80th Congress, 2d Session - - - - - House Document No. 587

CACHUMA UNIT OF THE SANTA BARBARA COUNTY PROJECT, CALIFORNIA

LETTER

FROM

THE SECRETARY OF THE INTERIOR

TRANSMITTING

A REPORT AND FINDINGS ON THE CACHUMA UNIT OF THE SANTA BARBARA COUNTY PROJECT, CALIFORNIA

APRIL 1, 1948.—Referred to the Committee on Public Lands and ordered to be printed with illustrations

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EXHIBIT
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CONTENTS

LETTERS OF TRANSMITTAL

ILLUSTRATIONS

LETTERS OF TRANSMITTAL

DEPARTMENT OF THE INTERIOR,
Washington, March 24, 1948.

Hon. JOSEPH W. MARTIN, Jr.,
Speaker of the House of Representatives.

MY DEAR MR. SPEAKER: In accordance with the requirements of section 9 (a) of the Reclamation Project Act of 1939, I submit herewith my report and findings on the Cachuma unit of the Santa Barbara County project, California. The Cachuma unit, consisting of Cachuma Reservoir, Tecolote transmountain diversion tunnel, and appurtenant works, is urgently needed to supply water for the irrigation of lands and for municipal use in the south coast area of Santa Barbara County. These works would alleviate to some extent the critical water shortage deriving from the current drought in California and would provide ample protection against future droughts for many years to come.

I find that the proposed construction has engineering feasibility; that the estimated cost of the proposed construction is $32,310,000; that the part of the estimated cost which can properly be allocated to irrigation and probably be repaid by the water users is $20,164,000; and that the part of the estimated cost which can properly be allocated to municipal water supply and probably be returned to the United States is $12,146,000. The total of the foregoing repayable and returnable allocations equals the total estimated cost of construction.

Pursuant to the procedures contemplated in section 1 of the Flood Control Act of 1944 (58 Stat. 887), the report has been transmitted to the Governor of the State of California and to the Secretary of the Army. Their views and recommendations are incorporated in the enclosed documents.

The requirements of section 9 (a) of the Reclamation Project Act of 1939 and of section 1 of the Flood Control Act of 1944 having been met, I find that the Cachuma unit of the Santa Barbara County project is authorized for construction in accordance with the Federal reclamation laws.

In making these findings, I have taken into account the possibility of increased costs which may or may not eventuate. Any increase or decrease in costs will, of course, be reflected in extensions or reductions, as the case may be, of the period during which construction costs are returned by collections from irrigation, municipal and other water-supply users. If experience should indicate costs exceeding the estimates contained in this report, the water rates to be paid by the water users should remain the same as herein proposed until the actual cost is repaid. The proportion of total costs returned by the irrigation water users and the municipal and other water users, respectively, would remain approximately the same.

On March 4 this report was submitted to the President. The Director of the Bureau of the Budget has advised that the project is outstanding and appears to justify authorization, and that there would be no objection to the submission of this report to the Congress. His letter is attached.

Sincerely yours,

J. A. KRUG,
Secretary of the Interior.

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington 25, D. C., March 24, 1948.

The honorable the SECRETARY OF THE INTERIOR.

MY DEAR MR. SECRETARY: This will acknowledge receipt of your letter dated March 4, 1948, enclosing a copy of your proposed report on the Cachuma Unit of the Santa Barbara County project and advising that pursuant to the provisions of section 9 (a) of the Reclamation Project Act of 1939, you have found it feasible and have authorized it for construction.

I note that the proposed repayment plan provides, on the basis of the estimates contained in the report, for the return of the cost of the project in about 50 years. Your letter states that any increase or decrease in construction costs will not be covered by adjustments in water rates but will be reflected in extensions or reductions, as the case may be, of the period during which construction costs are returned by collections from irrigation, municipal and other water-supply users. It has been my understanding that Reclamation law has generally been interpreted to require repayment of the cost of construction without interest in 40 years plus the 10-year development period where applicable. In those cases where this is impossible but other considerations appear to justify the project regardless, Congress has from time to time authorized their construction with provisions for longer repayment periods. I have also been advised that this is the first project found feasible on the basis of repayments being obtained through outright sale of water under the provisions of sections 9 (c) and (e) of the Reclamation Project Act of 1939. In view of the above it appears to me that we should move cautiously in any action which might set a precedent for approving projects involving a departure from the customary 40-year repayment period policy contemplated under existing Reclamation laws. However, since the subject report involves an improvement of outstanding merit, it would appear to justify its authorization as an exceptional case.

I also note that the submission contains no comments of the Department of Agriculture and the Federal Power Commission on the proposed plan of improvement. In view of the fact that the Department of Agriculture had raised questions on the previous report, this office has inquired of that agency as to its views on the revised report. Representatives of the Department of Agriculture stated that while they have not completed their detailed review and while they may raise minor questions on certain items, there would be no objection to the submission of the report to the Congress in its present form. The Federal Power Commission advises that the comments made on the

original report would still apply and that it would raise no questions on the revised report.

In accordance with the authority delegated to me in the letter from the President dated July 2, 1946, you are advised that there would be no objection to the submission of the report to the Congress. However, it would be appreciated if you would include a copy of this letter with your submission.

Sincerely yours,

FRANK PACE, Jr.,
Assistant Director

UNITED STATES DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, March 4, 1948.

The PRESIDENT.
The White House
(Through the Bureau of the Budget.)

MY DEAR MR. PRESIDENT: My report on the Cachuma unit of the Santa Barbara County project, California, is enclosed, pursuant to the provisions of section 9 (a) of the Reclamation Project Act of 1939.

Increased population, with consequent overdemand upon the limited ground-water supplies, coupled with gradual siltation of the major surface water supply reservoir now places the city of Santa Barbara and adjacent urban and south coast agricultural areas in an extremely vulnerable position. The drought of the past 2 months has emphasized the seriousness of the situation. A critical or extended drought could cause hardship of disastrous proportions. The enclosed report, which recommends authorization of the Cachuma unit of the Santa Barbara County project is designed to remedy this situation and has the added advantage that it will produce an early water supply from the tunnel excavations that can be utilized even before the new storage reservoir is completed.

The Commissioner of Reclamation, acting on my behalf, has obtained the written views of the State of California, and of the Secretary of the Army in accordance with the requirements of the Flood Control Act of 1944. Copies of the letters expressing these views are attached. The State of California includes in its views the recommendation that the project be authorized immediately and that funds be appropriated this session to initiate construction. The Secretary of the Army advises that the proposed project will not conflict with contemplated plans of the Corps of Engineers. The recommendations of the director of natural resources of the State of California, secured in accordance with the requirements of Public Law 732, Seventy-ninth Congress, are included with the comments of the State of California, and are also favorable.

I find that the proposed construction has engineering feasibility; that the estimated cost of the proposed construction is $32,310,000; that the part of the estimated cost which can properly be allocated to irrigation and probably be repaid by the water users is $20,164,000; and that the part of the estimated cost which can properly be allocated to municipal water supply or other miscellaneous purposes and probably be returned to the United States is $12,146,000. The total of the foregoing repayable and returnable allocations equals the total esti-

mated cost of construction. Consequently, I find, pursuant to the provisions of section 9 (a) of the Reclamation Project Act of 1939, that the Cachuma unit of the Santa Barbara County project is authorized for construction.

In making these findings, I am fully cognizant of the suggestion of the State of California with respect to the possibility of increased costs which may or may not eventuate. Any increase or decrease in costs will, of course, be reflected in extensions or reductions, as the case may be, of the period during which construction costs are returned by collections from irrigation, municipal and other water-supply users. If experience should indicate costs exceeding the estimates contained in this report, the water rates to be paid by the water users should remain the same as herein proposed until the actual cost is repaid. The proportion of total costs returned by the irrigation water users and the municipal and other water users, respectively, would remain approximately the same.

Unless you have objection, the report and the other documents enclosed will be transmitted to the Congress in accordance with the provisions of the Reclamation Project Act of 1939.

Sincerely yours,

J. A. KRUG,
Secretary of the Interior.

UNITED STATES DEPARTMENT OF THE INTERIOR,
BUREAU OF RECLAMATION,
Washington 25, D. C., March 2, 1948.

The SECRETARY OF THE INTERIOR.

SIR: Herewith is my report on the Cachuma unit of the Santa Barbara County project, California.

In your behalf I submitted copies of the report, which you adopted on January 7, 1948, as your proposed report, to the Secretary of the Army and to the State of California in accordance with the Flood Control Act of 1944 (58 Stat. 887), and to the head of the agency of the State of California exercising administration over the fish and wildlife resources of the State in accordance with the provisions of Public Law 732, Seventy-ninth Congress (60 Stat. 1080).

Copies of the replies are attached. As a result of these reviews, the State of California recommends, among other things, immediate authorization of the project, and that funds be appropriated in this session of the Congress for commencement of construction. The Secretary of the Army states that the proposed project would not conflict with contemplated plans of the Corps of Engineers.

Accordingly, it is recommended that you adopt your proposed report of January 7, 1948, as your report; that you find the Cachuma unit of the Santa Barbara County project to be feasible in accordance with the provisions of section 9 (a) of the Reclamation Project Act of 1939; and that you transmit it, together with the attached comments, to the President and subsequently to the Congress.

Respectfully,

MICHAEL W. STRAUS, *Commissioner.*

Approved and adopted: March 4, 1948.

J. A. KRUG,
Secretary of the Interior.

The honorable the SECRETA

DEAR MR. SECRETARY: F
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DEPARTMENT OF THE ARMY,
Washington, D. C., February 25, 1948.

The honorable the SECRETARY OF THE INTERIOR.

DEAR MR. SECRETARY: Reference is made to letters from the Commissioner, Bureau of Reclamation dated January 6, 1948, and January 8, 1948, to the Chief of Engineers and the Secretary of the Army, respectively, with which there were enclosed for the information and comment of the Department of the Army copies of your proposed report on the Cachuma unit, Santa Barbara County project, California. By letter dated January 14, 1948, the Chief of Engineers informed the Commissioner, Bureau of Reclamation, that the report would be promptly reviewed by the Department and that the Secretary of the Army would inform you of any comments he desired to make.

The report presents and recommends a plan of improvement to provide an adequate water supply for existing development on the south coast area of Santa Barbara County and for the anticipated future development on the south coast area and the Santa Ynez River Basin. Principal features of the plan are an earth-fill dam at the Cachuma site on Santa Ynez River to create a reservoir with 210,000 acre-feet gross capacity; Tecolote tunnel to deliver water by transmountain diversion from Cachuma Reservoir to the coastal plain; the Goleta south coast conduit; and the Goleta and Carpenteria County water districts lateral distribution system.

The total first cost is estimated by the Bureau of Reclamation at $32,310,000 based on 1947 prices and average annual charges including amortization over a 50-year period with interest at 3 percent are estimated at $1,372,000. The ratio of average annual benefits to average annual costs is given as 1.76 to 1.0. It is noted that water-conservation benefits are evaluated on the basis of $136 per acre-foot for municipal supply and an average of $88 per acre-foot for irrigation supply. The total average annual benefits for increased municipal water supply for the city of Santa Barbara are given as $1,066,000 and for increased irrigation water supply for the south coast area and Santa Ynez Valley as $1,424,000.

It is noted that repayment of the project in 50 years is to be made by sale of water at $35 per acre-foot to the city of Santa Barbara, $25 per acre-foot to irrigation interests on the south coast area, and $10 per acre-foot to the Santa Ynez River Water Conservation District. The estimated minimum gross return on this basis would be $32,000,000 in 50 years. It is indicated in the report that this program is within the repayment capacity of the areas benefited.

The report recommends that the principal features and related works constituting the Cachuma unit of the Santa Barbara project be authorized to be constructed, operated, and maintained by the Bureau of Reclamation, Department of the Interior, pursuant to Federal reclamation law.

The Department of the Army is currently preparing a comprehensive report on the Santa Ynez River and tributaries, with specific reference to flood control. Investigations in connection with this report indicate that the proposed reservoir at the Cachuma site would not interfere with or duplicate any flood control or related plans which may be recommended in the report now under way. These investigations have indicated, however, the desirability of ultimately develop-

ing the Cachuma Reservoir to its maximum feasible physical limit in order to insure the greatest practicable beneficial use of the water resources of the Santa Ynez River Basin. It is believed, therefore, that careful consideration should be given in the design of the structure to the possibility of raising the dam in the future to its maximum feasible height.

Review of the report of the Bureau of Reclamation discloses no conflict between plans contemplated by the Corps of Engineers for flood control or navigation and the plans proposed in the report by the Bureau of Reclamation.

Sincerely yours,

KENNETH C. ROYALL,
Secretary of the Army.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

Review of Federal Reports Pursuant to Public Law 534
Seventy-eighth Congress, Second Session

VIEWS AND RECOMMENDATIONS
OF
STATE OF CALIFORNIA
ON
PROPOSED REPORT OF THE SECRETARY OF THE INTERIOR
ON THE
CACHUMA UNIT, SANTA BARBARA COUNTY PROJECT, CALIFORNIA

FEBRUARY 1948

LETTER OF TRANSMITTAL

STATE OF CALIFORNIA,
DEPARTMENT OF PUBLIC WORKS,
Sacramento, February 16, 1948.

Hon. J. A. KRUG,
Secretary of the Interior,
Washington, D. C.

DEAR SIR: Your proposed report on the Cachuma unit of the Santa Barbara County project, California, was received on January 13, 1948, and transmitted on the same date to the division of water resources of this department for review and report thereon to this office.

The review of the division of water resources has been received and is transmitted herewith in accordance with the provisions of Public Law 534, Seventy-eighth Congress, second session. I concur in the conclusions and recommendations as set forth in that report and request that it be considered as expressing the views and recommendations of the State of California on your proposed report on the Cachuma unit, Santa Barbara County project, California.

Yours very truly,

C. H. PURCELL,
Director of Public Works.

REVIEW BY STATE DIVISION OF WATER RESOURCES OF THE PROPOSED REPORT OF THE SECRETARY OF THE INTERIOR ON THE CACHUMA UNIT, SANTA BARBARA COUNTY PROJECT, CALIFORNIA

Introduction

The Commissioner of Reclamation, by letter dated December 22, 1947, transmitted to the Secretary of the Interior a new report by the regional director, region II, United States Bureau of Reclamation, dated November 20, 1947, which recommends approval and authorization only of those works considered necessary to relieve the critical south coast water problem in Santa Barbara County. The Commissioner of Reclamation states in his letter of transmittal:

> That report supersedes his (regional director's) report dated June 18, 1945, copy of which is also attached with its substantiating materials and comments received upon it.

The concluding paragraph of the letter of the Commissioner of Reclamation is as follows:

> I recommend that you approve and adopt this report as your proposed report on the Cachuma unit of the Santa Barbara County project to supersede the proposed report of 1945 entitled "Comprehensive Basin Plan—Santa Barbara County Project," and that you authorize me, in your behalf, to transmit it to the Secretary of the Army and to the State of California in accordance with the provisions of section 1 of the Flood Control Act of 1944 (58 Stat. 887), and to the head of the agency of the State of California exercising administration over the wildlife resources of that State in accordance with the provisions of the act of August 14, 1946 (60 Stat. 1080).

The foregoing report was approved and adopted by the Secretary of the Interior on January 7, 1948, as his proposed report on the Cachuma unit, Santa Barbara County project, California.

The Commissioner of Reclamation, on January 8, 1948, transmitted the proposed report of the Secretary of the Interior to the director of public works, State of California, with the following request:

> In view of the urgent need for additional water to safeguard existing and urban developments in Santa Barbara County, it is hoped that we can have your views and recommendations on the proposed report at an early date, so that it will be possible to present the report to the President and to the Congress early in 1948.

The proposed report of the Secretary of the Interior was received by the Director of Public Works on January 13, 1948, and transmitted to the Division of Water Resources on the same date, with a request for a review and report thereon. On January 16, 1948, the report was referred by the Division of Water Resources to the State division of highways, department of natural resources, and the State lands commission for review and comment.

The comments, conclusions, and recommendations contained herein are directed entirely and only to the proposed immediate storage

development on the Santa Ynez River, diversion tunnel, supply conduit, and appurtenant works and distribution systems. Comments by the State of California on other proposals for water development and control in Santa Barbara County by the United States Bureau of Reclamation, Department of Interior, will await the submission of separate reports thereon as stated in paragraph 20 of the regional director's report, dated November 20, 1947.

CACHUMA UNIT

Data on the Cachuma unit of the Santa Barbara County project compiled from the regional director's report are as follows:

Features of unit	Construction cost	Amortized annual cost
Cachuma Reservoir on Santa Ynez River (capacity, 210,000 acre-feet)	$14,145,000	$550,000
Reservoir right-of-way and highway relocation	3,350,000	130,000
Tecolote diversion tunnel (length, 6 miles)	4,060,000	150,000
Goleta south coast conduit, with regulating reservoirs (length of conduit, 30 miles)	6,935,000	269,000
Subtotal	28,510,000	1,108,000
Distribution systems for Goleta and Carpinteria County water districts	3,700,000	144,000
Total	32,210,000	1,252,000

The annual operation, maintenance, and replacements costs are estimated in the report as (1) dam, reservoir, tunnel, and conduit at $50,000; and (2) distribution system for the county water districts at $70,000, or a total of $120,000.

In addition, investigations and surveys in the amount of $100,000 are charged to the construction cost as given in the regional director's report.

Repayment of costs of unit

It is estimated in the report under review that a dependable annual yield of 33,000 acre-feet of new water can be made available for sale at outlets of Cachuma Dam and Tecolote tunnel, based on the period of run-off, 1923-31. The figure includes, as reported by the regional office of the United States Bureau of Reclamation, about 1,800 acre-feet annually as the contribution of water from the tunnel itself and makes allowance for downstream rights on the Santa Ynez and upstream rights of the city of Santa Barbara and of the Montecito County water district.

With respect to the matter of repayment of the estimated construction cost of $28,610,000 for the Cachuma Reservoir, diversion tunnel, conduit, and related works, exclusive of distribution systems, and including $100,000 for investigations and surveys, the following is quoted from the regional director's report:

> Resolutions have been passed by the City Council of the City of Santa Barbara and the boards of direction of the various water districts indicating a willingness to pay for the following minimum amounts of water annually at the following maximum rates. * * *

	Minimum, first year	Minimum, thirty-seventh year	Maximum rate for water
	Acre-feet	*Acre-feet*	*Per acre-foot*
City of Santa Barbara	3,300	10,500	$35
Goleta County water district	3,300	11,900	25
Montecito County water district	500	3,000	25
Carpinteria County water district	1,000	3,800	25
Santa Ynez River Water Conservation District	500	[1] 3,300	10
Summerland (tentative)	100	500	25
Total	8,700	33,000	

[1] Optional.

Sales at the amounts and rates shown above would return over $32,000,000 in 50 years. Total collections would, therefore, be ample to pay operation and maintenance costs, estimated at $50,000 per year, and repay the capital cost of $28,610,000 in about 50 years. If the use of water during the first 37 years proves to be greater than the minimums assumed, and this is believed quite likely, the cost could be retired in less than 50 years. The county, through its board of supervisors, has announced its intention to aid the users of water from Cachuma unit to the extent of $100,000 per year. This amount would be raised by a county-wide tax * * *.

The return of construction costs of Cachuma Dam and related works ($28,610,000, including an appropriate portion of the cost of the investigations) would be covered by contracts under section 9 (e) of the Reclamation Project Act of 1939 between the United States and the Santa Barbara County Water Agency, an entity authorized by the California Legislature for the purpose of securing additional water supplies for the county. Assurances have been obtained that the agency in question is agreeable to inclusion in the rate or rates to be prescribed in such contracts of a construction charge component sufficient to return construction costs within a period of approximately 50 years * * *.

In connection with the repayment of the costs of the distribution systems, the following is quoted from the regional director's report:

> The cost of the lateral distribution systems for Goleta and Carpinteria districts, estimated at $3,700,000, would be repaid by the districts under contracts entered into pursuant to section 9 (d) of the Reclamation Project Act of 1939.

The regional director's report finds that the city of Santa Barbara can pay $35 per acre-foot for an additional supply, the irrigation interests on the south coast are able to pay $25 per acre-foot for water, and the irrigation interests in the Santa Ynez Valley, $10 per acre-foot.

The net direct benefits resulting from the use of the new irrigation supply is estimated in the report of the regional director at $97 per acre-foot in the south coast area and $33 per acre-foot in the Santa Ynez Valley.

The total direct irrigation benefits are estimated in the regional director's report at $1,424,000 per year. The direct benefit from municipal water is estimated in the report at $136 per acre-foot, or a total of $1,066,000 per year.

Nothing is claimed in the report for possible flood-control benefits, and a net annual loss of $70,000 to fish and wildlife conservation is attributed therein to the project. The total annual net direct benefits and the estimated amortization annual cost are given in the report as $2,420,000 and $1,372,000, respectively, resulting in a benefit-cost ratio of 1.76.

The following findings are made in the proposed report of the Secretary of Interior:

(*a*) The proposed works have engineering feasibility.

(*b*) The part of the estimated capital cost of $28,610,000 which can properly be allocated to irrigation and probably be repaid by the water users is $16,464,000.

(*c*) The part of the estimated capital cost of $28,610,000 which can properly be allocated to municipal water supply, and probably be returned to the United States, is $12,146,000.

(*d*) The entire cost of the lateral distribution systems for Goleta and Carpinteria County water districts, $3,700,000, would be allocated to irrigation and would be repaid by those districts.

(*e*) Since the Cachuma unit has engineering feasibility and the repayable allocations to irrigation and municipal water supply equal the estimated cost, the project is qualified for authorization under reclamation law.

