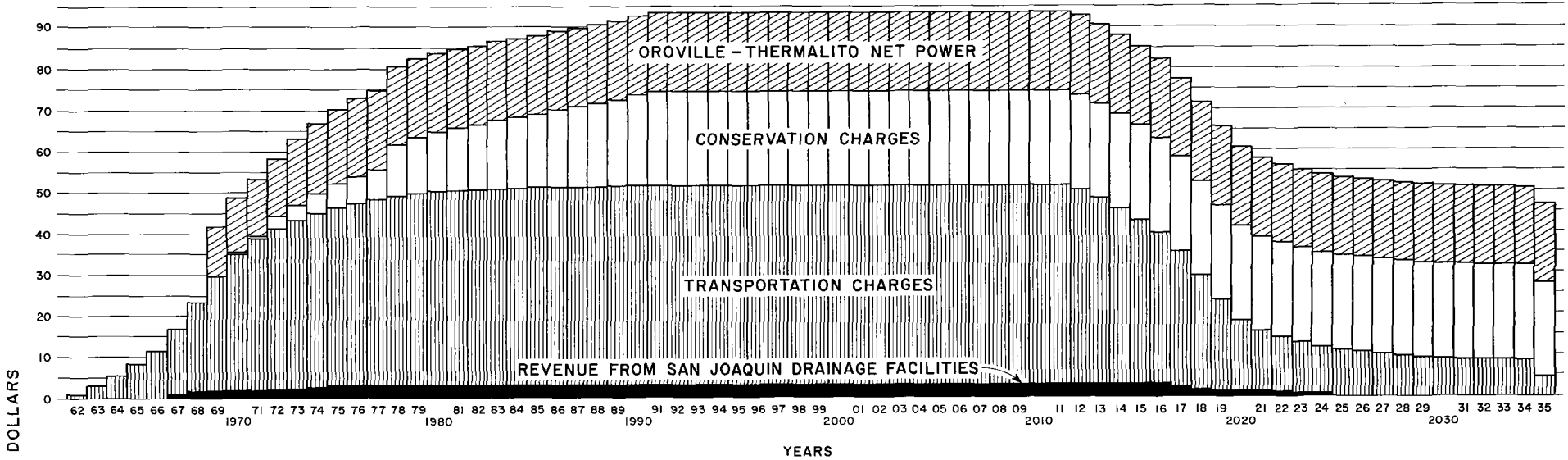


PLATE VII

UTILITY NET OPERATING REVENUES



UTILITY EXPENSES

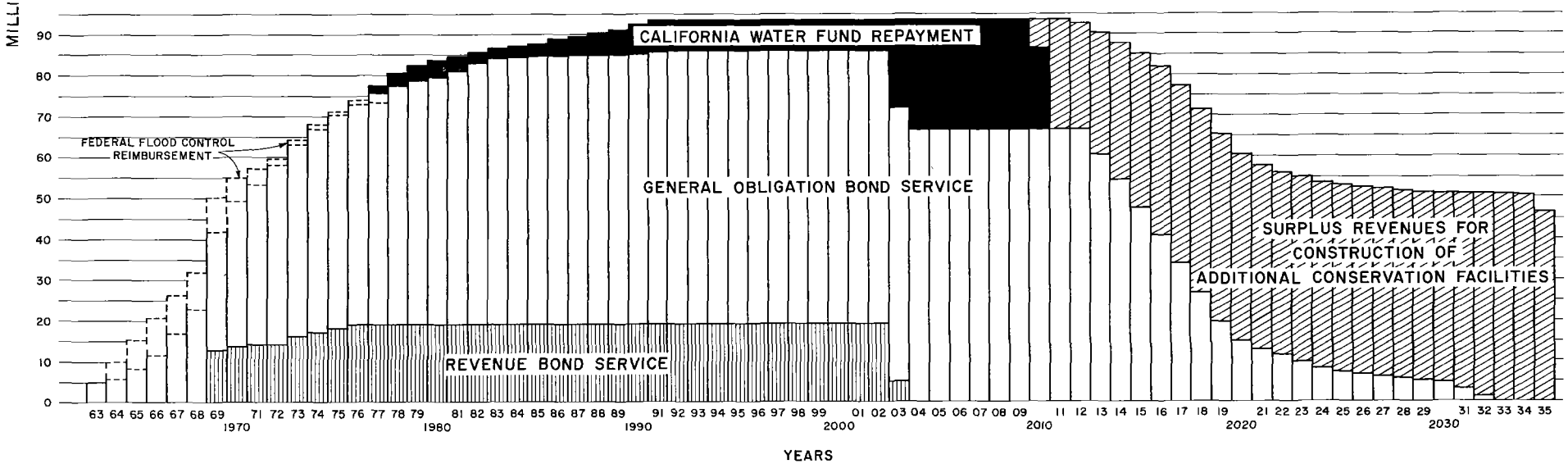


PLATE XIII