The United States Fish and Wildlife Service has made a study of the Cachuma unit with respect to the effect of its construction and operation on fish life and propagation and made a report with certain recommendations with regard to release of water from the Cachuma Reservoir for fish protection and to other matters relating to the improvement of conditions of fish life in the Santa Ynez River. The report of the regional director makes the following comment with regard to the recommendations of the United States Fish and Wildlife Service:

> The Bureau of Reclamation concurs in the objectives of these proposals. However, due to the very limited stream flows which prevail during the long series of dry years which occur in this area, it is impossible in some cases to assure the release of as much water as recommended for fish. In other cases, the recommended releases could only be made by the exclusion of irrigable land of high productive value. The Fish and Wildlife Service has recognized the high priority of uses of water for irrigation and municipal purposes and the high cost of construction necessary to convert the flashy flood flows of these streams to a dependable supply for such uses, and in a report on the Cachuma unit made in November 1947, it has scaled down its previously requested releases from Cachuma Reservoir for fish. Also, the fish hatchery formerly requested in connection with that reservoir has been eliminated * * *. *Every effort will be made to provide water and to so operate Cachuma Reservoir as to maintain the existing spawning grounds below the proposed Cachuma Dam.* [Emphasis supplied.]

The conclusions and recommendations of the regional director's report are as follows:

CONCLUSIONS

45. The only source of new water supply for Santa Barbara County is the flood flows which now escape unused to the ocean. Suitable reservoir sites, as indicated in the report, are available to convert these flood flows into usable supplies for irrigation, domestic, and municipal purposes. There is immediate need for additional water to care for present overdraft and near-future needs. This need can most readily be met by construction of the Cachuma unit, as described above. The construction has engineering feasibility and its cost can be fully repaid in about 50 years at reasonable rates for water. Need exists also for flood control and conservation on Santa Maria River.

RECOMMENDATIONS

46. It is recommended—

(*a*) That the following principal features and related works, constituting the Cachuma unit of the Santa Barbara County project, be authorized to be constructed, operated, and maintained by the Bureau of Reclamation, Department of Interior, pursuant to the Federal reclamation laws (act of

June 17, 1902, 32 Stat. 38
thereto) substantially in a
with such modifications as
approved by the Secretary
interests and the State of
Cachuma Reservoir
Tecolote tunnel (in lie
Goleta-South Coast c
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(*b*) That the Secretary
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(*c*) That, having adopt
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(*d*) That, upon the rece
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47. It is further recommend
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the Department of Natur
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The proposed report o
letter of Commissioner o
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7, 1948; (*b*) report of regio
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Fish and Wildlife Servic
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fornia, dated November
of the City of Santa Bar
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Santa Ynez River Water
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water agency for acquisit
Cachuma unit proposed t
of Reclamation; prelimin
capacity of reservoir 210
to Secretary of the Inte
director of public works.

June 17, 1902, 32 Stat. 388, and acts amendatory thereof or supplementary thereto) substantially in accordance with the plans set forth in this report, with such modifications as may be recommended by the Commissioner and approved by the Secretary of the Interior after full consultation with local interests and the State of California:

Cachuma Reservoir
Tecolote tunnel (in lieu of Tequepis tunnel)
Goleta-South Coast conduit
Goleta and Carpinteria County water districts lateral distribution systems

(*b*) That the Secretary of the Interior be requested to adopt this report as his proposed report on the Cachuma unit of the Santa Barbara County project;

(*c*) That, having adopted this report as his proposed report, he be requested to authorize transmittal of copies of it to the Secretary of the Army and to the State of California as required by the Flood Control Act of 1944 and to the appropriate official of the State of California as required by the act of August 14, 1946, for their comments and recommendations;

(*d*) That, upon the receipt of those comments and recommendations, this report be submitted to the President and the Congress along with the Secretary's findings as to all the matters with respect to which findings and reports are required to be made under section 9 (a) of the Reclamation Project Act of 1939; and that thereupon, unless the comments of the Secretary of the Army or of the State of California set forth objections thereto, the project herein recommended be deemed authorized.

47. It is further recommended that the investigation of the Santa Maria drainage basin be actively continued.

COMMENTS OF THE STATE DIVISION OF WATER RESOURCES

The following comments, conclusions, and recommendations on the proposed report of the Secretary of Interior are based upon a review and study not only of the material and data submitted by that report but also of detailed data furnished by the regional office of the United States Bureau of Reclamation in Sacramento, and of data obtained from other sources including material and reports in the office of the Division of Water Resources and upon a field inspection of conditions at sites of the proposed project works and areas to be served. In addition, the comments of the California State Division of Highways, the Department of Natural Resources, and the State Lands Commission are incorporated herein.

The proposed report of the Secretary of the Interior contains (*a*) letter of Commissioner of Reclamation to Secretary of the Interior, dated December 22, 1947, and approved by the Secretary on January 7, 1948; (*b*) report of regional director in form of letter to Commissioner of Reclamation, dated November 20, 1947; (*c*) report of United States Fish and Wildlife Service, dated November 1947; (*d*) excerpt from report by National Park Service, Cachuma Reservoir project, California, dated November 1947; (*e*) copies of resolutions of the Council of the City of Santa Barbara, Montecito County water district, Carpinteria County water district, Goleta County water district, and Santa Ynez River Water Conservation District, directing their respective officers to enter into negotiations with the Santa Barbara County water agency for acquisition of a water supply to be provided by the Cachuma unit proposed to be constructed by the United States Bureau of Reclamation; preliminary estimate and drawing of Cachuma Dam—capacity of reservoir 210,000 acre-feet; (*g*) letter of Secretary of War to Secretary of the Interior, dated February 5, 1946; (*h*) letter of director of public works, State of California, to Secretary of the In-

terior, dated February 9, 1946, transmitting Review by Division of Water Resources of Comprehensive Basin Plan, Santa Barbara County Project, California, as reported by the United States Department of the Interior, June 1945; (*i*) letter of Santa Barbara County water agency to United States Bureau of Reclamation, dated March 29, 1946; (*j*) letter of Chairman of Federal Power Commission to Commissioner of Reclamation, dated February 25, 1946; (*k*) letter of Assistant Secretary of Agriculture to Commissioner of Reclamation, dated March 4, 1946; and (*l*) the original proposed report of the Secretary of the Interior, approved October 19, 1945, together with the original regional director's report, dated June 18, 1945, with the substantiating material to that report.

In connection with this review of the Cachuma unit, the regional office of the Bureau of Reclamation in Sacramento supplied the following supplemental reports: (*a*) Appendix I. Climate and Hydrology—Santa Maria, Santa Ynez, and related basins; (*b*) Appendix II. Land Use and Economics; (*c*) Appendix III. Engineering Geology—Santa Ynez Basin; (*d*) Appendix V. Water Requirement and Supply, Santa Ynez Basin; and (*e*) Preliminary Designs and Estimates—Cachuma Dam and Tequepis Dam. The Geological Survey, United States Department of the Interior, supplied a copy of a report of that agency entitled, "Water levels in observation wells in Santa Barbara County, Calif., 1946."

1. There is an urgent and immediate need for substantial supplemental municipal and irrigation water supplies for the south coast area of Santa Barbara County, including the city of Santa Barbara, and the lands and developments in the three county water districts; namely, Montecito, Goleta, and Carpinteria, and also there is demand for additional supply of water in the Santa Ynez River Water Conservation District. The city of Santa Barbara has a critical water situation at this time. That city, on January 27, 1948, reported that as of January 21, 1948, the total amount of water in storage in Gibralter Reservoir was 2,670 acre-feet of which only 1,670 acre-feet can be diverted by gravity. The remaining 1,000 acre-feet, below the bottom of the outlet would require pumping. The diversion tunnel yields in seepage about 800 acre-feet per year. The city is drilling two new wells to supplement a supply from five wells drilled in 1931 which have an aggregate production of 1.5 to 2 million gallons daily. The water in the latter wells has a high hydrogen-sulfide content. Water is presently rationed in the city by ordinance, reducing consumption from about 5,000,000 gallons daily to about 3,000,000 gallons daily. The ordinance limits water use to domestic and sanitary purposes and commercial use by special permit.

The underground water supplies in the county water districts are being seriously overdrawn. In some localities the pumping water levels in wells are being lowered to a point which is resulting in excessive costs and in other localities the wells are being damaged by salt water intrusion. Supplemental supplies are needed to replenish these ground water basins.

2. The nearest and most logical source of an additional water supply for the south coast areas is the Santa Ynez River. The city of Santa Barbara and the Montecito County water district now obtain water supplies from that source. This additional supply can be secured by the construction of surface storage on the Santa Ynez River for

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the conservation of floodwaters and the conveyance of such regulated waters by means of a tunnel and other transmission lines to areas of use.

3. The general physical plan, as proposed in the report of the Secretary of the Interior, comprising surface storage on the Santa Ynez River, a diversion tunnel 6 miles long from the reservoir to the south coast area and a supply conduit extending for 30 miles from the tunnel to the vicinity of Carpinteria, is approved. However, it is believed that further study and consideration should be given to this matter with the view of formulating a final construction plan which would result in a substantial reduction, if possible, of the first cost of the project and furnish adequate service to the areas involved for 25 to 30 years, and permit later enlargement of the works. This suggestion is offered in view of the results of financial analyses on the project submitted later herein. It is believed that one alternative that should be studied further is the Tequepis Dam site in lieu of Cachuma site. Further exploration work comparable to that already done at the Cachuma site, should be carried out at the Tequepis site. Also, it is believed that a substantial reduction in the estimated cost of a dam at the Tequepis site could be effected if the saddle spillway site were utilized to pass the entire flood flows, omitting the spillway on the left end of the dam as shown in the preliminary designs and estimates of the Bureau of Reclamation. In addition, there may be possibilities of developing a progressive construction program that would effect substantial savings in the first cost of the project, thereby relieving the contractors for water of a financial burden, particularly in the early years of operation of the project. Such possibilities include building the storage dam to partial capacity with provisions for future enlarging, omitting the regulating reservoirs on the conduit for the present, or installing a conduit of a capacity to take care of the estimated needs for 25 to 30 years and at that time increasing its carrying capacity or installing a second line. Such procedures have been utilized in many similar cases of water development in the past.

4. In the regional director's report, it is estimated that the dependable water yield from the project with a reservoir of 210,000-acre-foot capacity at the Cachuma site would be 33,000 acre-feet annually. This figure includes an estimated yield of about 1,800 acre-feet of water which would be developed in the 6-mile diversion tunnel, leaving about 31,200 acre-feet net yield from the Cachuma Reservoir, after allowing for prior rights on the streams, including those of the city of Santa Barbara, Montecito County water district, and riparian rights. Based upon independent studies, the estimated figure of 31,200 acre-feet of yield of water annually available for exportation from the Cachuma Reservoir (210,000-acre-foot capacity) through the Tecolote tunnel to the south coast area appears to be reasonable. The yield of water from seepage in the Tecolote diversion tunnel also appears reasonable based upon yields, past and present, of the Mission diversion tunnel of the city of Santa Barbara and the Daulton diversion tunnel of the Montecito County water district. The regional director's report does not give safe yields of water which would be available for export to the south coast area with smaller sizes of reservoir at Cachuma or Tequepis. It is believed advisable to have such studies made, together with costs of storage designed for progressive

development up to a capacity of 210,000 acre-feet on the Santa Ynez River.

5. The cost of the Cachuma unit, excluding the distribution systems for Goleta and Carpinteria County water districts and including a pro rata share of the cost of investigations and surveys of the United States Bureau of Reclamation in the amount of $100,000, is estimated in the proposed report of the Secretary of the Interior at $28,610,000. The proposed report of the Secretary of the Interior states that this estimate is based on present construction cost levels. Information obtained from the United States Bureau of Reclamation region II offices is that the price level is as of April 1947. Based upon prices of labor and materials as of January 1948, and a review of the estimates of cost, it is indicated that the figure of $28,610,000 should be increased by $2,930,000, making a total capital cost of $31,540,000. No check was made of the capital cost of the distribution systems estimated by the United States Bureau of Reclamation at $3,700,000.

6. Each of the several water-using agencies has passed resolutions directing its respective officers to enter into negotiations with the Santa Barbara County water agency and other interested water agencies for the purpose of contracting to purchase water from the Cachuma unit through the Santa Barbara County water agency.

The resolution of the city of Santa Barbara calls for the—

purchase of water at the rate of $35 per acre-foot or less, and to obtain water by the most feasible plan.

The resolution of the Montecito County water district provided for negotiations—

for the purpose of contracting to purchase through the Santa Barbara County agency at the rate of not to exceed $25 per acre-foot the initial quantity of 500 acre-feet of water and the maximum annual quantity of 3,000 acre-feet, to be delivered from such conduit to a point or points within the boundaries of this district, from said project.

The resolution of the Carpinteria County water district calls for the same action as that of the Montecito County water district except the initial quantity of water is 1,000 acre-feet annually and the maximum annual quantity is 3,800 acre-feet. The resolution of the Goleta County water district is the same as those of the two foregoing districts except that the initial annual quantity of water is 3,300 acre-feet and the maximum is 11,900 acre-feet. The maximum price, $25 per acre-foot, is the same for the three foregoing districts. The resolution of the Santa Ynez River water conservation district provides for negotiations—

for the purpose of contracting to purchase through the Santa Barbara County water agency at the rate of not to exceed $10 per acre-foot, the initial miminum annual quantity of 500 acre-feet and the optional maximum annual quantity of 3,300 acre-feet of water to be delivered at the outlet of said dam (Cachuma) on said Santa Ynez River.

The foregoing represents the offers made for the purchase of water. No contracts have been entered into as of this date.

7. In the regional director's report, it is stated that:

The county through its board of supervisors has announced its intention to aid the users of water from Cachuma unit to the extent of $100,000 per year. This amount would be raised by a county-wide tax.

The "board of supervisors" in the foregoing quotation means the Santa Barbara County Water Agency, whose directors are the mem-

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bers of Santa Barbara County board of supervisors. The Santa Barbara County Water Agency has power under section 10.2, chapter 1501, Statutes of 1945—

> to expend as contributions in aid of construction or of payment of the cost of works all or any part of the revenues derived from taxes levied pursuant to section 10.1 * * *

Based upon the foregoing, it has been assumed in the financial analyses made by this office of the Cachuma unit that an annual contribution of $100,000 would be made to the repayment of the cost of the Cachuma unit of the Santa Barbara County project.

8. In connection with a discussion of the repayment of the cost of Cachuma unit, the following statement is made in the regional director's report:

> The return of construction costs of Cachuma Dam and related works ($28,610,000, including an appropriate portion of the cost of the investigations) would be covered by contracts under section 9 (e) of the Reclamation Project Act of 1939 between the United States and the Santa Barbara County Water Agency, an entity authorized by the California Legislature for the purpose of securing additional water supplies for the county.

Also, in the regional director's report, the following statement is made with reference to the repayment of the cost of the distribution systems:

> The cost of the lateral distribution systems for Goleta and Carpinteria districts, estimated at $3,700,000, would be repaid by the districts under contracts entered into pursuant to section 9 (d) of the Reclamation Project Act of 1939.

Section 9 (e) of the Reclamation Project Act of 1939 provides as follows:

> In lieu of entering into a repayment contract pursuant to the provisions of subsection (d) of this section to cover that part of the cost of the construction of works connected with water supply and allocated to irrigation, the Secretary (Secretary of Interior), in his discretion, may enter into either short- or long-term contracts to furnish water for irrigation purposes. Each such contract shall be for such period, *not to exceed 40 years*, and at such rates as in the Secretary's judgment will produce revenues at least sufficient to cover an *appropriate share of the annual operation and maintenance cost* and *an appropriate share of such fixed charges as the Secretary deems proper*, due consideration being given to that part of the cost of construction of works connected with water supply and allocated to irrigation; and shall require payment of said rates each year in advance of delivery of water for said year. In the event such contracts are made for furnishing water for irrigation purposes, the costs of any irrigation water distribution works constructed by the United States in connection with the new project, new division of a project or supplemental works on a project, shall be covered by a repayment contract entered into pursuant to said subsection (d). [Italic supplied.]

From the foregoing it appears that a contract under section 9 (e) is limited to irrigation and the provisions of that section would not be applicable to a municipal supply. However, similar provisions covering municipal water supplies are contained in section 9 (c) of the Reclamation Project Act of 1939, which provides as follows:

> The Secretary (Secretary of the Interior) is authorized to enter into contracts to furnish water for municipal water supply or miscellaneous purposes: *Provided*, That any such contract either (1) shall require repayment to the United States, over a period of not to exceed forty years from the year in which water is first delivered for the use of the contracting party, with *interest not exceeding the rate of 3½ per centum per annum if the Secretary determines an interest charge to be proper, of an appropriate share as determined by the Secretary of that part of the construction costs allocated by him to municipal water supply or other miscellaneous purposes;* or (2) shall be for such periods, not to exceed forty years, and at such

rates as in the Secretary's judgment will produce revenues at least sufficient to cover an appropriate share of the annual operation and maintenance cost and an appropriate share of such fixed charges as the Secretary deems proper, and shall require the payment of said rates each year in advance of delivery of water for said year. * * * [Italic supplied.]

Section 9 (d) of the Reclamation Project Act of 1939 provides in general for the repayment of the capital cost in annual payments without interest.

In the financial analyses that follow herein it is assumed that contracts would be executed with local agencies which would provide for (*a*) no interest charges for either irrigation or municipal use of water; (*b*) repayment of capital cost in annual installments over a period of 50 years; and (*c*) the rates for water to include repayment of capital cost, depreciation of physical works, and operation and maintenance of works.

9. Five financial analyses have been made by the division of water resources of the Cachuma unit of the Santa Barbara County project. The features included in the analyses are the Cachuma Dam and Reservoir, Tecolote tunnel, Goleta-South Coast conduit, regulating reservoirs, and the surveys and investigations. The distribution systems are not included in the analyses.

Analysis No. 1.—In this analysis, the capital cost is $28,610,000, as given in the proposed report of the Secretary of the Interior. The water sales are taken in amount and price for each entity, as follows:

	Water sales, in acre-feet		Rate for water per acre-foot
	First year	Thirty-seventh year	
City of Santa Barbara	3,300	10,500	$35
Goleta County water district	3,300	11,900	25
Montecito County water district	500	3,000	25
Carpinteria County water district	1,000	3,800	25
Santa Ynez River water conservation district	500	3,300	10
Summerland	100	500	25
Total	8,700	33,000	

Total water sales are taken as 8,700 acre-feet the first year of operation of the project with an annual increase of about 675 acre-feet until the entire alllocated supply to each entity is absorbed in the thirty-seventh year or in the aggregate amount of 33,000 acre-feet. Also, it is assumed that the county of Santa Barbara would contribute $100,000 annually to the project for a period of 50 years. No interest charge on investment was included in the annual costs. Annual costs include repayment of capital cost in 50 annual installments. Depreciation on dam, tunnel, and regulating reservoirs was calculated by applying the factor of 0.0023 to the capital costs of those features, and for the conduit by applying the factor of 0.0103. Annual operation and maintenance charges on the dam and the regulating reservoirs were estimated at $11,300 and $2,000, respectively. The operation and maintenance charges on the tunnel were calculated by applying a factor of 0.0025 to the capital cost and on the conduit by applying a factor of 0.005 to the capital cost.

Analysis No. 2.—In analysis No. 2, all elements and criteria are the same as for analysis No. 1 except that the period of absorption of water is 25 years. The amount of water sold increases from a total

of 8,700 acre-feet the first ye
year, or an increase of about

Analysis No. 3.—In this a
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Analysis No. 4.—In this a
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Analysis No. 5.—The elem
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of $28,610,000 is allocated t
cated to irrigation.

These analyses are summa

Summa

	Capital cost	Ab t pe y
Analysis No. 1: Costs as in report	$28,610,000	
Analysis No. 2: Costs as in report	28,610,000	
Analysis No. 3: Estimated cost, Jan. 1, 1948	31,540,000	
Analysis No. 4: Estimated cost, Jan. 1, 1948	31,540,000	
Analysis No. 5:		
Costs as in report	28,610,000	
Allocation to—		
Municipal water	12,146,000	
Irrigation water	16,464,000	

From the foregoing sum
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10. The proposed report
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Reference is made to your l
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By information received fr
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advance estimate of $220,000
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The Goleta conduit crosses
included in the estimates.

of 8,700 acre-feet the first year to 33,000 acre-feet in the twenty-fifth year, or an increase of about 972 acre-feet per year.

Analysis No. 3.—In this analysis all the elements and criteria are the same as for analysis No. 1 except the capital cost which is $31,540,000 as estimated by the Division of Water Resources, based upon prices as of January 1948.

Analysis No. 4.—In this analysis the elements and criteria are the same as for analysis No. 3 except the water-absorption period is 25 years instead of 36 years.

Analysis No. 5.—The elements and the criteria are the same as for analysis No. 1 except that the sum of $12,146,000 of the capital cost of $28,610,000 is allocated to municipal use and $16,464,000 is allocated to irrigation.

These analyses are summarized in the following table:

Summary of financial analyses

	Capital cost	Absorption period, in years	Total water sales in 50-year period, in acre-feet	Cumulative annual costs in 50-year period	Cumulative revenues in 50-year period	Surplus or deficit in 50-year period	Surplus or deficit per acre-foot of water sold
Analysis No. 1: Costs as in report	$28,610,000	36	1,200,450	$35,955,000	$37,232,000	+$1,277,000	+$1.06
Analysis No. 2: Costs as in report	28,610,000	25	1,334,100	35,955,000	40,737,500	+4,782,500	+3.58
Analysis No. 3: Estimated cost, Jan. 1, 1948	31,540,000	36	1,200,450	39,920,000	37,232,000	−2,688,000	−2.24
Analysis No. 4: Estimated cost, Jan. 1, 1948	31,540,000	25	1,334,100	39,920,000	40,737,500	+817,500	+0.61
Analysis No. 5:							
Costs as in report	28,610,000						
Allocation to—							
Municipal water	12,146,000	36	391,800	15,266,000	15,838,000	+572,000	+1.46
Irrigation water	16,464,000	36	808,650	20,689,000	21,394,000	+705,000	+0.87

From the foregoing summary it may be noted that the Cachuma unit is financially feasible under the assumed criteria using the estimated cost of $28,610,000 as given in the proposed report of the Secretary of Interior. On the other hand, if the higher estimated cost of $31,540,000 is used, the available yield of 33,000 acre-feet of water would have to be absorbed or sold within a 25-year period instead of 36 years, for the project to be feasible financially with other assumptions and criteria the same.

10. The proposed report of the Secretary of the Interior was submitted to the California State Division of Highways for review and comment. The comments of State Highway Engineer G. T. McCoy, submitted on January 29, 1948, are as follows:

> Reference is made to your letter of January 16, 1948, regarding review of the Cachuma unit of Santa Barbara County flood-control project.
>
> The cost estimate on page 8 of the report cites an item, "Reservoir, right-of-way, and highway relocation," in the amount of $3,350,000.
>
> By information received from the USBR, this item contains $1,870,000 for 8.5 miles of State highway relocation, which amount is in accord with the State's advance estimate of $220,000 per mile on December 13, 1946.
>
> This figure was based on current prices which probably will have increased by the time of construction.
>
> The Goleta conduit crosses State Route 80 and the cost thereof should be included in the estimates.

11. The proposed report of the Secretary of the Interior was submitted also to the State Department of Natural Resources for review and comment. The director of natural resources, Warren T. Hannum, submitted on January 26, 1948, the following comments:

> In response to yours of January 16 on above subject, the Division of Fish and Game collaborated in the formulation of the recommendations of the United States Fish and Wildlife Service appearing on pages 17 to 21, inclusive, of this report. These recommendations have been approved by the fish and game commission.
>
> It is recommended that the programs for construction and operation be so planned as to accomplish the purposes of these recommendations.

12. The California State Lands Commission advised on February 5, 1948, that it had no suggestions with respect to the proposed report of the Secretary of the Interior, inasmuch as no navigable waters or sovereign lands are involved.

13. Utilizing the criteria given in the report of November 1947, prepared by the United States Fish and Wildlife Service covering the flows of Santa Ynez River to be maintained by releases from the proposed Cachuma Reservoir for protection and propagation of fish life, studies of the United States Bureau of Reclamation which have been checked by the division of water resources show that for the period 1927–31, 5,200 acre-feet annually on the average would have to be released from the Cachuma Reservoir to meet those requirements at Santa Agueda Creek, and 5,400 acre-feet to meet the requirements at Robinson Bridge on the Santa Ynez River. These figures are on the assumption of no stream losses between the Cachuma Reservoir and the points of control. Such losses would be substantial under certain circumstances. It should be pointed out that the foregoing estimated water demands, 5,200 and 5,400 acre-feet annually, for fish protection is about equivalent in amount to the present normal use of water by the city of Santa Barbara.

CONCLUSIONS

1. The water-supply situation in the south-coast area of Santa Barbara County, Calif., is critical and steps should be taken immediately to relieve the water shortage in that area.

2. The best and most logical source of an additional water supply for the south-coast area of Santa Barbara County is the Santa Ynez River.

3. The general plan set forth in the proposed report of the Secretary of Interior of securing a water supply from the Santa Ynez River for the south-coast area of Santa Barbara County is feasible from an engineering standpoint and adequate to supply the present and anticipated future water needs thereof.

4. The estimates of the water supply obtainable from the Santa Ynez River with the works proposed for the Cachuma unit as set forth in the proposed report of the Secretary of the Interior appear reasonable and adequate to meet the present and anticipated future needs for additional water in the south-coast area of Santa Barbara County.

5. Based upon current (January 1948) costs of labor and materials, the estimated cost of the works of the Cachuma unit (not including the distribution systems) of the Santa Barbara County project given in the proposed report of the Secretary of the Interior appears to be

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reservoir sites on Santa Ynez
a storage reservoir on the S
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low by about 10 percent. No check has been made by the division of water resources of the estimated cost of the distribution systems.

6. Financial analyses indicate that the anticipated revenues from the sale of water for municipal and irrigation purposes are sufficient to meet the operation and maintenance costs and the fixed charges of the Cachuma unit, not including the distribution systems, on the basis of no interest on capital investment, and repayment of capital cost in 50 annual payments.

7. There would be no water available on a dependable basis from the proposed storage development on the Santa Ynez River exclusively for the protection and propagation of fish life over and above the present and anticipated future demands for water in the south-coast area and in the lower Santa Ynez River area.

RECOMMENDATIONS

1. It is recommended that the Cachuma unit of the Santa Barbara County project, California, be authorized immediately for construction by the United States Bureau of Reclamation, Department of the Interior, with provisions in such authorization for utilization of either the Cachuma or Tequepis site for storage of water on the Santa Ynez River and to permit stage construction of such storage and of the Goleta south coast transmission conduit and appurtenant works as may be determined in the best interests of the project.

2. It is recommended that funds in a substantial amount be appropriated by the Eightieth Congress, second session, to the United States Bureau of Reclamation for commencement of construction of the storage works which may be selected on the Santa Ynez River, and of the Tecolote diversion tunnel, as parts of the Cachuma unit of the Santa Barbara County project, California. It is further recommended that the driving of the Tecolote tunnel be pressed as rapidly as possible so that the anticipated water yield therefrom will be available for use in the south coast area.

3. It is recommended (*a*) that the negotiation of the necessary contracts between the United States and the local interests be expedited so that such contracts will be executed if possible before commencement of construction of the storage and transmission facilities of the Cachuma unit of the Santa Barbara County project, California; (*b*) that such contracts provide, among other things, for the inclusion in the water rates or charges of sums for operation and maintenance of project works and for repayment of capital cost of such works on a non-interest-bearing basis in 50 years; and (*c*) that such contracts provide for the acquisition by the local interests and water users of the project works and water rights by and through the necessary congressional action.

4. It is recommended that the United States Bureau of Reclamation immediately develop its plans sufficiently (*a*) to permit completion, as soon as practicable, of negotiations with the State division of highways for the relocation of the State highway now running through the reservoir sites on Santa Ynez River, and (*b*) to enable construction of a storage reservoir on the Santa Ynez River and of the Tecolote diversion tunnel, to proceed without delay after funds have been provided by the Congress for such purposes.

5. It is recommended that, because of the limited water supply available in the Santa Ynez River to meet the present and anticipated future domestic, municipal, and irrigation requirements of the area dependent upon that source of supply, no water from the Cachuma unit or other storage on the Santa Ynez River be dedicated to the protection or propagation of fish life on that stream. Any release from such storage in the interest of fish life should be on a temporary basis only, and one which would result in no impairment of the water supply for higher uses; namely, municipal, domestic, and irrigation.

Submitted by:

A. D. EDMONSTON,
Assistant State Engineer.

Approved:

EDWARD HYATT,
State Engineer.

SACRAMENTO, CALIF., *February 16, 1948.*

UNITED STATES

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UNITED STATES DEPARTMENT OF THE INTERIOR
J. A. KRUG, *Secretary*

COMPREHENSIVE BASIN PLAN
SANTA BARBARA COUNTY PROJECT, CALIFORNIA

SANTA MARIA, SANTA YNEZ, AND RELATED BASINS

WATER RESOURCES AND UTILIZATION

Report by the Department of the Interior
Sponsored by and prepared under the general supervision of

BUREAU OF RECLAMATION
MICHAEL W. STRAUS, *Commissioner*

Region No. II
Richard L. Boke, *Regional Director*

Revised November 1947

LETTER OF TRANSMITTAL

UNITED STATES DEPARTMENT OF THE INTERIOR,
BUREAU OF RECLAMATION,
Washington 25, D. C., December 22, 1947.

Subject: Cachuma unit of the Santa Barbara County project, California.

The SECRETARY OF THE INTERIOR.

SIR: In October 1945, a report entitled, "Comprehensive Basin Plan—Santa Barbara County Project, California", dated June 1945, which was adopted by former Secretary Ickes as his proposed report on October 19, 1945, was submitted to the Secretary of War and to the State of California for their views and recommendations pursuant to the requirements of the Flood Control Act of 1944. At the same time, that report was submitted to the Department of Agriculture, the Federal Power Commission, and the Santa Barbara County water agency. Following receipt of the views of these agencies the report was submitted to the President through the Bureau of the Budget. On September 24, 1946, the Director of the Bureau of the Budget advised you that the report could not at that time be considered to be in accord with the program of the President. While there was uniform agreement as to the urgent need for enlarging the water supply for the south-coast area to satisfy the needs of both irrigation and municipal demands, and there were no important objections to that portion of the comprehensive plan which would accomplish this, it was evident from the nature of the comments received that, because several units of the comprehensive plan will not be needed in the immediate future, it would be wise to investigate in more detail various related factors before adoption of a comprehensive basin-wide plan.

Accordingly, at my request and because of the urgency of supplying water to the south-coast area, the regional director has concentrated his activities toward that purpose. His investigations fully warrant immediate action toward development of the Cachuma unit of the Santa Barbara County project to meet this need. The further investigations have been carried on with the material assistance of and in close cooperation with the officials of the Santa Barbara County water agency, the cities and towns concerned, the irrigation interests, and the county itself, which has participated in the financing of these investigations.

The basic structures required for this unit include a reservoir on the Santa Ynez River, a transmountain diversion tunnel, a conduit along the south coast, and lateral distribution systems. Local officials are in agreement on the proposed development as attested by resolutions, copies of which are attached to the regional director's report.

The new report by the regional director, dated November 20, 1947, which I approve, is attached, and recommends approval and authorization only for those works necessary to relieve the critical south coast water problem. That report supersedes his report dated June 18, 1945, copy of which is also attached with its substantiating materials and the comments received upon it. The principal revisions as provided in the new report are:

(*a*) The new report asks for approval and authorization of the construction of the Cachuma unit, consisting of Cachuma Reservoir on the Santa Ynez River, a transmountain diversion through the Tecolote tunnel to the south coast area, the Goleta-south coast conduit, and lateral distribution systems in the south coast area.

(*b*) No recommendation is made at this time for a nonreimbursable allocation of a portion of the costs of Cachuma Reservoir to flood control.

(*c*) Data relating to the proposed charges for water are included in the report, and the benefits anticipated are measured on a net basis rather than upon the basis of gross crop returns.

(*d*) The revised report recommends that the entire cost of construction be repaid by the irrigation and municipal water users instead of permitting the writing off of an undetermined portion of the construction costs.

The county board of supervisors and the representatives of the Governor of California, being particularly familiar with water conditions in the area, have urged that prompt action be taken to secure authorization for this initial unit of the basin plan, in view of the critical water shortage now felt in the area. The county has already secured enabling State legislation which will permit the county to enter into contracts with the United States to carry out the plan of development and to enter into contracts for the return of the reimbursable costs of the project works to the United States.

Estimated cost of the Cachuma unit at present construction-cost levels is $28,610,000 for the dam, transmountain diversion tunnel, and conduit, and $3,700,000 for lateral distribution systems. The return of the construction costs of the dam, tunnel, and conduit within approximately 50 years can be reasonably assured by contracts between the United States and the Santa Barbara County water agency under sections 9 (e) and 9 (c) of the Reclamation Project Act of 1939. Construction costs of the lateral distribution systems will be returned under contracts made pursuant to section 9 (d) of that act.

The works proposed for authorization herein are the practical minimum necessary to avert and remedy a critical water shortage affecting the city of Santa Barbara and the adjacent south coast irrigation area. The proposed works have engineering feasibility. The total estimated cost of the proposed construction is $32,310,000. The part of the estimated cost which can properly be allocated to irrigation and probably be repaid by the water users is $20,164,000. The part of the estimated cost which can properly be allocated to municipal water supply or other miscellaneous purposes and probably be returned to the United States is $12,146,000. The total of the foregoing repayable and returnable allocations equals the total estimated cost of construction.

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Respectfully,

Approved and adopte

I recommend that you approve and adopt this report as your proposed report on the Cachuma unit of the Santa Barbara County project to supersede the proposed report of 1945 entitled, "Comprehensive Basin Plan—Santa Barbara County Project," and that you authorize me, in your behalf, to transmit it to the Secretary of the Army and to the State of California in accordance with the provisions of section 1 of the Flood Control Act of 1944 (58 Stat. 887), and to the head of the agency of the State of California exercising administration over the wildlife resources of that State in accordance with the provision of the act of August 14, 1946 (60 Stat. 1080).

Respectfully,

MICHAEL W. STRAUS,
Commissioner.

Approved and adopted: January 7, 1948.

J. A. KRUG,
Secretary of the Interior.

CONTENTS

REPORT OF THE REGIONAL DIRECTOR

ATTACHMENTS TO THE REGIONAL DIRECTOR'S REPORT

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COMPREHENSIVE BASIN PLAN, SANTA BARBARA COUNTY PROJECT, CALIFORNIA

UNITED STATES DEPARTMENT OF THE INTERIOR,
BUREAU OF RECLAMATION,
Region II, Sacramento, Calif., November 20, 1947.

To: The Commissioner, Bureau of Reclamation.
From: Regional director, region II, Sacramento, Calif.
Subject: Comprehensive Basin Plan for Santa Barbara County, Calif.

TRANSMITTAL

1. On October 30, 1945, copies of the Secretary of the Interior's proposed report, Comprehensive Basin Plan—Santa Barbara County Project, California, dated June 1945, were transmitted to the State of California and to the Secretary of War pursuant to section 1 of the Flood Control Act of December 22, 1944, with a request to each agency for written views and recommendations. Also, in accordance with established procedures of the Federal Interagency River Basin Committee, copies of the proposed report were transmitted to the Department of Agriculture and the Federal Power Commission. A copy of the proposed report was sent also to the chairman of the Board of Supervisors of Santa Barbara County, which agency contributed financially to the investigations. The written views and recommendations of the State and the various agencies have been received and copies are transmitted herewith.

2. As a result of the comments, views, and recommendations received from the State and the Federal agencies, and as a result of further conferences with prospective water users, it has been found desirable to make certain revisions in the regional director's letter of June 18, 1945, which letter was a part of the report mentioned above. This letter supersedes that of June 18, 1945. In this revised letter Cachuma Reservoir on Santa Ynez River is recommended for initial construction instead of Camuesa Reservoir proposed in the original letter at a site higher up on the same stream. The principal reasons for the change were: (*a*) Camuesa dam site is located within the existing water supply reservoir of the city of Santa Barbara, and construction difficulties from high water and trouble in maintaining water service to the city during construction were feared; (*b*) the yield of Camuesa Reservoir would not have been sufficient to meet the demands of the water users.

PRESENTATION

3. The tentative plan for development of the water resources of Santa Barbara County, Calif., given in the following pages, is designed to advance the maximum beneficial use of the water resources of the county. The report has been prepared as a Department of Interior

report sponsored by and prepared under the general supervision of the Bureau of Reclamation. It describes the present uses of water, appraises future water needs, and outlines physical works, mainly seven reservoirs, needed to make maximum use of water presently wasting to the ocean. It recommends the authorization and immediate construction of one of the reservoirs (Cachuma) and its related works, urgently needed to protect and maintain existing irrigation and municipal developments.

AUTHORITY FOR THE REPORT

4. This report is authorized to be made by virtue of the Federal reclamation laws (act of June 17, 1902, 32 Stat. 388, and acts amendatory thereof or supplementary thereto).

COOPERATION AND ACKNOWLEDGMENTS

5. The report is the result of the joint efforts and cooperation of numerous Federal, State, and local governmental agencies, water districts, and private citizens, all working toward the development of a comprehensive plan. Outstanding has been the contribution of time, effort, and money by the Board of Supervisors of Santa Barbara County, which entered a cost-sharing contract with the Bureau of Reclamation (12r–13077, dated July 1, 1941, and amendments thereto) under which the investigations leading to this report were performed. The officials of the city of Santa Barbara, representatives of local water districts, and many local citizens have made important contributions in the course of the investigations. Various agencies of the State of California have provided valuable information. Of equal importance has been the participation of five Federal agencies: the Geological Survey, the Fish and Wildlife Service, the National Park Service, the Department of Agriculture, and the Corps of Engineers, the former two of which prepared reports incorporated in the substantiating material. A new report on Cachuma Reservoir by the Fish and Wildlife Service is appended to this letter. Also, the conclusions and recommendations of a report on the recreational value of that reservoir by the National Park Service. The primary responsibility and supervisory work in the preparation of the report was carried on by the Bureau of Reclamation.

DESCRIPTION OF AREA

6. Santa Barbara County is located in the semiarid, mountainous coastal area of California about 100 miles northwest of Los Angeles. The watershed area of 3,600 square miles included in these investigations comprises practically all of Santa Barbara County, and small portions of San Luis Obispo, Ventura, and Kern Counties. The area is about 50 miles wide north to south and about 80 miles long east to west, and includes the drainage areas of Cuyama, Sisquoc, and Santa Maria Rivers, San Antonio Creek, Santa Ynez River, and the long, narrow coastal area situated along the south edge of Santa Barbara County, referred to hereinafter as the south coast area. More than half of the county is mountainous and unsuited to farming. Somewhat less than a third is hilly and is utilized chiefly for dry farming and for raising livestock, and less than a tenth is in irrigated farms.

7. The climate is characterized by a short rainy season in winter and a long dry season in summer. Precipitation consists almost entirely of rainfall, but occasionally snow falls in the mountains. Annual precipitation has varied from 4.49 to 45.21 inches at Santa Barbara, and has averaged 18.4 inches for the 77 years of record. Summers along the coast are cool, while the interior mountain valleys are hot and dry. At Santa Barbara, the mean annual temperature is 60 degrees, and the average frost-free period is 334 days.

8. Santa Barbara County produces large quantities of lemons, walnuts, avocadoes, vegetables, sugar beets, flower seeds, beans, alfalfa, honey, beef, and dairy products on its 1,340 farms, which have a total cultivated area of 150,000 acres. Sixty percent of the cultivated land is dry farmed and 40 percent is irrigated. The dry-farmed lands, devoted largely to beans, hay, and grain, produced an average annual gross crop return of $55 per acre during 1936–40 as compared to $339 per acre for the irrigated land. In 1943 the total gross crop value f. o. b. was $32,000,000, and the livestock and livestock products were valued at $10,000,000.

9. Petroleum production has been and still is important in the county. The diatomite deposit at Lompoc, now highly developed, is probably the largest and richest known deposit of that material. Production of these and other minerals was valued at $8,000,000 in 1940.

10. A total of 75 manufacturing establishments, engaged in food processing, printing, publishing, oil refining, and other plants manufacturing building and industrial materials, produced manufactured products valued at $8,700,000 in 1939.

11. The urban population in 1940 was 46,859, located in the three cities of Santa Barbara (34,958), Santa Maria (8,522), and Lompoc (3,379). The rural population in 1940 was 23,696, which included 8,436 persons living on farms. The population of the county has increased from 70,555 in 1940 to an estimated 87,000 in 1946, an increase of 23 percent. By 1990 the city of Santa Barbara is expected to have a population of 100,000.

12. The scant, undependable surface water supplies which result from the winter rains of November to May are now only partially utilized because of the lack of the large storage reservoirs necessary to conserve them. Water pumped from underground basins is utilized for present irrigation and municipal supplies, except in the city of Santa Barbara and Montecito County water district. In these two areas, both of which are located on the south coast, the residents have found it necessary to import water from Santa Ynez River. This is accomplished by means of two small reservoirs on that stream and tunnels through the Santa Ynez Mountains.

NEED FOR DEVELOPMENT

13. Santa Barbara County is now in urgent need of additional regulated water supplies to maintain existing irrigation, suburban, and urban developments and to provide for normal expansion in the coming years. The most immediate need is in the south coast area, which has a total irrigable area of 29,650 acres. In Carpinteria and Goleta county water districts, which include 24,200 acres of irrigable land, the present use of water by pumping from underground reser-

voirs is estimated to be 9,900 acre-feet annually, compared with a safe yield of 4,800 acre-feet as estimated by the Geological Survey. If this overpumping continues, over one-half of the presently irrigated land in these areas may be forced to revert to dry farming by reason of infiltration of toxic salts from ocean water which may ruin the present ground-water supply or because of excessive lowering or exhaustion of the ground waters. In these areas the existing development cannot be maintained without securing additional water supplies. The present use of water by the city of Santa Barbara exceeds by one-third the dependable supply from all its existing sources. It is fortunate that the past years have been wet because, if drought years like 1898–1900 or 1926–31 had occurred, the city would have experienced a severe water shortage. In Santa Maria Valley it is estimated on the basis of preliminary information that there is an overdraft on the present ground-water supplies, a situation which must be remedied by supplying additional water to the ground-water basins if the present irrigation development is to be maintained. Ground-water supplies in the Santa Ynez and Lompoc Valleys appear to be adequate for present needs, but the irrigation of new lands will require additional supplies which could be obtained in part from the initial unit and subsequently either by enlargement of Cachuma Reservoir, construction of Santa Rosa or Salsipuedes Reservoirs, or use of ground-water storage, or a combination of these methods.

14. Flood control is needed to alleviate the present flood damage along Santa Ynez and Santa Maria Rivers. Recent estimates by the Corps of Engineers place average annual flood damages on Santa Ynez River at $150,000. An earlier estimate for Santa Maria River was $433,600 per annum. The heavy silt loads carried down the streams during floods accumulate in storage reservoirs, thus reducing their effective life and necessitating provision of additional storage for silt. Economical development of hydroelectric power is not practicable because of the extreme variations in run-off and reservoir releases. Navigation is not a factor on any of the streams of Santa Barbara County.

PROPOSED PLAN

15. As a result of extensive surveys made by the Bureau of Reclamation in cooperation with the county of Santa Barbara and others, a tentative county-wide plan has been developed to meet future as well as present water needs of the county. This plan includes seven principal proposed reservoirs and certain related works. The reservoirs, the locations of which are shown on the map facing page 70, are as follows: Camuesa, Cachuma, and Santa Rosa Reservoirs on Santa Ynez River; Salsipuedes Reservoir on Salsipuedes Creek; Round Corral Reservoir on Sisquoc River; and Vaquero and Cuyama Reservoirs on Cuyama River. Exploration of foundations has been performed at all of these sites except Salsipuedes and Cuyama to determine the adequacy of the dam sites for the reservoir capacities proposed. In addition to the reservoirs, a tunnel to carry the water from Santa Ynez River to the south coast area will be necessary, as will certain small regulating reservoirs and lateral distribution systems.

16. The only undeveloped source of water supply for Santa Barbara County is the run-off from winter rains. This run-off is so erratic that reservoirs of unusually large capacity are necessary to regulate it to a

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70, are as follows:

Reservoir	
Camuesa	
Cachuma	
Santa Rosa	
Salsipuedes	
Vaquero	
Round Corral	
Cuyama Debris	

SUMMAR

19. The proposed reserv
irrigation of about 30,000
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By providing for replenishn

dependable year-round supply or to reduce the flood flows to releases which can be utilized to replenish the ground-water basins. The continued use of such ground-water storage will be necessary to any plan for maximum utilization of the new and supplemental irrigation supplies. In the case of the south coast area, where practically all irrigation is now from wells, the additional water would be delivered from reservoirs on the Santa Ynez River to the lands by a tunnel, a gravity conduit, and distribution systems. Since only part of the water supplied to the land for irrigation is consumed through evaporation and transpiration, the remainder will percolate to the underground basin and become available for repumping. In Santa Maria, Lompoc, and Santa Ynez Valleys the new supplies would be made available by the main stream storage reservoirs, which would replenish the ground water through regulated releases which would percolate from the natural stream channels to the underground basins, thus making possible additional pumping. Only through such surface and underground storage, use and reuse of water can maximum conservation of the limited unused water resources for Santa Barbara County be attained.

17. The rights to store and divert waters for the proposed plan will be secured in accordance with established California water laws. In accordance with reclamation law and as practiced by the Bureau of Reclamation since the inception of the reclamation program, the Bureau of Reclamation recognizes and respects existing water rights and those which have been perfected or which are in process of being perfected under State laws. All presently outstanding rights to water for present use or future development based on such rights will be recognized to their full legal extent. This report does not attempt to specify the quantity of water necessary to meet these rights. It is contemplated that this matter will be settled by agreement with holders of these rights.

18. All reservoirs in the comprehensive plan would be used for irrigation, silt storage and flood control. In addition to these purposes, Camuesa and Cachuma Reservoirs would provide municipal water. The capacities of the principal reservoirs, shown on the map facing page 70, are as follows:

Reservoir	Stream	Reservoir capacity, acre-feet
Camuesa	Santa Ynez	125,000
Cachuma	do	210,000
Santa Rosa	do	100,000
Salsipuedes	Salsipuedes	30,000
Vaquero	Cuyama	350,000
Round Corral	Sisquoc	67,000
Cuyama Debris	Cuyama	20,000

SUMMARY OF ACCOMPLISHMENTS

19. The proposed reservoirs listed above would provide water for irrigation of about 30,000 acres of land now dry farmed or used for pasture, and a supplemental supply for 40,000 acres now irrigated from ground-water supplies adequate only for about 27,000 acres. By providing for replenishment of ground water in quantities sufficient

to care for this present overdraft, which is about 20,000 acre-feet per year, the reservoirs would assure against intrusion of damaging ocean water which otherwise might cause eventual abandonment of valuable lands along the coast. Also, water would be made available for municipal uses. In addition, the present average annual flood damage in Santa Maria and Santa Ynez Valleys, estimated at $433,600 and $150,000, respectively, by the Corps of Engineers, could be greatly reduced by the reservoirs. Other real but less tangible benefits to the county from the proposed reservoirs and related works include increased taxable values and increased population and business.

20. Since most of the reservoirs listed above will not be required for many years and since costs of construction at the time of building are not possible of prediction, authorization of only Cachuma Reservoir is recommended in this report. Separate reports for the additional reservoirs will be prepared as needed. These reports will be based on conditions then existing and upon the results of the continuing investigations relating to flood control, ground water, and other matters as proposed in this report and in my previous report of June 18, 1945. It is expected that the next report to be prepared will cover Santa Maria Valley, its need for additional water and flood control, and the extent to which those needs can be met by the construction of a reservoir or reservoirs at Vaquero and Round Corral sites.

CACHUMA UNIT

21. The initial program herein recommended would include as its primary feature Cachuma Reservoir, with a capacity of 210,000 acre-feet, to store floodwaters of the Santa Ynez River which now waste to the ocean. Of this gross capacity, 34,000 acre-feet is for storage of silt. At past rates of silting on Santa Ynez River, this capacity would be adequate for 60 to 80 years. With the program for prevention of erosion proposed and now under way by the Department of Agriculture in the Santa Ynez River watershed, the storage provided for silt should be adequate for a much longer period, possibly several times the figures named above. Water would be released downstream to meet rights prior to those of the Bureau, and additional releases would be made to the extent the Santa Ynez district desires to purchase water from the development. The remaining water would be diverted to the south coast area through the 6-mile Tecolote tunnel (located just east of the former Tequepis tunnel site). From the tunnel outlet, the water would be carried eastward through the Goleta-South Coast Conduit, a gravity pipe line about 30 miles long.

COSTS

22. The total estimated costs of the recommended construction is $32,310,000 at 1947 price levels. (See following tabulation.) Of this total, $3,700,000 represents the estimated costs of lateral distribution systems for 24,200 acres in the Goleta and Carpinteria County water districts and is reimbursable by these districts. Assuming no future allocation to other uses, the remainder, $28,610,000, would be repaid by the users of the water through contracts with the Santa Barbara County Water Agency. These costs, as well as the annual costs to the Nation (capital costs amortized at 3 percent in 50 years), are itemized in the following tabulations:

CACHUMA UNIT, S

Cachuma Dam (reservoir capacity, 210,0
Reservoir right-of-way and highway reloc
Tecolote tunnel (in lieu of Tequepis tunn
Goleta-South Coast conduit
Total
Lateral systems (Goleta and Carpinteria
Total construction
Annual operation, maintenance and repl
(1) Dam, reservoir, tunnel, conduit
(2) Lateral distribution system (Gol districts)
Investigations and surveys
Total

[1] Proportion of Bureau of Reclamation County which is properly chargeable to payment.

23. The return of constr works ($28,610,000, includ the investigations) would b of the Reclamation Projec and the Santa Barbara Co by the California Legislat water supplies for the cou the agency in question is to be prescribed in such co sufficient to return constru 50 years. (See par. 24.)

24. The dependable ann at the outlets of Cachum at 33,000 acre-feet, based 1923 to 1931. Precipitat to 1902 may have been s but stream flow records pendable yield would be in under present conditions i by the city council of the direction of the various wa for the following minimum ing maximum rates. (Co

City of Santa Barbara
Goleta County water district
Montecito County water district
Carpinteria County water district
Santa Ynez River Water Conservation
Summerland (tentative)
Total

[1] Optional.

	Construction cost	Amortized annual cost
Cachuma Dam (reservoir capacity, 210,000 acre-feet)	$14,145,000	$550,000
Reservoir right-of-way and highway relocation	3,350,000	130,000
Tecolote tunnel (in lieu of Tequepis tunnel)	4,080,000	159,000
Goleta-South Coast conduit	6,935,000	269,000
Total	28,510,000	1,108,000
Lateral systems (Goleta and Carpinteria County water districts)	3,700,000	144,000
Total construction	32,210,000	1,252,000
Annual operation, maintenance and replacement costs:		
(1) Dam, reservoir, tunnel, conduit		50,000
(2) Lateral distribution system (Goleta and Carpinteria County water districts)		70,000
Investigations and surveys	[1] 100,000	
Total	32,310,000	1,372,000

[1] Proportion of Bureau of Reclamation expenditure for investigation of water resources in Santa Barbara County which is properly chargeable to the limited project now recommended for construction and repayment.

REPAYMENT

23. The return of construction costs of Cachuma Dam and related works ($28,610,000, including an appropriate portion of the cost of the investigations) would be covered by contracts under section 9 (e) of the Reclamation Project Act of 1939 between the United States and the Santa Barbara County Water Agency, an entity authorized by the California Legislature for the purpose of securing additional water supplies for the county. Assurances have been obtained that the agency in question is agreeable to inclusion in the rate or rates to be prescribed in such contracts of a construction charge component sufficient to return construction costs within a period of approximately 50 years. (See par. 24.)

24. The dependable annual yield of new water available for sale at the outlets of Cachuma Dam and Tecolote tunnel is estimated at 33,000 acre-feet, based on a drought cycle such as occurred from 1923 to 1931. Precipitation records indicate that the period 1894 to 1902 may have been somewhat drier than that of 1923 to 1931 but stream flow records are inadequate to estimate what the dependable yield would be in the event of a recurrence of such a drought under present conditions in the basin. Resolutions have been passed by the city council of the city of Santa Barbara and the boards of direction of the various water districts indicating a willingness to pay for the following minimum amounts of water annually at the following maximum rates. (Copies of the resolutions are appended:)

	Minimum first year	Minimum thirty-seventh year	Maximum rate for water
	Acre-feet	*Acre-feet*	*Dollars per Acre-foot*
City of Santa Barbara	3,300	10,500	35
Goleta County water district	3,300	11,900	25
Montecito County water district	500	3,000	25
Carpinteria County water district	1,000	3,800	25
Santa Ynez River Water Conservation District	500	[1] 3,300	10
Summerland (tentative)	100	500	25
Total	8,700	33,000	

[1] Optional

Sales at the amounts and rates shown above would return over $32,000,000 in 50 years. Total collections would therefor be ample to pay operation and maintenance costs, estimated at $50,000 per year, and repay the capital cost of $28,610,000 in about 50 years. If the use of water during the first 37 years proves to be greater than the minimums assumed, and this is believed quite likely, the cost could be retired in less than 50 years. The county, through its board of supervisors, has announced its intention to aid the users of water from Cachuma unit to the extent of $100,000 per year. This amount would be raised by a country-wide tax.

25. The spirit of cooperation shown by the city, the irrigation interests, and the county as a whole in joining in the construction of a project which is too large for either the city or irrigation interests to underwrite separately augurs well for the success of the project.

26. The cost of the lateral distribution systems for Goleta and Carpinteria districts, estimated at $3,700,000, would be repaid by the districts under contracts entered into pursuant to section 9 (d) of the Reclamation Project Act of 1939.

REPAYMENT CAPACITY

27. As stated above, the city of Santa Barbara has expressed a willingness to pay $35 per acre-foot for water, the irrigation interests on the south coast $25 per acre-foot. The Santa Ynez River water conservation district has passed a resolution directing its officers to negotiate for water at $10 per acre-foot.

28. A study of the operation reports of the city water department indicates that it can pay $35 per-acre foot for additional water.

29. Studies have been made of farm income and cost of crop production for irrigated agriculture in the south coast area and Santa Ynez Valley, based on the average 1939–44 price level. The data were obtained from the Department of Agriculture, University of California, Extension Service, county agricultural commissioner, local fruit exchanges, and farmers. These studies show, after allowance for all costs except water, an average capacity by the water users for payment of all water charges of $97 per acre in the south coast area and $68 per acre in the Santa Ynez Valley. Because of the risk involved in the production of highly specialized crops such as lemons, avocados, and vegetables, the maximum amount that the water users reasonably could be expected to pay for water would be about $58 per acre in the south coast area and $40 per acre in the Santa Ynez Valley. For the south coast area the annual water requirement is one acre-foot per acre, corresponding to a water charge of $25 per acre at the district boundaries for the maximum rates accepted by the county water districts. The Goleta and Carpinteria County water districts would have an additional yearly cost for the construction, operation, and maintenance of their distribution systems amounting to an estimated maximum of $13 per acre. For the Santa Ynez Valley the annual water requirement is 2 acre-feet per acre, corresponding to a water charge of $20 per acre at the district boundary. It is apparent that the estimated farm returns available for water charges, of $58 and $40 per acre, would be ample to pay for the new water supply, even after inclusion of the costs of the lateral distribution system required in the Goleta and Carpinteria County water

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BENEFITS

30. The development of the Cachuma unit would result in benefits of primary importance from the use of stored water for continuing present agricultural production, a substantial portion of which will go out of production in the absence of an additional supply of water, expanding the acreage devoted to irrigation farming, and providing a needed additional water supply for the city of Santa Barbara and suburban homes. In addition, but not used in the computation of the benefit-cost ratio, there will be substantial benefits from the flood protection and recreation value afforded by the reservoir.

31. The irrigation benefits used are the net direct benefits, determined by subtracting from increased annual gross farm income all increased costs of production, interest on investment, and an allowance for family living. These net benefits are $97 per acre-foot in the south coast area and $33 per acre-foot in the Santa Ynez Valley. They average about $88 per acre-foot of water used and represent total direct irrigation benefits of $1,424,800 per year. Over and above this benefit to the water users, numerous indirect benefits would accrue to the local area, to the State, and to the Nation. The increased farm production will support additional activity in processing and packing of agricultural products, transportation, and trade. Farming opportunities as well as opportunities for nonfarm business and service enterprises will be greatly increased.

32. The determination of the benefits of providing domestic and industrial water supplies to the urban acres is more difficult than the determination of the benefits of providing water for irrigation purposes. The severity of the situation which would prevail in these prosperous urban areas, with their increased population and industry, cannot be overemphasized if Santa Barbara County were to have another of its recurring droughts before an increased water supply can be provided. Under these conditions, a water supply would not be evaluated in terms of benefits. It would be considered an emergent necessity. In evaluating the benefits from domestic and industrial water for this report such benefits have been taken as exceeding the benefits from agricultural water in the same proportion as the rates per acre-foot for city water indicated in the tabulation of paragraph 24 exceed the irrigation rates for the south coast area. On this basis the direct benefit from domestic and industrial water is estimated at $136 per acre-foot, or a total of $1,066,000 for the supply which would be made available from the proposed Cachuma Reservoir.

33. Even with full use of Cachuma Reservoir for conservation, a substantial measure of flood protection will result along the Santa Ynez River although such protection cannot be assured for any given flood or any given period. No estimate has been made of the portion of the annual flood damages ($150,000 estimated by Corps of Engineers) that would be prevented by the operation of the reservoir for conservation and, therefore, no benefits are claimed at this time.

34. Cachuma Reservoir would have considerable recreational value. Picnic and camp grounds along the shorelands could be provided, as could sites for summer cabins and group camps. Boating and angling on the reservoir probably would prove popular. The relocated highway would become a scenic drive. Because the reservoir would be used to a large extent for domestic water supply, the local officials have indicated that swimming should not be permitted, but water released below the reservoir might be channeled through a pool suitable for swimming. The National Park Service has estimated that if suitable facilities are provided the recreational benefits from use of picnic areas, camp grounds, summer cabins, and group camps attributable to the reservoir would total $99,000 annually, not including benefits from fishing in the reservoir, estimated by the Fish and Wildlife Service at $10,000 annually. Whether the recreational benefits are realized to the extent estimated by the National Park Service will depend on the degree to which the local interests wish to develop the recreational potentialities of the reservoir. The National Park Service recommends that development, administration and maintenance of the recreational facilities and opportunities, which will be created by the reservoir, be by Santa Barbara County or some other local agency. Appended to this report are the conclusions and recommendations of the National Park Service as contained in its report of November 1947 on Cachuma Reservoir project, California, Code No. XIV/108.

35. The Fish and Wildlife Service has estimated that construction and operation of Cachuma unit will result in an annual loss of $80,000 due to the reduced spawning grounds available to steelhead and an annual benefit of $10,000 from the increased fish production in the reservoir. This represents a net annual loss of $70,000 to fish and wildlife conservation.

36. The average annual net direct benefits, computed upon the indicated rate of increase in water use shown under repayment, are $1,424,000 from irrigation and $1,066,000 from municipal water as computed above. Deducting the annual loss of $70,000 in fish and wildlife benefits, the total annual net direct benefits amount to $2,420,000. Such net direct benefits exceed the annual cost of the development ($1,372,000) in the ratio of 1.76 to 1. The comparison of benefits and costs for this unit is clearly favorable without including the other direct benefits of flood control and recreation, or any of the important indirect benefits.

FEASIBILITY OF CACHUMA UNIT

37. The engineering feasibility of the Cachuma unit of Santa Barbara County project has been amply demonstrated through water supply studies, reservoir and dam site surveys, drilling of the dam site, testing of construction materials and investigation and location of the tunnel, conduit and distribution systems. Estimates based on 1947 prices give a total cost for Cachuma Reservoir, Tecolote tunnel and the south coast conduit of $28,610,000. The lateral distribution systems for Goleta and Carpinteria water districts would cost an additional $3,700,000. A preliminary estimate drawing of Cachuma Dam is found facing page 50 and a tabulation showing the estimate of cost for the dam is on pages 48–50.

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38. The part of the estimated cost of Cachuma unit which can properly be allocated to irrigation and probably be repaid by the water users is $16,464,000, and the part which can properly be allocated to municipal water supply and probably be returned to the United States is $12,146,000, a total of $28,610,000. The entire cost of the lateral distribution systems for Goleta and Carpinteria County water districts, $3,700,000, would be allocated to irrigation and would be repaid by those districts.

39. The benefits of flood protection have not been estimated and no allocation of costs to flood control is proposed at this time.

40. Navigation is not involved and production of power is not feasible.

41. A future allocation to recreation would be justified, if enabling legislation for this type of allocation is enacted by Congress, but no allocation is proposed at this time.

42. Since the Cachuma unit has engineering feasibility and the repayable allocations to irrigation and municipal water supply equal the estimated cost, the project is qualified for authorization under reclamation law. If, in the future, legislative provision is made for nonreimbursable allocations to various additional purposes, the allocations herein proposed to municipal and irrigation water uses may be recomputed.

43. Local participation and interest in the preparation of plans for comprehensive water development has been excellent ever since Santa Barbara County entered the first of a series of contracts with the Bureau of Reclamation to share in the cost of the investigations for this report. The initial program herein proposed has been well received locally. An act was passed by the State legislature creating the Santa Barbara County water agency. This agency embraces the whole of Santa Barbara County, and as previously stated, is empowered, through the county board of supervisors, as ex officio directors thereof, to enter into contracts with the United States or others for construction of works, sale of water, and repayment of the reimbursable costs.

RELATED INVESTIGATIONS

44. (*a*) In order to obtain basic facts related to both surface water and ground water of Santa Barbara County, the Geological Survey has recommended a continuation of the investigational program which it is now carrying out for the county, estimated to cost about $16,000 annually, with an additional cost for rehabilitation, readjustment, and expenses of $55,000 over a 2-year period. It is anticipated that Santa Barbara County will pay one-half the cost of the continuing program, or $8,000 to $12,000 annually, as it has been doing since the inauguration of the cooperative program in November 1940 when the first steps were taken toward preparation of a comprehensive plan. The basic water facts obtained and to be obtained by the Geological Survey are needed for use not only in the design, construction, and operation of the plan herein recommended, but also in the future planning, construction, operation, and administration of other structures, involving the development of additional water for the region. The Survey's investigations should be actively prosecuted so that the data secured shall be continuous and representative. Also, the Geological Survey

has recommended that plan and profile surveys be made of the Santa Maria, Cuyama, Sisquoc, and Santa Ynez Rivers and some of the larger tributaries at a cost of $16,000. The State in its comments advocated additional studies of flood control and ground water.

(*b*) The streams of Santa Barbara County are at the extreme southern range of the steelhead, an anadromous variety of rainbow trout. Angling for them is a sport of considerable importance. The Fish and Wildlife Service has made preliminary studies of the streams of the county in connection with this report, and as a result has made a number of specific recommendations designed to improve conditions for fish life. The Bureau of Reclamation concurs in the objectives of these proposals. However, due to the very limited streamflows which prevail during the long series of dry years which occur in this area, it is impossible in some cases to assure the release of as much water as recommended for fish. In other cases, the recommended releases could only be made by the exclusion of irrigable land of high productive value. The Fish and Wildlife Service has recognized the high priority of uses of water for irrigation and municipal purposes and the high cost of construction necessary to convert the flashy flood flows of these streams to a dependable supply for such uses, and in a report on Cachuma unit made in November 1947 it has scaled down its previously requested releases from Cachuma Reservoir for fish. Also, the fish hatchery formerly requested in connection with that reservoir has been eliminated. A copy of this new report by the Fish and Wildlife Service, prepared in cooperation with the State division of fish and game, is appended. Every effort will be made to provide water and to so operate Cachuma Reservoir as to maintain the existing spawning grounds below the proposed Cachuma Dam. The reservoir, with a minimum water surface area of 900 acres at dead-storage level and a maximum water surface area of 3,020 acres, would provide increased upstream angling to help offset the loss of spawning grounds between Cachuma and Gibraltar Dams.

(*c*) As mentioned previously, the studies of the National Park Service have shown that Cachuma Reservoir would offer good recreational opportunities. The National Park Service, in cooperation with the Bureau of Reclamation and the local interests, should prepare a master plan for the reservoir area to insure that the recreational potentialities will be considered fully in developing the project, keeping in mind the effect on the water supplies for municipal use.

(*d*) Investigations of the Department of Agriculture, and others, indicated a real and important need for the adoption and improvement of widespread upstream watershed conservation practices, and this resulted in recommendation of measures for the prevention of fires and soil erosion, and the reforestation and revegetation of burned-over areas. The Bureau of Reclamation concurs with these recommendations because the useful life of any reservoir built in this area will be prolonged if the presently high rates of silt accumulation are reduced. Other upstream watershed conservation practices proposed certainly will be valuable to the county and to the Nation. In the Flood Control Act of December 22, 1944 (Public Law 534, 78th Cong.), the Congress has authorized a program for waterflow retardation and prevention of soil erosion on the Santa Ynez River watershed. This program, on which work already has started, should be carried out promptly.

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46. It is recommended—

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(e) Through mutual cooperation between the Corps of Engineers and the Bureau of Reclamation much valuable information has been exchanged throughout these studies. Flood damages and flood-control benefits evaluated by the Corps of Engineers have been accepted by the Bureau of Reclamation. Additional work remains to be done for the Santa Maria drainage basin before its flood and water-conservation problems can be solved. This work should be continued and a report rendered at an early date for Santa Maria Valley.

CONCLUSIONS

45. The only source of new water supply for Santa Barbara County is the flood flows which now escape unused to the ocean. Suitable reservoir sites, as indicated in the report, are available to convert these flood flows into usable supplies for irrigation, domestic, and municipal purposes. There is immediate need for additional water to care for present overdraft and near-future needs. This need can most readily be met by construction of the Cachuma unit, as described above. The construction has engineering feasibility and its cost can be fully repaid in about 50 years at reasonable rates for water. Need exists also for flood control and conservation on Santa Maria River.

RECOMMENDATIONS

46. It is recommended—

(a) That the following principal features and related works, constituting the Cachuma unit of the Santa Barbara County project, be authorized to be constructed, operated, and maintained by the Bureau of Reclamation, Department of the Interior, pursuant to the Federal reclamation laws (act of June 17, 1902, 32 Stat. 388, and acts amendatory thereof or supplementary thereto) substantially in accordance with the plans set forth in this report, with such modifications as may be recommended by the Commissioner and approved by the Secretary of the Interior after full consultation with local interests and the State of California:

Cachuma Reservoir
Tecolote tunnel (in lieu of Tequepis tunnel)
Goleta-South Coast conduit
Goleta and Carpinteria County Water Districts lateral distribution systems

(b) That the Secretary of the Interior be requested to adopt this report as his proposed report on the Cachuma unit of the Santa Barbara County project:

(c) That, having adopted this report as his proposed report, he be requested to authorize transmittal of copies of it to the Secretary of the Army and to the State of California as required by the Flood Control Act of 1944 and to the appropriate official of the State of California as required by the Act of August 14, 1946, for their comments and recommendations;

(d) That, upon the receipt of those comments and recommendations, this report be submitted to the President and the Congress along with the Secretary's findings as to all the matters with respect to which findings and reports are required to be made

under section 9 (a) of the Reclamation Project Act of 1939; and that thereupon, unless the comments of the Secretary of the Army or of the State of California set forth objections thereto, the project herein recommended be deemed authorized.

47. It is further recommended that the investigation of the Santa Maria drainage basin be actively continued.

RICHARD L. BOKE.

SANTA BARBARA COUNTY PROJECT

UNITED STATES BUREAU OF RECLAMATION RECOMMENDATIONS FOR FISHERY MAINTENANCE, SANTA YNEZ RIVER, CALIF.[1]

In its river basin report on water developments in Santa Barbara County[2] the United States Bureau of Reclamation proposed three dams, Camuesa, Cachuma, and Santa Rosa, for the Santa Ynez River, and one dam for Salsipuedes Creek. Two dams—Vaquero and Round Corral—were proposed for Santa Maria River.

A report recommending facilities for fish protection, in the event these dams were built, was prepared by the Fish and Wildlife Service and submitted to the Water Resources Committee on February 21, 1945. It was included as an appendix to a second basin development report issued by the Bureau of Reclamation in June, 1945.[3] This report placed particular emphasis on the needs for fish protection above and below Camuesa Dam, the uppermost dam on the Santa Ynez River, which was to have been built as the first unit in the comprehensive plan.

More recent water development plans for the Santa Ynez River project recommend Cachuma Reservoir for immediate construction. It will be formed by an earth-fill dam (185 feet high to crest of the spillway sill) across Santa Ynez River immediately above the mouth of Hilton Canyon Creek, and 3.6 miles upstream from the mouth of Santa Agueda Creek in the general vicinity of the town of Santa Ynez, Calif. Eighteen feet of storage capacity above the spillway sill level will be provided to temporarily store flood flows in excess of spillway capacity. This storage would be used only in occasional years.

The reservoir will have a storage capacity of 210,000 acre-feet, a dead storage reservation of 34,000 acre-feet, and an annual yield of 33,000 acre-feet. Water from the reservoir will be drawn off at dead storage level (90 feet below spillway crest), and will be transported through a tunnel (Tecolote tunnel) to the city of Santa Barbara and its surrounding agricultural communities. Water would be released down the channel of Santa Ynez River as required to meet downstream senior rights, and there exists the possibility of releasing an additional 3,300 acre-feet annually in addition to that released to satisfy outstanding rights, for use in Santa Ynez Valley, provided the water users decide to subscribe to that amount.

All of the firm yield of Cachuma Reservoir will not be used by contracting interests at the beginning of project operation. However, as the area develops, additional water will be required so that ultimately the entire yield will be used. The Bureau of Reclamation estimates that this full utilization stage will be reached in 37 years or less.

Santa Ynez River is of major importance as a spawning ground and nursery stream for the largest steelhead trout run in southern California. It is also the source of many game fish stocked in the waters of Santa Barbara, Ventura, and San Luis Obispo Counties.

The average size of the spawning run of steelhead in Santa Ynez River is estimated by competent personnel of the California State Division of Fish and Game at 20,000. The size of individual annual runs ranges between 13,000 and 25,000 fish. These fish and their progeny are eagerly sought after by sportsmen in California. Statistics compiled by the California Division of Fish and game show approximately 262,000 trout caught by 4,375 anglers in 1941; 129,000 trout caught by 3,210 anglers in 1942, and 146,000 trout taken by 2,700 anglers in 1943 in the waters of Santa Barbara County. Steelhead trout are included in these

[1] Report prepared by James W. Moffett and Reed S. Nielson, U. S. Fish and Wildlife Service, Central Valley Investigations, Stanford University, Calif.

[2] U. S. Bureau of Reclamation, Region II, Basin Report Santa Barbara County, Calif., Water Resources and Utilization, Sacramento, Calif., January 1945.

[3] Comprehensive Basin Plan, Santa Barbara County project, Calif.: Santa Maria, Santa Ynez, and related basins: water resources and utilization. Region II, U. S. Bureau of Reclamation, Project Planning Report 2-3,1-3. June 1945.

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totals and cannot be segregated. Their offspring are also included since they constitute the bulk of the catch made by summer anglers. Not all of the fish taken were supplied by Santa Ynez River and its tributaries. But, since it is the major stream in the county, it can be safely assumed that the majority of the catch came from that stream.

It is difficult to appraise the value of this fishing and that of the brood stock which keeps it supplied. However, it is believed that each adult steelhead entering Santa Ynez River is worth about $10. The average annual value of the steelhead run is approximately $160,000. In every dry years the steelhead run does not gain access to Santa Ynez River in any degree of success during the fishing season (season ends February 28). Because of this condition, the total value of $200,000 annually cannot be realized.

Cachuma Dam will remove from availability about two-thirds of the best spawning grounds in the Santa Ynez River system. Since the dam's height will make unlikely the construction of a functional fishway over it, maintenance of the present steelhead run must be attempted in that portion of the river below this obstruction.

Subsequent to project construction there will remain about 11 miles of good spawning stream between the dam and the town of Solvang and 22 miles of stream of doubtful quality between Solvang and the mouth of Salsipuedes Creek. The remaining 14-mile section of stream between the mouth of Salsipuedes Creek and the ocean is entirely unsuited for steelhead spawning. Some spawning can be expected to occur in tributary streams below Cachuma Dam during years when run-off is sufficiently large to result in stream flow during the period February through June. Spawning areas remaining in Santa Ynez River below Cachuma Dam will be insufficient to accommodate the present runs of steelhead. It is estimated that these runs will suffer losses amounting to approximately 50 percent, or $80,000 annually.

Maintenance of a segment of the present runs of steelhead in Santa Ynez River, when Cachuma Dam is constructed, will require water flows adequate to make the 33 miles of stream below the dam satisfactory spawning and nursery grounds. Flood and winter run-off below the dam will provide sufficient water in most years to enable the steelhead to enter the river. But Cachuma Dam will retain virtually all of the stream flow originating above it, and will leave the stream bed, immediately below, practically dry except for the rather insignificant contributions of Santa Agueda, San Lucas, Sanja Cota, and Quiota Creeks.

Water discharges at Lompoc during the period 1928–44, were great enough to allow immigration of spawning steelhead in all years except probably 1929 and 1931. Normally, a bar forms across the mouth of Santa Ynez River during periods of low flow and an extensive lagoon is formed. This bar prevents access to the river from the ocean. It is either washed out by the river or it is removed by the Southern Pacific Co. each winter. Immigrant steelhead apparently await the break in the bar and move into the river whenever the break occurs. Upstream migrations are likely to occur in December, January, February, March, or even April. With Cachuma Reservoir in operation, it seems certain that the bar at the mouth of the stream will remain intact for extended periods.

Because of erratic run-off and precipitation cycles in the drainage of Santa Ynez River, a relatively large reservoir must be constructed to provide a rather small firm yield of water. The reservoir will fluctuate greatly and will hold over, from one season to another, large quantities of water. At times, the hold-over will extend for several years. During such dry cycles, the reservoir will never fill and will approach dead storage level each year.

According to operational studies made by the Bureau of Reclamation for the years 1917–42, the reservoir would have spilled water in only 5 winters out of 25. These spills would have occurred in 1918, 1922, 1938, 1941, and 1942. From 1918 to 1922, the reservoir surface would have fallen 45 feet with minor seasonal changes. In 1922, run-off would have filled the reservoir and spilled 9,373 acre-feet of water downstream. The reservoir level would have fallen 56 feet from 1922 to 1926 and then risen to within 1.6 feet of the spillway crest in 1926 and 1927. After 1927, the reservoir surface level would have dropped each year until 1932 when it would have been only 2 feet above dead-storage level and some 88 feet below the spillway crest. From 1932 to 1937 the reservoir level would have remained between 35 and 81 feet below the spillway crest. Precipitation in the winters of 1937 and 1938 would have filled the reservoir to capacity and, in 1938, 198,777 acre-feet of water would have spilled. After 1938 and until the end of the operation period the reservoir level would have fluctuated only 24 feet. In 1941, the reservoir would have spilled 360,311 acre-feet of floodwater.

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The production of fish in a reservoir of this type would vary extremely. The only dependable reservoir volume in which production could be assured is that reserved for dead storage. On the basis of river-basin evaluations, the fish production in the dead storage of Cachuma Reservoir (area 960 acres) would be worth about $10,000 annually.

In the Service's report on fish and wildlife which was appended to the Bureau of Reclamation report: "Comprehensive Basin Plan, Santa Barbara County Project, California," dated June 1945, a minimum release of 15 second-feet from Cachuma Reservoir was recommended for fishery maintenance. Such a release would require 10,840 acre-feet or 32.8 percent of the firm yield (33,000 acre-feet) each year. Despite the desirability of, and need for, the stated flow to maintain adequate steelhead trout stocks below that dam, the delivery of that amount of water for fishery maintenance is not possible if the project is to serve its purpose.

In consideration of present Bureau of Reclamation plans for Cachuma Reservoir, the following recommendations are made. They recognize the fact that the section of Santa Ynez River below the dam is insufficient to support present steelhead populations.

1. Flow in Santa Ynez River as measured just below the mouth of Santa Agueda Creek should be maintained as follows:

(a) December 16 to February 28—15 second-feet as long as natural runoff below the dam is sufficient to maintain a flow of 25 second-feet at Robinson Bridge. Whenever the flow at Robinson Bridge becomes less than 25 second-feet during this period, supplemental releases should be made from the reservoir sufficient to maintain such a flow.

(b) March 1 to May 31—10 second-feet.

(c) June 1 to December 15—5 second-feet. During the period of construction and initial filling, releases should be made from Cachuma Reservoir in accordance with this schedule.

2. The flow in Santa Ynez River from Cachuma Dam to the mouth of Santa Agueda Creek should never be less than 2 second-feet as measured immediately above the junction of the two streams.

3. Surplus water over present and future contractual needs should be reserved by enabling legislation to the State for use in fishery maintenance until contracted for by water users.

4. Water for all downstream use should be released so as to benefit fish whenever practical.

5. A concrete, box-type culvert should be constructed through the bar at the mouth of Santa Ynez River leading from normal lagoon level to low-tide level outside. Such a structure would aid in the maintenance of normal lagoon levels and provide passageway for fish at all times.

6. Water releases from the reservoir should be made at the lowest practicable level in the dam.

7. A stilling basin should be incorporated in the outlet works to avoid excessive turbulence and to aerate water.

8. Trapping and holding facilities should be provided below the stilling basin for salvage of adult steelhead and to effect the transfer of same to the reservoir and stream above the dam. These facilities should be operative by December 1, following the start of dam construction.

9. Outlet tunnel should be as fully screened against passage of fish as possible.

10. The use of Santa Ynez River as a dumping place for construction debris must be prevented, and all unnecessary pollution of the stream should be avoided.

11. The reservoir area should be open to free public use and leases of land within the area should stipulate the right of public access for the purpose of hunting, fishing, and other recreational uses.

12. Management of the fishery resources on the project should be vested in the State of California.

EXCERPT FROM REPORT BY NATIONAL PARK SERVICE "CACHUMA RESERVOIR PROJECT, CALIFORNIA, CODE NO. XLV/108," DATED NOVEMBER 1947

CONCLUSIONS AND RECOMMENDATIONS

(a) The proposed Cachuma Reservoir will fulfill a present need for additional domestic water supply for the city of Santa Barbara as well as turn much irrigable land into a productive status.

(b) By creation of the reservoir very desirable recreational areas adjacent to the reservoir will be formed. The Cachuma Reservoir will assist in fulfilling the

definite existing recreational need
well as furnish recreation to many
furnish recreation of such varied typ
camps, summer homes, water sports

(c) The anticipated use is 49,000

(d) The net annual monetary rec

(e) It is recommended that the
the county board of forestry be the
tration, and maintenance of recre
locally to assume this responsibility,
public should take place.

(f) Development of Cachuma Re
National, State, or local parks or m

(g) Historical and archeological
area before any construction is start

(h) Approximately 980 acres of
National Forest patented land sho
posed recreational development an
reservoir area.

(i) Recreational development sh
which is 5 feet above maximum wa

(j) A master plan study should
of the individual areas. The propo
interested county and local groups
adequately meet the present and fu

RESOL

A RESOLUTION OF THE COUNCIL OF
TIVE TO THE NEGOTIATING OF A
WATER AGENCY FOR THE PURC
ACRE-FOOT, OR LESS, AND TO O

Whereas the Water Commission
October 1, 1947, unanimously rec
with the Santa Barbara County W
of water, upon the completion of a
Ynez River, and appurtenant work
Bureau of Reclamation, and that
sively increased to a maximum o
after completion of said project; p
9E contract, at the rate of $35 per a

Whereas the mayor and the me
sideration to the recommendation
Barbara; and

Whereas the mayor and the mer
selves as to the problem of the city
of water for use of its inhabitants:

The Council of the City of San
of said city shall enter into negoti
Agency for the purpose of entering
chase of water at the rate of $35 pe
most feasible plan: Be it further

Resolved, That the execution of
approval of the same by a vote of
manner provided by law.

STATE OF CALIFORNIA,
County of Santa Barbara,

I, Faye Canfield, City Clerk of
certify that the foregoing Resoluti
Council of the City of Santa Bar
2:00 P. M., and was adopted by th

Yeas: Council members: Fl
MacGillivray, Stewart S. Mai

Nays: Council members: N

Absent: Council members:

definite existing recreational need of Santa Barbara and county in general as well as furnish recreation to many living as far away as Los Angeles. It will furnish recreation of such varied types as day use, campgrounds, organized group camps, summer homes, water sports, and recreational concessions.

(*c*) The anticipated use is 49,000 visitor-days per year.

(*d*) The net annual monetary recreational benefit is estimated as $99,300.

(*e*) It is recommended that the Santa Barbara County Park Authority under the county board of forestry be the responsible agency for development, administration, and maintenance of recreational facilities. If there is no disposition locally to assume this responsibility, no recreational developments for the general public should take place.

(*f*) Development of Cachuma Reservoir will not affect any existing or proposed National, State, or local parks or monuments.

(*g*) Historical and archeological investigations should be conducted in the area before any construction is started.

(*h*) Approximately 980 acres of private land and 133 acres of Los Padres National Forest patented land should be acquired in connection with the proposed recreational development and to effectively administer and protect the reservoir area.

(*i*) Recreational development should not be undertaken below elevation 773 which is 5 feet above maximum water level.

(*j*) A master plan study should be made of the entire area and detailed plans of the individual areas. The proposals for development should be correlated with interested county and local groups in order to formulate a plan that will most adequately meet the present and future needs of the community.

Resolution No. 1926.

A Resolution of the Council of the City of Santa Barbara, Calif., Relative to the Negotiating of a Contract With the Santa Barbara County Water Agency for the Purchase of Water at the Rate of $35 Per Acre-Foot, or Less, and To Obtain Water by the Most Feasible Plan

Whereas the Water Commission of the City of Santa Barbara, at its meeting on October 1, 1947, unanimously recommended "that the City Council contract with the Santa Barbara County Water Agency for a minimum of 3,300 acre-feet of water, upon the completion of a 210,000 acre-foot capacity dam on the Santa Ynez River, and appurtenant works at a site to be selected by the United States Bureau of Reclamation, and that said amount of contracted water be progressively increased to a maximum of 10,500 acre-feet in the thirty-seventh year after completion of said project; payment for said water shall be based upon a 9E contract, at the rate of $35 per acre-foot"; and

Whereas the mayor and the members of the city council have given due consideration to the recommendation of the Water Commission of the City of Santa Barbara; and

Whereas the mayor and the members of the city council have informed themselves as to the problem of the city of Santa Barbara with respect to the acquiring of water for use of its inhabitants: Now, therefore

The Council of the City of Santa Barbara do hereby resolve that the council of said city shall enter into negotiations with the Santa Barbara County Water Agency for the purpose of entering into a contract with said agency for the purchase of water at the rate of $35 per acre-foot, or less, and to obtain water by the most feasible plan: Be it further

Resolved, That the execution of said contract by the city shall be subject to approval of the same by a vote of the people of the city of Santa Barbara in the manner provided by law.

State of California,
County of Santa Barbara, ss:

I, Faye Canfield, City Clerk of the City of Santa Barbara, California, hereby certify that the foregoing Resolution was read in full at a regular meeting of the Council of the City of Santa Barbara, held on the 9th day of October, 1947, 2:00 P. M., and was adopted by the following vote on roll call:

Yeas: Council members: Floyd O. Bohnett, Edith J. Hancock, W. Donald MacGillivray, Stewart S. Maitland, Owen H. O'Neill, Emery J. Pippin.

Nays: Council members: None.

Absent: Council members: None.

In witness whereof, I have hereunto set my hand and affixed the Seal of the City of Santa Barbara this 9th day of October, 1947.

[SEAL] FAYE CANFIELD, *City Clerk.*
By MARY ACQUISTAPACE.
Deputy City Clerk, City of Santa Barbara.

I hereby approve the foregoing Resolution this 9th day of October, 1947.

NORRIS MONTGOMERY,
Mayor of the City of Santa Barbara.

RESOLUTION NO. 157A

Whereas the Board of Directors of the Montecito Water District recognize the necessity of securing for said District an adequate supply of water for the present and future needs of the District and its inhabitants; and

Whereas said Board of Directors is of the present belief that such a supply can be secured more easily, quickly, and economically by means of a cooperative effort of this District with the City of Santa Barbara, the Goleta and Carpinteria County Water Districts, and the Santa Ynez River Water Conservation District, in conjunction with the Santa Barbara County Water Agency; and

Whereas it appears to this Board of Directors that it is now time to initiate negotiations leading to such a cooperative effort; and

Whereas the Bureau of Reclamation has proposed the construction of a dam on the Santa Ynez River at a suitable site in the vicinity of the proposed Tequepis or Cachuma sites with a storage capacity of approximately 210,000 acre-feet, and a safe annual yield of approximately 33,000 acre-feet; and the construction of a tunnel from said dam site to the south coast through the Santa Ynez Mountains; together with a conduit from said tunnel capable of carrying water in suitable quantities to said City and to such of the above-named Districts as are on the south coast; Now, therefore, be and it is hereby

Resolved, That—

(*a*) This District, through its proper officers forthwith enter into preliminary negotiations with the aforesaid City, Water Districts, and County Water Agency, for the purpose of contracting to purchase through the Santa Barbara County Water Agency at the rate of not to exceed $25 per acre-foot the initial annual quantity of 500 acre-feet of water and the maximum annual quantity of 3,000 acre-feet, to be delivered from said conduit to a point or points within the boundaries of this District, from said project.

(*b*) That the aforesaid project be constructed by the Bureau of Reclamation of the Department of the Interior for the Santa Barbara County Water Agency, under a form of contract mutually satisfactory to all contracting parties.

(*c*) That the officers of this District, after entering into such negotiations, report back to this Board of Directors the status and progress of such negotiations, it being expressly understood that said officers shall have no power, express or implied, to bind this District, or its Board of Directors, to any terms of any such contract, without the further approval of this Board of Directors and/or the voters of this District.

(*d*) That certified copies of this resolution forthwith be sent to the aforesaid Districts, the City of Santa Barbara, and the Santa Barbara County Water Agency.

I hereby certify that I am the Secretary of the above-named Montecito County Water District; that the foregoing is a full, true, and correct copy of a resolution duly adopted by the Board of Directors of said District at a special meeting of said Board duly called and held on the 17th day of October 1947, at which a majority of the directors were present and voted, and that said resolution is entered on the minutes and in full force and effect.

In witness whereof, I have hereunto set my hand and the corporate seal of said District this 17th day of October 1947.

[SEAL] MARTHA G. EVANS, *Secretary.*

RESOLUTION No. 25

Whereas the board of directors of the Carpinteria County Water District recognize the necessity of securing for said district an adequate supply of water for the present and future needs of the district and its inhabitants; and

Whereas said board of directors i
be secured more easily, quickly, and
of this district with the city of Sant
water districts, and the Santa Yne
junction with the Santa Barbara C
Whereas it appears to this boarc
negotiations leading to such a coop
Whereas the Bureau of Reclamati
the Santa Ynez River at a suitable s
Cachuma sites with a storage capac
safe annual yield of approximately
tunnel from said dam site to the sou
together with a conduit from said
quantities to said city and to such
south coast: Now, therefore, be an
Resolved, That—
(*a*) This district, through its pro
negotiations with the aforesaid cit
for the purpose of contracting to
Water Agency at the rate of not t
quantity of 1,000 acre-feet of wate
acre-feet, to be delivered from said
aries of this district, from said proje
(*b*) That the aforesaid project b
of the Department of Interior fo
under a form of contract mutually
(*c*) That the officers of this dist
port back to this board of director
it being expressly understood that
implied, to bind this district, or its
contract, without the further appro
of this district.
(*d*) That certified copies of this
the city of Santa Barbara, and the

The vote on the question by roll
Ayes: Stanley L. Shepard,
R. Sawyer.
Noes: None.
Absent: Burchell W. Upson
Approved:
[SEAL]
Attest:
F. W. THOMAS, *Secretary.*

Whereas the board of directors of
necessity of securing for said distri
and future needs of the district and
Whereas said board of director
can be secured more easily, quickl
effort of this district with the city of
County water districts, and the Sa
conjunction with the Santa Barbar
Whereas it appears to this boa
negotiations leading to such a coop
Whereas the Bureau of Reclama
the Santa Ynez River at a suitabl
or Cachuma sites with a storage
and a safe annual yield of approxi
of a tunnel from said dam site to t
tains, together with a conduit fr
suitable quantities to said city and
the south coast: Now, therefore, be
Resolved, That—
(*a*) This district, through its pr
negotiations with the aforesaid city

Whereas said board of directors is of the present belief that such a supply can be secured more easily, quickly, and economically by means of a cooperative effort of this district with the city of Santa Barbara, the Montecito, Goleta, and county water districts, and the Santa Ynez River Water Conservation District, in conjunction with the Santa Barbara County Water Agency; and

Whereas it appears to this board of directors that it is now time to initiate negotiations leading to such a cooperative effort; and

Whereas the Bureau of Reclamation has proposed the construction of a dam on the Santa Ynez River at a suitable site in the vicinity of the proposed Tequepis or Cachuma sites with a storage capacity of approximately 210,000 acre-feet, and a safe annual yield of approximately 33,000 acre-feet; and the construction of a tunnel from said dam site to the south coast through the Santa Ynez Mountains, together with a conduit from said tunnel capable of carrying water in suitable quantities to said city and to such of the above-named districts as are on the south coast: Now, therefore, be and it is hereby

Resolved, That—

(*a*) This district, through its proper officers forthwith enter into preliminary negotiations with the aforesaid city, water districts, and county water agency, for the purpose of contracting to purchase through the Santa Barbara County Water Agency at the rate of not to exceed $25 per acre-foot the initial annual quantity of 1,000 acre-feet of water and the maximum annual quantity of 3,800 acre-feet, to be delivered from said conduit to a point or points within the boundaries of this district, from said project.

(*b*) That the aforesaid project be constructed by the Bureau of Reclamation of the Department of Interior for the Santa Barbara County water agency, under a form of contract mutually satisfactory to all contracting parties.

(*c*) That the officers of this district, after entering into such negotiations, report back to this board of directors the status and progress of such negotiations, it being expressly understood that said officers shall have no power, express or implied, to bind this district, or its board of directors, to any terms of any such contract, without the further approval of this board of directors and/or the voters of this district.

(*d*) That certified copies of this resolution be sent to the aforesaid districts, the city of Santa Barbara, and the Santa Barbara County water agency.

The vote on the question by roll resulted as follows:

Ayes: Stanley L. Shepard, Max Young, Lawrence N. Bailard, Clarence R. Sawyer.

Noes: None.

Absent: Burchell W. Upson.

Approved:

[SEAL] STANLEY L. SHEPARD, *President.*

Attest:

F. W. THOMAS, *Secretary.*

RESOLUTION

Whereas the board of directors of the Goleta County water district recognize the necessity of securing for said district an adequate supply of water for the present and future needs of the district and its inhabitants; and

Whereas said board of directors is of the present belief that such a supply can be secured more easily, quickly, and economically by means of a cooperative effort of this district with the city of Santa Barbara, the Carpinteria and Montecito County water districts, and the Santa Ynez River water conservation district, in conjunction with the Santa Barbara County water agency; and

Whereas it appears to this board of directors that it is now time to initiate negotiations leading to such a cooperative effort; and

Whereas the Bureau of Reclamation has proposed the construction of a dam on the Santa Ynez River at a suitable site in the vicinity of the proposed Tequepis or Cachuma sites with a storage capacity of approximately 210,000 acre-feet, and a safe annual yield of approximately 33,000 acre-feet; and the construction of a tunnel from said dam site to the south coast through the Santa Ynez Mountains, together with a conduit from said tunnel capable of carrying water in suitable quantities to said city and to such of the above-named districts as are on the south coast: Now, therefore, be and it is hereby

Resolved, That—

(*a*) This district, through its proper officers forthwith enter into preliminary negotiations with the aforesaid city, water districts, and county water agency for

the purpose of contracting to purchase through the Santa Barbara County water agency at the rate of not to exceed $25 per acre-foot the initial annual quantity of 3,300 acre-feet of water and the maximum annual quantity of 11,900 acre-feet, to be delivered from said conduit to a point or points within the boundaries of this district, from said project.

(b) That the aforesaid project be constructed by the Bureau of Reclamation of the Department of the Interior for the Santa Barbara County Water Agency, under a form of contract mutually satisfactory to all contracting parties.

(c) That the officers of this district, after entering into such negotiations, report back to this board of directors the status and progress of such negotiations, it being expressly understood that said officers shall have no power, express or implied, to bind this district, or its board of directors, to any terms of any such contract, without the further approval of this board of directors and/or the voters of this district.

(d) That certified copies of this resolution forthwith be sent to the aforesaid districts, the city of Santa Barbara, and the Santa Barbara County Water Agency.

[SEAL]

GOLETA COUNTY WATER DISTRICT,
F. G. STEVENS, *President.*
CHESTER RICH, *Secretary-Treasurer.*
BEN HARTMAN,
W. N. HOLLISTER,
GEO. W. SMITH,
Directors.

RESOLUTION

Whereas the board of directors of the Santa Ynez River water conservation district recognize the necessity of securing for said district an adequate supply of water for the present and future needs of the district and its inhabitants; and

Whereas said board of directors is of the present belief that such a supply can be secured more easily, quickly, and economically by means of a cooperative effort of this district with the city of Santa Barbara, the Montecito, Goleta, and Carpinteria County water districts, in conjunction with the Santa Barbara County water agency; and

Whereas it appears to this board of directors that it is now time to initiate negotiations leading to such a cooperative effort; and

Whereas the Bureau of Reclamation has proposed the construction of a dam on the Santa Ynez River at a suitable site in the vicinity of the proposed Tequepis or Cachuma sites with a storage capacity of approximately 210,000 acre-feet; and a safe annual yield of approximately 33,000 acre-feet; and the construction of a tunnel from said dam site to the south coast through the Santa Ynez Mountains, together with a conduit from said tunnel capable of carrying water in suitable quantities to said city and to such of the above-named districts as are on the south coast; and

Whereas this board of directors has been assured from time to time that said proposed dam will not impound any waters other than flood waters which would otherwise waste to the ocean, and that there will be released from such dam all the water which would normally flow down the Santa Ynez River and be beneficially used in this water shed. Now, therefore, be it and it is hereby

Resolved, That—

(a) This district, through its proper officers, forthwith enter into preliminary negotiations with the aforesaid city, water districts, and county water agency for the purpose of contracting to purchase through the Santa Barbara County Water Agency at the rate of not to exceed $10 per acre-foot, the initial minimum annual quantity of 500 acre-feet of water and the optional maximum annual quantity of 3,300 acre-feet of water, to be delivered at the outlet to said dam on said Santa Ynez River.

(b) That the aforesaid project be constructed by the Bureau of Reclamation of the Department of the Interior for the Santa Barbara County Water Agency, under a form of contract mutually satisfactory to all contracting parties;

(c) That the contract between this district and the Santa Barbara County Water Agency shall expressly provide that no water will be impounded by said reservoir which would otherwise flow past said dam site and be beneficially used by the riparian owners, overlying owners, and holders of other prior water rights below the dam.

(d) That the officers of this dis
report back to this board of director
it being expressly understood that
implied, to bind this district, or its
contract, without the further appro
of this district.

(e) That certified copies of this
districts, the city of Santa Barbara
and the Bureau of Reclamation.

I hereby certify that I am the Sec
Water Conservation District; that
of a resolution duly adopted by the
meeting of said board duly called
at which a majority of the directors
tion is entered on the minutes and i

In witness whereof I have hereun
district the 4th day of November, 1

(*d*) That the officers of this district, after entering into such negotiations, report back to this board of directors the status and progress of such negotiations, it being expressly understood that said officers shall have no power, express or implied, to bind this district, or its board of directors, to any terms of any such contract, without the further approval of this board of directors and/or the voters of this district.

(*e*) That certified copies of this resolution be forthwith sent to the aforesaid districts, the city of Santa Barbara, the Santa Barbara County Water Agency, and the Bureau of Reclamation.

I hereby certify that I am the Secretary of the above-named Santa Ynez River Water Conservation District; that the foregoing is a full, true and correct copy of a resolution duly adopted by the board of directors of said district at a special meeting of said board duly called and held on the 4th day of November 1947, at which a majority of the directors were present and voted, and that said resolution is entered on the minutes and in full force and effect.

In witness whereof I have hereunto set my hand and the corporate seal of said district the 4th day of November, 1947.

ARDEN T. JENSEN, *Secretary*.

Santa Barbara County investigations of the Cachuma Dam, Calif.

[210,000 acre-feet capacity]

Item	Preliminary estimate (current prices)								Basic estimate, 1940 prices							
	Quantity		Material and labor furnished by the contractor		Material furnished by the Government		Summary		Material and labor furnished by the contractor			Material furnished by the Government			Summary	
	Amount	Unit	Unit cost	Total cost	Unit cost	Total cost	Unit cost	Total cost	Index factor	Unit cost	Total cost	Index factor	Unit cost	Total cost	Unit cost	Total cost
Dam:																
Diversion and care of river during construction and unwatering foundations.	(1)		(1)	$375,000			(1)	$375,000		(1)	$250,000				(1)	$250,000
Excavation, common, stripping borrow-pits.	$300,000	Cubic yards	$0.35	105,000			$0.35	105,000		$0.20	60,000				$0.20	60,000
Excavation, common, stripping dam foundation.	180,000	....do....	.45	81,000			.45	81,000		.25	45,000				.25	45,000
Excavation, common, for embankment toedrains.	2,500	....do....	.90	2,250			.90	2,250		.50	1,250				.50	1,250
Excavation, common, for cut-off trench	700,000	....do....	.75	525,000			.75	525,000		.60	420,000				.60	420,000
Excavation, rock, for grout cap	1,600	....do....	16.00	25,600			16.00	25,600		10.00	16,000				10.00	16,000
Excavation, common, in borrow-pits and transportation to dam embankment.	6,000,000	....do....	.55	3,300,000			.55	3,300,000		.40	2,400,000				.40	2,400,000
Excavation, rock, in borrow-pits and transportation to dam embankment.	100,000	....do....	2.25	225,000			2.25	225,000		1.20	120,000				1.20	120,000
Earthfill in embankment	2,900,000	....do....	.18	522,000			.18	522,000		.10	290,000				.10	290,000
Sluiced sand, gravel, and cobble fill	3,950,000	....do....	.22	869,000			.22	869,000		.15	592,500				.15	592,500
Riprap	130,000	....do....	1.00	130,000			1.00	130,000		.40	52,000				.40	52,000
Constructing 6-inch-diameter sewer-pipe drains with uncemented joints embedded in gravel.	1,200	Linear feet	1.75	2,100	$0.35	$420	2.10	2,520		.60	720		$0.25	$300	.85	1,020
Constructing 8-inch-diameter sewer pipe drains with uncemented joints embedded in gravel.	1,600	....do....	2.05	3,280	.50	800	2.55	4,080		.75	1,200		.30	480	1.05	1,680
Constructing 10-inch-diameter sewer pipe drains with uncemented joints embedded in gravel.	1,100	....do....	2.40	2,640	.60	660	3.00	3,300		.90	990		.35	385	1.25	1,375
Drilling 1¾-inch-diameter grout holes in stage from 0 to 30 feet.	8,000	....do....	2.00	16,000			2.00	16,000		1.00	8,000				1.00	8,000
Drilling 1¾-inch-diameter grout holes in stage from 30 to 60 feet.	5,000	....do....	2.25	11,250			2.25	11,250		1.25	6,250				1.25	6,250
Drilling 1¾-inch-diameter grout holes in stage from 60 to 100 feet.	3,000	Linear feet	2.50	7,500			2.50	7,500		1.50	4,500				1.50	4,500
Placing grout pipe and fittings	7,000	Pound	.30	2,100	.15	1,050	.45	3,150		.10	700		.10	700	.20	1,400
Pressure grouting	15,000	Cubic feet	2.00	30,000			2.00	30,000		1.00	15,000				1.00	15,000
Concrete in grout cap	1,600	Cubic yard	25.00	40,000			25.00	40,000		12.00	19,200				12.00	19,200
Concrete in parapet and curb	1,250	....do....	45.00	56,250			45.00	56,250		20.00	25,000				20.00	25,000
Placing reinforcement bars	150,000	Pound	.035	5,250	.05	7,500	.085	12,750		.02	3,000		.03	4,500	.05	7,500
Furnishing and handling cement	8,200	Barrel	4.65	38,595			4.65	38,595		3.90	32,370				3.90	32,370
Total for dam				6,374,815		10,430		6,385,245			4,303,680			6,365		4,370,045
Spillway:																
Excavation, common	964,000	Cubic yard	.70	674,800			.70	674,800		.50	482,000				.50	482,000
Excavation, rock	585,000	....do....	1.75	1,023,750			1.75	1,023,750		1.00	585,000				1.00	585,000
Backfill	154,000	....do....	.75	115,500			.75	115,500		.50	77,000				.50	77,000
Dumped riprap	13,200	....do....	3.50	46,200			3.50	46,200		2.00	26,400				2.00	26,400
Constructing 4-inch-diameter cutter																

Constructing 8-inch-diameter sewer pipe drains with uncemented joints embedded in gravel	1,000	do	2.05	3,290	.60	800	2.55	4,080		.75	1,200		.30	480	1.05	1,080
Constructing 10-inch-diameter sewer pipe drains with uncemented joints embedded in gravel	1,100	do	2.40	2,640	.60		3.00	3,300		.90	990		.35	385	1.25	1,375
Drilling 1¾-inch-diameter grout holes in stage from 0 to 30 feet	8,000	do	2.00	16,000			2.00	16,000		1.00	8,000				1.00	8,000
Drilling 1¾-inch-diameter grout holes in stage from 30 to 60 feet	5,000	do	2.25	11,250			2.25	11,250		1.25	6,250				1.25	6,250
Drilling 1¾-inch-diameter grout holes in stage from 60 to 100 feet	3,000	Linear feet	2.50	7,500			2.50	7,500		1.50	4,500				1.50	4,500
Placing grout pipe and fittings	7,000	Pound	.30	2,100	.15	1,050	.45	3,150		.10	700		.10	700	.20	1,400
Pressure grouting	15,000	Cubic feet	2.00	30,000			2.00	30,000		1.00	15,000				1.00	15,000
Concrete in grout cap	1,600	Cubic yard	23.00	40,000			25.00	40,000		12.00	19,200				12.00	19,200
Concrete in parapet and curb	1,250	do	45.00	56,250			45.00	56,250		20.00	25,000				20.00	25,000
Placing reinforcement bars	150,000	Pound	.035	5,250	.05	7,500	.085	12,750		.02	3,000		.03	4,500	.05	7,500
Furnishing and handling cement	8,200	Barrel	4.65	38,595			4.65	38,595		3.90	32,370				3.90	32,370
Total for dam				5,374,815		10,430		6,385,245			4,361,680			6,365		4,370,045
Spillway:																
Excavation, common	964,000	Cubic yard	.70	674,800			.70	674,800		.50	482,000				.50	482,000
Excavation, rock	585,000	do	1.75	1,023,750			1.75	1,023,750		1.00	585,000				1.00	585,000
Backfill	154,000	do	.75	115,500			.75	115,500		.50	77,000				.50	77,000
Dumped riprap	13,200	do	3.50	46,200			3.50	46,200		2.00	26,400				2.00	26,400
Constructing 4-inch-diameter sewer-pipe drains with uncemented joints embedded in gravel	3,280	Linear feet	1.50	4,920	.25	820	1.75	5,740		.40	1,312		.20	656	.60	1,968
Constructing 6-inch-diameter sewer-pipe drains with uncemented joints embedded in gravel	4,860	do	1.75	8,505	.35	1,701	2.10	10,206		.60	2,916		.25	1,215	.85	4,131
Constructing 12-inch-diameter sewer-pipe drains with uncemented joints embedded in gravel	1,630	do	2.70	4,401	.75	1,223	3.45	5,624		1.00	1,630		.40	652	1.40	2,282
Drilling 1¾-inch-diameter grout holes up to 30-foot stage	1,900	do	2.00	3,800			2.00	3,800		1.00	1,900				1.00	1,900
Drilling 1¾-inch-diameter grout holes in stage from 30 feet to 60 feet	3,800	do	2.25	8,550			2.25	8,550		1.25	4,750				1.25	4,750
Placing grout pipe and fittings	1,400	Pound	.30	420	.15	210	.45	630		.10	140		.10	140	.20	280
Pressure grouting	8,500	Cubic feet	2.00	17,000			2.00	17,000		1.00	8,500				1.00	8,500
Gravel under floor	4,720	Cubic yard	5.00	23,600			5.00	23,600		3.00	14,160				3.00	14,160
Concrete in floors	15,000	do	25.00	375,000			25.00	375,000		13.00	195,000				13.00	195,000
Concrete in counterfort walls	11,800	do	35.00	413,000			35.00	413,000		20.00	236,000				20.00	236,000
Concrete in cantilever walls	5,760	do	35.00	201,600			35.00	201,600		20.00	115,200				20.00	115,200
Concrete in gate structure	5,000	do	40.00	200,000			40.00	200,000		22.00	110,000				22.00	110,000
Placing reinforcement bars	4,260,000	Pound	.035	149,100	.05	213,000	.085	362,100		.02	85,200		.03	127,800	.05	213,000
Installing radial gates	480,000	do	.07	33,600	.22	106,800	.29	139,200		.03	14,400		.10	48,000	.13	62,400
Installing gate hoists	120,000	do	.08	9,600	.50	60,000	.58	69,600		.04	4,800		.35	42,000	.39	46,800
Furnishing and handling cement	53,830	Barrel	4.65	250,310			4.65	250,310		3.90	209,937				3.90	209,937
Total for spillway				3,563,656		382,554		3,946,210			2,176,245			220,463		2,396,708
Outlet works:																
Excavation, open cut, all classes	5,300	Cubic yards	2.00	10,600			2.00	10,600		1.10	5,830				1.10	5,830
Excavation, tunnels and shaft, all classes	3,950	do	30.00	118,500			30.00	118,500		13.00	51,350				13.00	51,350
Drilling grout holes	5,500	Linear feet	2.25	12,375			2.25	12,375		1.00	5,500				1.00	5,500
Pressure grouting	5,500	Cubic feet	2.00	11,000			2.00	11,000		1.00	5,500				1.00	5,500
Placing grout pipe and fittings	2,000	Pounds	.30	600	.15	300	.45	900		.10	200		.10	200	.20	400
Drilling weepholes	1,500	Linear feet	2.50	3,750			2.50	3,750		1.40	2,100				1.40	2,100
Installing tunnel liner plates and ribs	200,000	Pounds	.23	46,000			.23	46,000		.10	20,000				.10	20,000

[1] Lump sum.

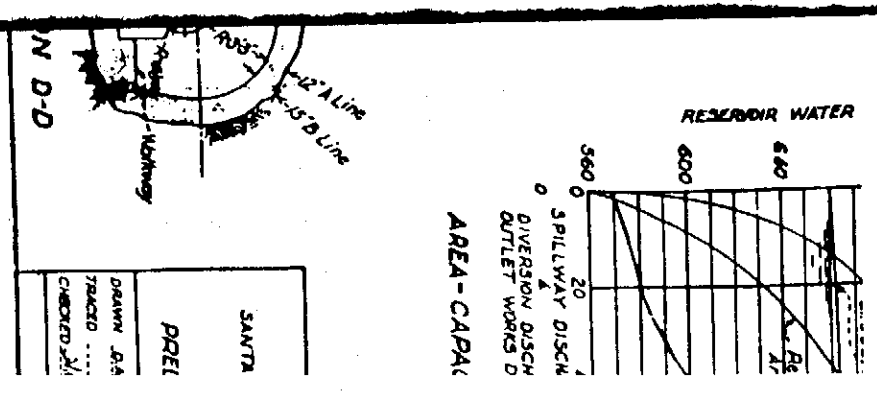
Santa Barbara County investigations of the Cachuma Dam, Calif.—Continued

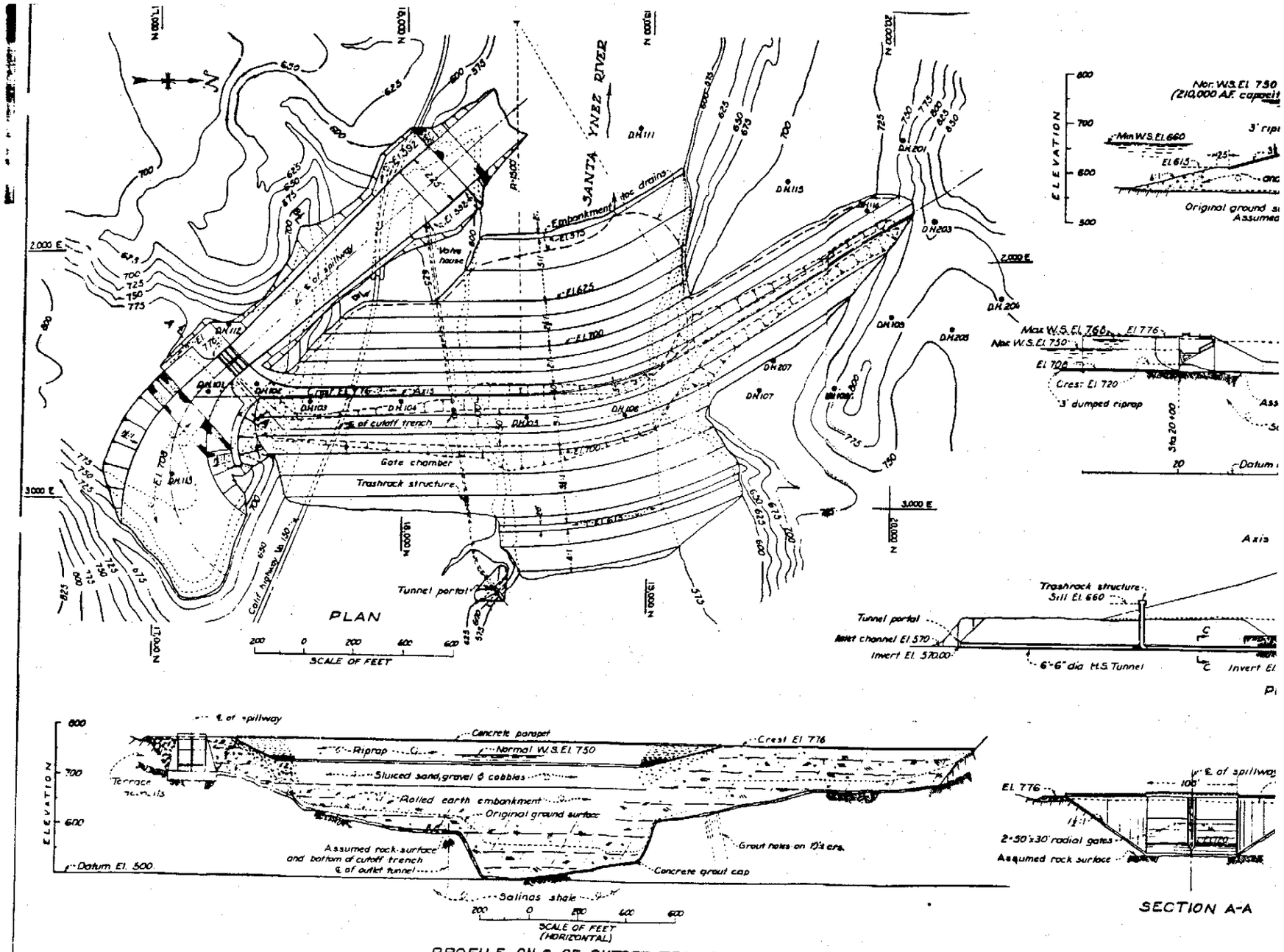
[210,000 acre-feet capacity]

Item	Preliminary estimate (current prices)								Basic estimate, 1940 prices							
	Quantity		Material and labor furnished by the contractor		Material furnished by the Government		Summary		Material and labor furnished by the contractor			Material furnished by the Government			Summary	
	Amount	Unit	Unit cost	Total cost	Unit cost	Total cost	Unit cost	Total cost	Index factor	Unit cost	Total cost	Index factor	Unit cost	Total cost	Unit cost	Total cost
Outlet works—Continued																
Concrete in trashrack structure	10	Cubic yards	$65.00	$650			$65.00	$650		$35.00	$350				$35.00	$350
Concrete in tunnels and shafts	1,900	do	45.00	85,500			45.00	85,500		20.00	38,000				20.00	38,000
Concrete in gate-chamber	90	do	55.00	4,950			55.00	4,950		25.00	2,250				25.00	2,250
Concrete in valve and access house	90	do	70.00	6,300			70.00	6,300		44.00	3,960				44.00	3,960
Concrete in tunnel-plugs	100	do	35.00	3,500			35.00	3,500		20.00	2,000				20.00	2,000
Placing reinforcement bars	165,000	Pounds	.035	5,775	$0.05	$8,250	.085	14,025		.02	3,300		$0.03	$4,950	.05	8,250
Installing trashrack metalwork	4,200	do	.08	336	.15	630	.23	966		.05	210		.10	420	.15	630
Installing outlet pipe	86,000	do	.08	6,880	.14	12,040	.22	18,920		.04	3,440		.12	10,320	.16	13,760
Installing high-pressure gate, hoist, etc.	21,000	do	.09	1,890	.30	6,300	.39	8,190		.04	840		.16	3,360	.20	4,200
Installing controls for high-pressure gate	2,000	do	.35	700	.50	1,000	.85	1,700		.10	200		.25	500	.35	700
Installing hollow-jet valve	3,000	do	.07	210	1.35	4,050	1.42	4,260		.05	150		1.00	3,000	1.05	3,150
Installing ventilating system	2,500	do	.30	750	.50	1,250	.80	2,000		.10	250		.40	1,000	.50	1,250
Installing miscellaneous metalwork	1,500	do	.25	375	.20	300	.45	675		.15	225		.15	225	.30	450
Furnishing and handling cement	5,300	Barrels	4.65	24,645			4.65	24,645		3.90	20,670				3.90	20,670
Installing electrical apparatus, etc.	(1)		(1)	1,750	(1)	1,600	(1)	3,350		(1)	1,000		(1)	1,000	(1)	2,000
Total for outlet works				347,036		35,720		382,756			167,325			24,975		192,300
Subtotal for dam and appurtenant works								10,714,211								6,950,053
Contingencies plus 20 percent								2,142,842								1,391,811
Subtotal								12,857,053								8,350,864
Engineering and inspection plus 6 percent								771,420								501,052
Superintendence and accounts plus 1½ percent								192,855								125,263
General expense plus 2½ percent								323,672								208,821
Total for dam and appurtenant works								14,145,000								9,180,000

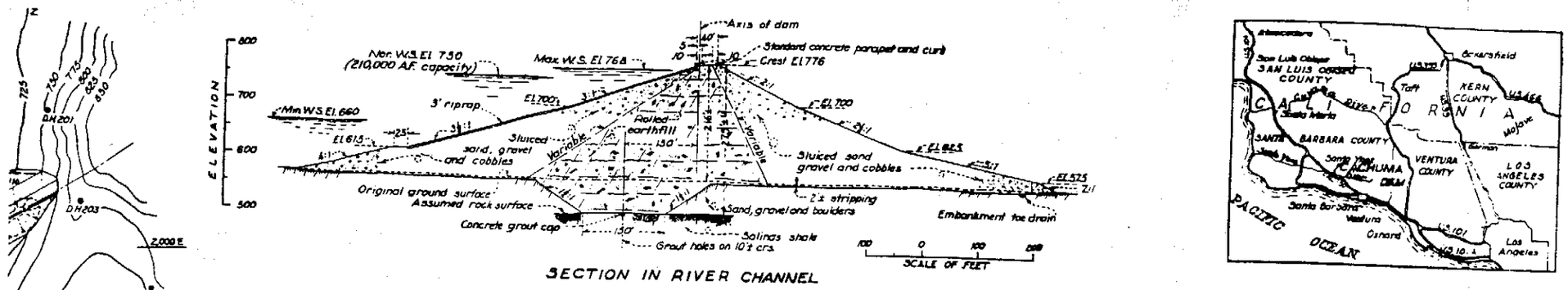
[1] Lump sum.

Prepared by Dam Engineering Division, Office of the Chief Engineer. Drawing No. 368-D-13.





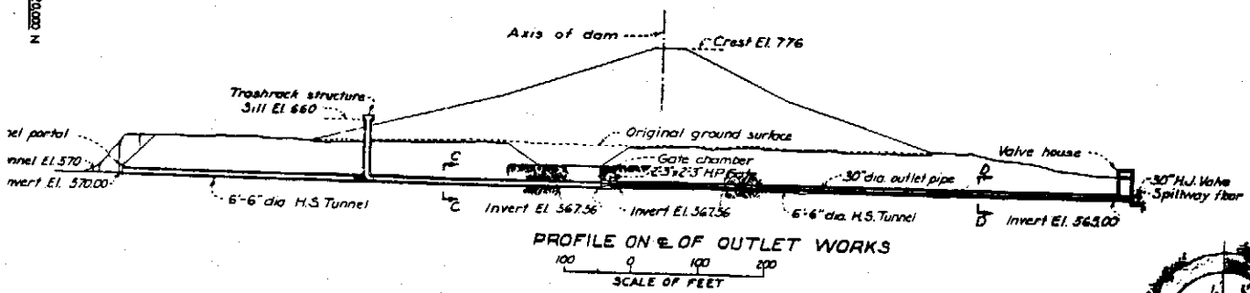
PROFILE ON ℄ OF CUTOFF TRENCH



SECTION IN RIVER CHANNEL

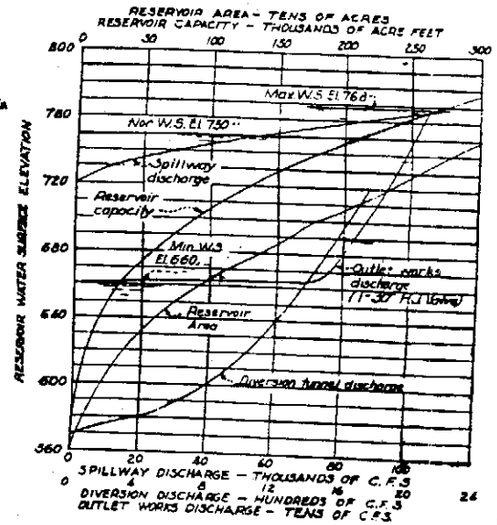
LOCATION MAP

PROFILE ON ℄ OF SPILLWAY

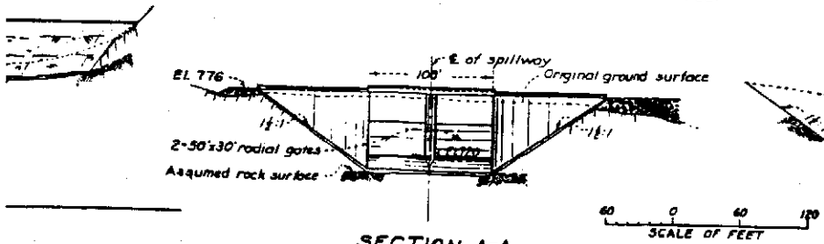


PROFILE ON ℄ OF OUTLET WORKS

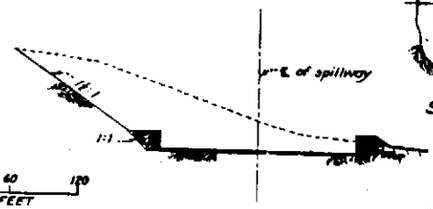
SCALE OF FEET



AREA - CAPACITY - DISCHARGE CURVES

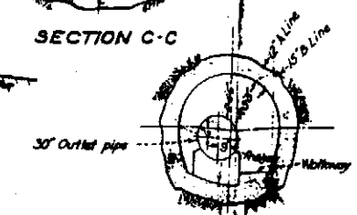


SECTION A-A



SECTION B-B

SECTION C-C



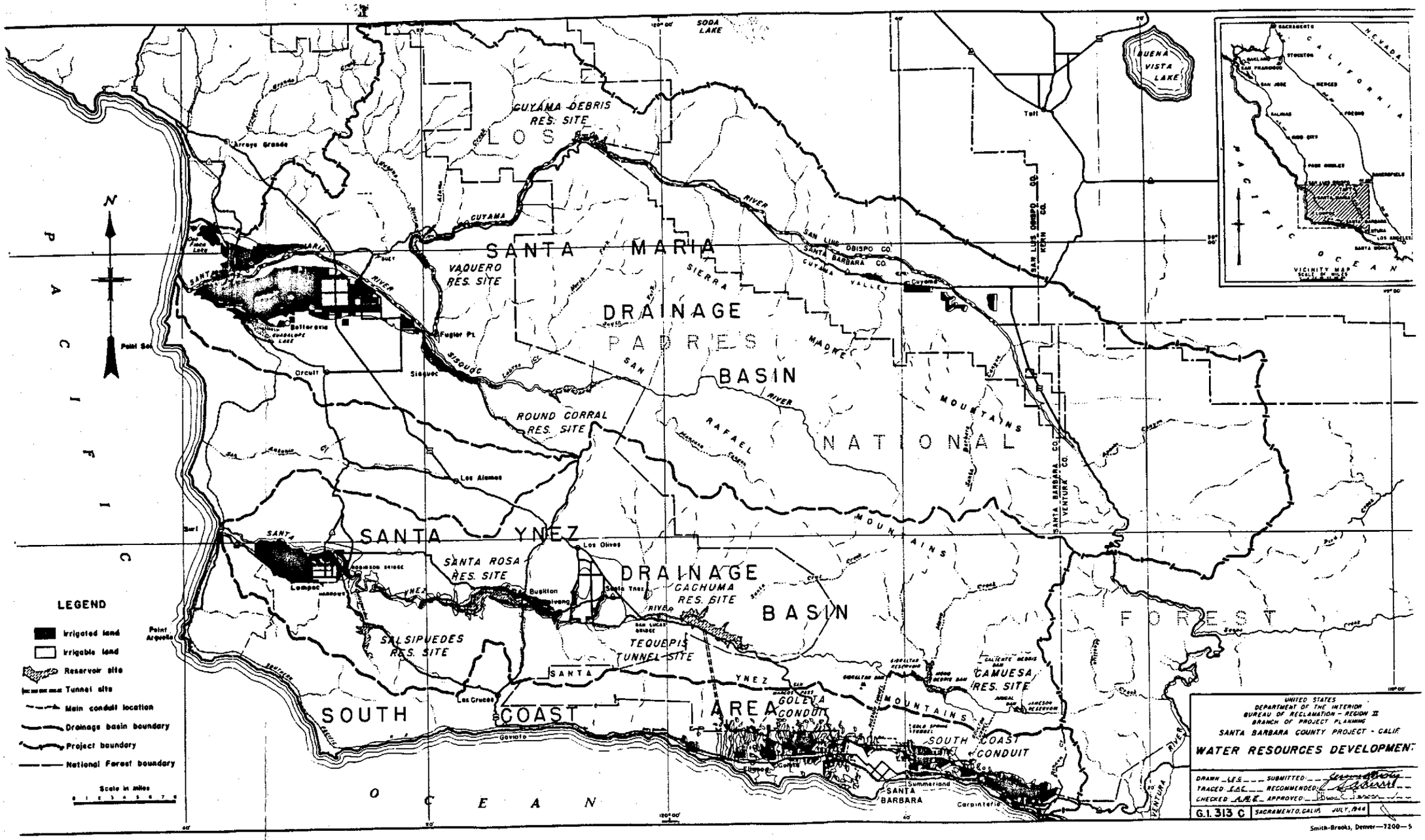
SECTION D-D

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SANTA BARBARA COUNTY INVESTIGATIONS
CALIFORNIA

CACHUMA DAM
PRELIMINARY ESTIMATE DRAWING
210,000 AF CAPACITY

DRAWN D.S.S.
TRACED
CHECKED J.W.Q.
SUBMITTED Fred C. Walker
RECOMMENDED H.W. Keenan
APPROVED W.W. Mendell
COMMISSIONER
DENVER, COLORADO JULY 21, 1947
308-D-12

34



its thereof), under which the investigations leading to this report

WAR DEPARTMENT,
Washington, February 5, 1946.

The honorable the SECRETARY OF THE INTERIOR.

DEAR MR. SECRETARY: Reference is made to letters from the Commissioner of the Bureau of Reclamation dated October 30, 1945, addressed to the Secretary of War and to the Chief of Engineers with which there were enclosed for the information and comments of the War Department, copies of your proposed report on the comprehensive basin plan for the Santa Barbara project, California. By letters dated November 2, 1945, the Acting Chief of Engineers informed the Commissioner of the Bureau of Reclamation that the report would be promptly reviewed by the Department and that the Secretary of War would inform you of any comment he desired to make.

The report on Santa Barbara County, Calif., summarizes the investigation of a plan to conserve the water resources of the Santa Maria and Santa Ynez Rivers, San Antonio Creek, and a narrow coastal area south of the Santa Ynez Mountains, extending from Point Arguello eastward to the Ventura River Divide. The proposed reservoirs discussed in the report of the Bureau of Reclamation are located within the drainage basin of the Santa Maria and Santa Ynez Rivers, currently under study by this Department in two separate reports.

The report of the district engineer at Los Angeles, Calif., on an investigation of the Santa Maria River Basin made under authority of the Flood Control Acts approved June 2, 1936, and May 14, 1937, recommends the construction of a complete levee system on the Santa Maria River from Fugler's Point to the mouth and levees on Bradley Canyon, a small tributary near the town of Santa Maria.

Because of the possibility of loss of life, the improvement recommended by the district engineer was designed to control the maximum probable flood and to prevent overflow in the town of Santa Maria and outlying agricultural lands. The plan of the Bureau of Reclamation which involves the construction of multiple-purpose reservoirs on Sisquoc and Cuyama Rivers above their junction at Fugler's Point would only provide partial flood control, and no levees are contemplated.

It is noted that a total of 132,000 acre-feet of flood-control storage is proposed in the two reservoirs recommended in the Santa Maria watershed. The report states that this storage will regulate the discharge of the Santa Maria River at Fugler's Point to 50,000 cubic feet per second. Since the Santa Maria River below Fugler's Point has a present capacity of 30,000 cubic feet per second, extensive channel improvements would be required in addition to the reservoir control proposed in order to safely pass a flow of 50,000 cubic feet per second. Costs of such channel improvements must be considered in arriving at the amounts of benefits which can be allocated to the reservoirs.

Since floods smaller than 30,000 cubic feet per second may break through at vulnerable points and result in the diversion of the entire stream into the heart of the Santa Maria Valley, there is a constant threat to the city of Santa Maria. For these reasons this Department is of the opinion that a levee system is essential to any satisfactory plan for flood control in this area. Our studies indicate that the cost of the levee system would not be greatly reduced by the construction of flood control or multiple-purpose reservoirs on the principal tributaries.

Reference is made to paragraph 23 (*d*) on page 11 of the report in which it is stated "flood-control benefits evaluated by the Corps of Engineers have been accepted and adopted by the Bureau of Reclamation." The material of this Department upon which flood-control benefits in the Santa Maria River report are based, has been made available to representatives of the Bureau of Reclamation and the data have been discussed in correspondence and conferences between the respective field representatives of the two Departments. The Bureau of Reclamation representatives were informed that the benefits evaluated were for the War Department's plan of complete control by means of levees and that partial control would produce correspondingly less benefits. Field representatives of this Department offered to evaluate the flood-control benefits from the reservoirs in the Bureau's plan but have not been furnished sufficient data concerning the design and operation of the reservoirs to permit this evaluation.

The Department's district engineer at Los Angeles is preparing a survey report on the Santa Ynez River and up to the present time that office has not been furnished sufficient data on the design and operation of the structures proposed by the Bureau of Reclamation to permit an evaluation of the flood-control benefits. However, unlike the improvements considered by the Bureau of Reclamation for the Santa Maria River Basin, the work proposed in the Santa Ynez River Basin does not conflict with the improvements being considered by this Department.

While the upstream reservoirs considered by the Bureau would have some flood-control value in the areas below these reservoirs, it is noted that flood-control storage is not proposed in any of the reservoirs recommended in the Santa Ynez watershed. However, with respect to operation of the Cachuma Reservoir, the report states on page 27 of the substantiating material that "During its initial operations a large portion of the capacity of Cachuma Reservoir could be used to provide flood control on lower Santa Ynez River. Later, as the demand for water increased, flood-control operation would become incidental to conservation." It is believed that such a program would encourage development in the area initially protected with the result that the flood damage in that area would be aggravated due to the increased development when the degree of flood protection initially afforded by the Cachuma Reservoir is later reduced.

In the opinion of this Department, flood-control works in addition to reservoir control are necessary to provide positive protection in the Santa Maria Valley. The amount of benefits which can be allocated to reservoir control cannot be evaluated until the reservoir operation has been established. It is, therefore, suggested that the flood storage planned be allocated to the demonstrated water-conservation benefits and that this Department's plan for levee protection be depended upon for flood control. The reports of the two Departments would then provide a fully coordinated plan of improvement.

The opportunity of reviewing and commenting on your proposed report on the investigation of Santa Barbara County, Calif., is sincerely appreciated.

Sincerely yours,

ROBERT P. PATTERSON,
Secretary of War.

STATE OF CALIFORNIA,
DEPARTMENT OF PUBLIC WORKS,
Sacramento, February 9, 1946.

Hon. HAROLD L. ICKES,
Secretary of Interior, Washington 25, D. C.

MY DEAR MR. ICKES: Your proposed report on the comprehensive basin plan for Santa Barbara County project, California, was received on November 6, 1945, and has been under review since that date in accordance with provisions of Public Law 534, Seventy-eighth Congress, second session. At my direction, your proposed report was submitted to the division of water resources of this department for study and report thereon.

The report of the division of water resources has been received and is transmitted herewith with the request that it be included as a part of the comments of the State on your report.

I concur in the conclusions of that report. As stated in the letter to me from Mr. Richard L. Boke, regional director, region II, United States Bureau of Reclamation, dated January 4, 1946, additional studies will be necessary on both the Santa Ynez and Santa Maria Rivers before final plans can be presented. In conformity with that letter, it is understood that opportunity will be afforded this department to keep appraised of continuing additional detailed work by the Bureau of Reclamation and the Corps of Engineers, and to make further comment upon completion of the investigation of the Bureau of Reclamation.

Yours very truly,

C. H. PURCELL,
Director of Public Works.

STATE OF CALIFORNIA,
DEPARTMENT OF PUBLIC WORKS,
DIVISION OF WATER RESOURCES,
February 9, 1946.

REVIEW BY DIVISION OF WATER RESOURCES OF COMPREHENSIVE BASIN PLAN, SANTA BARBARA COUNTY PROJECT, CALIFORNIA, AS REPORTED BY THE UNITED STATES DEPARTMENT OF INTERIOR, JUNE 1945, AND APPROVED BY THE SECRETARY OF INTERIOR ON OCTOBER 19, 1945

In accordance with section 2 of Public Law 534, seventy-eighth Congress, second session, the report of the United States Department of Interior entitled "Comprehensive Basin Plan, Santa Barbara County Project, California," was transmitted

by the Commissioner of Reclamation on October 30, 1945, to the director of public works, the official designated by Governor Earl Warren as his representative in such matters. The report was received by the director of public works and referred to the State engineer on November 6, 1945, for review, and report thereon. On the same date, the report was referred to the State division of highways and the State department of natural resources for review and comment.

By letter dated October 10, 1945, the Commissioner of Reclamation submitted the report prepared by region II, United States Bureau of Reclamation, to the Secretary of Interior, with the following concluding statement: "I recommend that the plan as a whole be approved and that the particular units which compose the urgently needed initial stage of development be authorized, with the proviso that the order of construction of Camuesa and Cachuma reservoirs and works incidental to the use of waters from those reservoirs be determined by further agreement with authorities of Santa Barbara County. Accordingly, I recommend that you adopt this report as your proposed report on the comprehensive basin plan for the Santa Barbara County project, California, and that you authorize me, in your behalf, to transmit copies of this letter and of the attached proposed report to the affected State (California) and to the Secretary of War in accordance with the requirements of Section 1 of the Flood Control Act of 1944." The Secretary of Interior on October 19, 1945, approved the letter of the Commissioner.

FEATURES OF PLAN

The plan of development proposed in the report comprises surface reservoirs, conduits, and lateral systems estimated to cost, on basis of 1940 prices of labor and materials, at $46,400,000. The initial stage of development is estimated to cost $22,000,000 on the same basis. The reservoirs would be operated for conservation of water supplies for domestic and irrigation uses in conjunction with underground storage, and for flood and silt control. No provision is made for development of electric power. The following table sets forth the physical features of the plan:

Description	Stream	Reservoir capacity	Estimated cost
		Acre-feet	
Camuesa Reservoir, Mission tunnel, South Coast and Goleta conduits, and other related works	Santa Ynez	125,000	$10,000,000
Fish hatchery			200,000
Cachuma Reservoir, Tequepis tunnel, Goleta conduit connection	Santa Ynez	200,000	10,000,000
Santa Rosa Reservoir	do	100,000	4,500,000
Salsipuedes Reservoir	Salsipuedes	30,000	2,000,000
South coast lateral systems	Santa Ynez		800,000
Santa Ynez Mesa lateral system	do		600,000
Total, Santa Ynez River Basin and South Coast area			28,100,000
Vaquero Reservoir	Cuyama	197,000	11,000,000
Round Corral Reservoir	Sisquoc	50,000	5,500,000
Cuyama Debris Reservoir	Cuyama	20,000	1,000,000
Total, Santa Maria River Basin			17,500,000
Investigations, including, but not limited to preparation of plans for initial stage of development			800,000
Total, Santa Barbara County project		722,000	46,400,000

ESTIMATED ANNUAL BENEFITS AND COST OF PLAN

Benefits of the plan as set forth in the report are estimated on the bases of (1) 15,200 acre-feet of municipal water delivered annually to the City of Santa Barbara at $65 per acre-foot, (2) increase in gross crop returns from 30,000 acres receiving a new irrigation supply and from 40,600 acres receiving a supplemental irrigation supply, and (3) reduction of flood damage to properties in the Santa Ynez and Santa Maria Basins.

The estimated annual benefits by basins are as follows:

Santa Ynez and South Coast Basins:		
New water supply:		
Carpinteria, Montecito, and Goleta	$4,045,000	
Santa Ynez and Lompoc Valleys	3,393,000	
Subtotal		$7,438,000
Supplemental water supply:		
Carpinteria and Goleta		1,755,000
City water supply (Santa Barbara)		988,000
Flood control		50,000
Total, Santa Ynez and South Coast Basins		10,231,000
Santa Maria Basin:		
New water supply		0
Supplemental water supply		1,897,000
Flood control		385,000
Total, Santa Maria Basin		2,282,000
Total, Santa Barbara County project		12,513,000

The estimated annual costs are given in the report only for the entire project as follows:

Operation and maintenance	$240,000
Amortization of entire project, 50 years at 3 percent	1,803,000
Total annual cost	2,043,000

The ratio of benefit to cost for the entire project is given as 6.12 to 1.

Additional so-called nonreimbursable benefits are listed such as added values to the tax base, increase in agricultural income, added values due to control of silt, protection to farm lands from intrusion of ocean water, improvement of fish runs, and increased agricultural opportunities to returning veterans and others.

The estimated present and future water requirements for domestic and irrigation purposes are summarized in the report as follows:

Locality	Present use [1]		Total future use (including present)		
	Irrigated acres	Use in acre-feet	Irrigable acres additional	Total	Use in acre-feet
Santa Barbara		5,900			16,600
Montecito	2,400	2,300	3,200	5,600	5,600
Carpinteria	3,800	3,100	1,800	5,600	5,600
Goleta	6,800	6,800	11,600	18,400	18,400
Ellwood to Gaviota	900	900		900	900
South Coast area	13,900	19,000	16,600	30,500	47,100
Santa Ynez	3,000	4,500	9,000	12,000	18,000
Lompoc	8,000	[3] 16,000	4,000	12,000	[3] 24,000
Camp Cooke		2,400			2,400
Santa Ynez Basin	11,000	22,900	13,000	24,000	44,400
Santa Maria	30,000	[4] 60,000		30,000	[4] 60,000
Cuyama	4,000	6,000	400	4,400	6,600
Santa Maria Basin	34,000	66,000	400	34,400	66,600
San Antonio Creek	1,100	1,100		1,100	1,100
Total, Santa Barbara County	60,000	109,000	30,000	90,000	159,200

[1] The present uses reflect the requirements for present development but dependable water supply in the absence of project construction is inadequate to meet all present requirements.
[3] Includes 4,000 acre-feet outflow to prevent accumulation of salts.
[4] Includes 6,000 acre-feet outflow to prevent accumulation of salts.
[4] Includes 15,000 acre-feet outflow to prevent accumulation of salts.

In the following table ar
Ynez and Santa Maria Rive
for detention of silt, total ca
(1918–42), the drainage are
in water:

Reservoir	Dr ar sc n
Camuesa	
Cachuma	
Santa Rosa	
Sallspuedes	

[1] Drainage area above Gibraltar I
[2] Estimated annual run-off above
[3] Estimated yield in addition to
[4] Not given.

Reservoir	Drainage area, in square miles	Est a a r 191 ac
Vaquero	1,135	
Round Corral	282	
Cuyama Debris	823	

[1] Not given.

In addition to the foreg
and Cachuma Reservoirs,
feet annually would be ob
Barbara), and Tequepis tu
of the water yield from t
"Conservation storage wo
to the percolation capacity
of ground water replenishr

The flood damage, acc
annually in the Santa Yn
Basin. The largest flood
daily flow and on the Sant
of the Santa Maria cor
capacity of the channel o
in the report but it has be

The report recommends
"(a) That the compreh
be approved.
"(b) That the followin
incidental thereto, constit
County and adjacent are
ated, and maintained by
substantially in accordan
fication as may be recon
approved by the Secret
tunnel, South Coast con
Coast lateral system; fish

as follows:

------ $4, 045, 000	
------ 3, 393, 000	
----------	$7, 438, 000
----------	1, 755, 000
----------	988, 000
----------	50, 000
is----------	10, 231, 000
----------	0
----------	1, 897, 000
----------	385, 000
----------	2, 282, 000
----------	12, 513, 000

port only for the entire project

----------	$240, 000
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ments for domestic and irriga- ws:

use [1]	Total future use (including present)		
Use in cre-feet	Irrigable acres addi-tional	Total	Use in acre-feet
5, 900			16, 600
2, 300	3, 200	5, 600	5, 600
3, 100	1, 800	5, 600	5, 600
6, 800	11, 600	18, 400	18, 400
900		900	900
19, 000	16, 600	30, 500	47, 100
4, 500	9, 000	12, 000	18, 000
16, 000	4, 000	12, 000	[3] 24, 000
2, 400			2, 400
22, 900	13, 000	24, 000	44, 400
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t but dependable water supply in the uirements.

In the following table are set forth for each proposed reservoir on the Santa Ynez and Santa Maria Rivers, the water storage capacity, storage space set aside for detention of silt, total capacity, estimated average run-off above each reservoir (1918–42), the drainage area above the reservoir, and the estimated annual yield in water:

Santa Ynez Basin

Reservoir	Drainage area, in square miles	Estimated average annual run-off, 1918–42, in acre-feet	Storage capacity in acre-feet			Annual water yield, in acre-feet
			Water	Silt	Total	
Camuesa	[1] 219	[2] 35, 300	100, 000	25, 000	125, 000	20, 000
Cachuma	421	72, 600	175, 000	25, 000	200, 000	[3] 23, 000
Santa Rosa	704	106, 900	95, 000	5, 000	100, 000	([4])
Salispuedes	----------	----------	30, 000	----------	30, 000	([4])

[1] Drainage area above Gibraltar Dam.
[2] Estimated annual run-off above Gibraltar Dam.
[3] Estimated yield in addition to yield from Camuesa.
[4] Not given.

Santa Maria Basin

Reservoir	Drainage area, in square miles	Estimated average annual run-off, 1918–42, in acre-feet	Storage capacity in acre-feet				Annual water yield, in acre-feet
			Water	Flood control	Silt	Total	
Vaquero	1, 135	32, 800	40, 000	112, 000	45, 000	197, 000	([1])
Round Corral	282	30, 500	20, 000	20, 000	10, 000	50, 000	([1])
Cuyama Debris	823	11, 000	----------	----------	20, 000	20, 000	([1])

[1] Not given.

In addition to the foregoing estimate of annual water yield from the Camuesa and Cachuma Reservoirs, it is estimated in the report that a total of 3,900 acre-feet annually would be obtained from seepage in the Montecito, Mission (Santa Barbara), and Tequepis tunnels. In the Santa Maria Basin no estimate is given of the water yield from the proposed works but it is stated in the report that "Conservation storage would be used to regulate the run-off as fully as possible to the percolation capacity of the river bed in order to secure a maximum amount of ground water replenishment."

FLOOD CONTROL

The flood damage, according to the report, has been estimated at $80,000 annually in the Santa Ynez Basin and at $433,600 annually in the Santa Maria Basin. The largest flood on the Santa Ynez is estimated at 62,000 second-feet daily flow and on the Santa Maria at 200,000 second-feet with the Sisquoc Branch of the Santa Maria contributing 90,000 second-feet. The present carrying capacity of the channel of the Santa Maria River in the delta area is not given in the report but it has been estimated by others to be 25,000 second-feet.

RECOMMENDATIONS OF REPORT

The report recommends in part as follows:

"(a) That the comprehensive plan of development as described in this report, be approved.

"(b) That the following principal units, and such related works as may be incidental thereto, constituting the initial stage of development in Santa Barbara County and adjacent areas in California, be authorized to be constructed, operated, and maintained by the Bureau of Reclamation, Department of Interior, substantially in accordance with the plans set forth in this report, with such modification as may be recommended from time to time by the Commissioner and approved by the Secretary of Interior, to wit: Camuesa Reservoir, Mission tunnel, South Coast conduit, Goleta conduit, and other related works; South Coast lateral system; fish hatchery; Vaquero Reservoir.

* * * * * * *

"(*d*) That the principal units and related works constituting the initial stage of development, outlined in (*b*) above, be authorized to be constructed, operated, and maintained pursuant to the Federal reclamation laws (Act of June 17, 1902, 32 Stat. 388, and acts amendatory thereof or supplementary thereto), provided—

"(1) That this report shall be deemed to satisfy the requirements of the Federal reclamation laws governing the submission to the President and the Congress of a finding of engineering feasibility;

"(2) That the allocation of costs shall comprehend the estimated cost of all of the works proposed in this report to be constructed by the Bureau of Reclamation for eventual development or control of the water resources of the Santa Barbara County area;

"(3) That the water users shall not be required to repay that part of the estimated cost allocated to irrigation which, in the judgment of the Secretary of the Interior upon consideration of all appropriate factors, exceeds the amount that the water users should be required to repay;

"(4) That the excess, if any, of the total estimated cost of all of the works proposed in accordance with this report to be constructed by the Bureau of Reclamation for eventual full development and control of the water resources of the Santa Barbara County area, over the aggregate of the estimated repayments and returns, together with the excess, if any, of actual costs over total estimated costs, shall be nonreimbursable;

"(5) That submission to the President and the Congress of a report and findings on the estimated cost of the proposed construction, the part of the estimated cost which can properly be allocated to irrigation and probably be repaid by the water users, the part of the estimated cost which can properly be allocated to power and probably be returned to the United States in net power revenues, the part of the estimated cost which can properly be allocated to municipal water supply or other miscellaneous purposes and probably be returned to the United States, and the part of the estimated cost which can properly be allocated to flood control or navigation, shall not be deemed a condition precedent to proceeding with construction."

With respect to initial stage of development as heretofore set forth the following is quoted from the letter of the Commissioner of Reclamation to the Secretary of the Interior, dated October 10, 1945:

"Since the receipt of the report of the regional director dated June 18, 1945, further conferences have been held with the officials of Santa Barbara County and the city of Santa Barbara. These conferences have dealt primarily with the sequence of construction of certain works in the initial stage of development outlined in paragraph 25 (b) of the regional director's report, particularly with the question whether Camuesa Reservoir and its related works should be constructed prior to or subsequent to construction of Cachuma Reservoir and its related works. Determination of this point will naturally depend, as in all such matters, upon the desires of the local people and their ability to make satisfactory financial arrangements for repayment with the United States."

Subsequent to the making of a field trip and inspection by the State engineer and other representatives of the State division of water resources of the sites of the proposed works of the plan and of the areas affected, a letter was received by the Director of Public Works from the regional director, region II, dated January 4, 1946, wherein it is stated that (*a*) it may be desirable to build Cachuma Reservoir first instead of Camuesa on the Santa Ynez River with a reduced capacity of 175,000 acre-feet, and designed so as that it may be increased to 275,000 acre-feet at a later date; (*b*) that the capacity of Vaquero Reservoir on the Santa Maria River as set forth in the report may be modified substantially after studies in progress have been completed by the Bureau of Reclamation and the Corps of Engineers; (*c*) that opportunity would be afforded the State to keep appraised of the continuing additional detailed work by the Bureau and the Corps of Engineers, and to make further comment upon completion of the investigation of the Bureau of Reclamation.

Comments of the State Division of Water Resources

The following comments of the State division of water resources are submitted on the proposed report of the Secretary of the Interior, which comprises the letter of the Commissioner of Reclamation to the Secretary of the Interior, dated October 10, 1945, and approved by the Secretary on October 19, 1945, and the report of the regional director, region II, dated June 18, 1945, entitled "Comprehensive Basin Plan, Santa Barbara County Project, Calif." These comments are based upon a review of the foregoing reports, a study of additional data in the

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files of the Bureau of Reclamation, a review of certain data in the United States Engineer Office in Los Angeles, a review of reports of the United States Department of Agriculture on the Santa Ynez and Santa Maria Rivers, data contained in reports of J. B. Lippincott and Quinton, Code and Hill—Leeds and Barnard, additional data in the files of the division of water resources, and upon comments received from the division of highways of the State department of public works, and State department of natural resources:

1. A plan for ultimate development and control of the water resources and for the development, utilization and protection of lands and properties in Santa Barbara County will require the construction of surface storage reservoirs at strategic points on the major streams of the county with capacities adequate to regulate, in conjunction with the utilization of the underground reservoirs on the coastal plains, the limited water supply of irregular occurrence to meet the present and anticipated increasing demands of the county. Flood control on the major streams would be obtained with leveed streams in combination with the use of storage space in the surface reservoirs where such use would be feasible and economically justified. In planning and fixing the priorities of construction of particular features of the ultimate development special consideration must be given to the matter of silt encroachment on the reservoir capacities, and to the utilization of underground water storage.

2. The construction of works proposed in the report for ultimate development is feasible from an engineering standpoint.

3. There is immediate need for the construction of works to relieve the serious water shortage now existing in the south coast area of the county. The various interests are overdrawing the available local water supplies. The city of Santa Barbara is now using one-third more water than its dependable supply. The capacity of the Gibraltar Reservoir on the Santa Ynez River of the city of Santa Barbara has been depleted 50 percent through the deposition of silt since 1920.

4. The nearest and most logical source of an additional water supply for the south coast area is the Santa Ynez River. The city of Santa Barbara and the Montecito water district now obtain water from that source. This additional supply can be secured by the construction of surface storage on the Santa Ynez River for the conservation of flood waters and the conveyance of such regulated waters by means of a tunnel or tunnels and other transmission lines to areas of use.

Further consideration should be given, however, to the two possible plans on the Santa Ynez River, as set forth in the report, for developing the additional supply required for the south coast area. The plan including the Camuesa Reservoir has an advantage of delivering by gravity, water to the approximate center of the area of need, would be subjected to silt deposition from only one-half of the drainage area to Cachuma Reservoir. On the other hand, the Cachuma Reservoir draining twice the area would have a dependable water yield estimated at twice that at Camuesa. Pumping to the city of Santa Barbara system would be required, utilizing the Cachuma site. Both plans are estimated by the Bureau of Reclamation to cost $10,000,000.

Furthermore, in connection with a study of an immediate supplemental water supply for the south coast area, consideration should be given to the enlargement of Gibraltar Reservoir.

5. Construction of the conservation storage reservoirs on the Santa Ynez River as set forth in the report would materially reduce damage from minor floods, but unless reservoir storage space is provided and utilized specifically for flood control, the flood damage estimated in the report might be substantially increased due to developments taking place below the flood plain during dry cycles.

6. There is immediate need for flood-control works in the Santa Maria River to protect adequately the city of Santa Maria and farm lands and improvements adjacent thereto. It is proposed in the report to accomplish this by the construction of the Vaquero Reservoir on the Cuyama River near its mouth, allocating space in the reservoir for flood control as well as for conservation purposes.

The Round Corral Reservoir on the Sisquoc River would not be constructed in the initial step of development and no levees would be constructed on the Santa Maria River. Inasmuch as it is estimated that the Sisquoc River may in a capital flood discharge 90,000 second-feet into the Santa Maria River, having a present carrying capacity estimated at only 25,000 to 30,000 second-feet, it is obvious that levees are required to confine such a flood to the stream channel even if the entire contribution on the Cuyama River were detained in the Vaquero Reservoir. In view of the immediate need for flood protection to the city of Santa Maria and its environs, the lack of information necessary to determine the amount of surface storage required for conservation purposes, and the need for

levees even in conjunction with surface storage, consideration should be given to the immediate construction of levees as an initial step in the development, and the flood control surface storage be constructed and utilized for additional degree of protection in connection with the necessary conservation storage, if found feasible and economically justified.

7. As nearly all present development in Santa Barbara County is based on utilization of ground water, the results of a comprehensive ground water investigation should be available prior to formulation of final plans for the control, conservation and utilization of the water resources of Santa Barbara County.

The development of any area that is based primarily on increased utilization of ground waters, such as has occurred in Santa Barbara County, is necessarily accompanied by a general lowering of the water plane. However, a general lowering of the water plane is not in itself evidence that an underground reservoir is overdrawn. It often means only that the water plane is being drawn low enough so that natural waste of ground water is reduced and converted to beneficial uses. In reaching a conclusion as to existence and amount of overdraft in any basin, it is necessary to develop complete data on input and output. Movement on lowering of water plane is only one item of a number necessary before a reliable conclusion can be reached.

The alluvial fills should be geologized in detail to develop information necessary for determination of maximum capacity for ground water storage and extent of present and ultimate depletion thereof. The amounts and locations of unused or incompletely developed ground water storage should be investigated. The respective boundaries of alluvium overlying free water table and pressure areas should be defined. Consumptive uses on irrigated land cannot be relied upon as the measure of water required to successfully grow crops, unless the area overlies free water table and 100 percent recovery of the unconsumed water can be effected. Insofar as use of irrigation water is confined to coastal plane pressure areas adjacent to the ocean, where it is physically impossible for the unconsumed water on such lands to return to the pumping zone, gross water requirements should be used as a measure of draft on the proposed enhancement of water supplies.

The quality of ground waters throughout the areas of use and proposed use should be explored to determine the existence, extent, degree of toxicity and source of various types of contamination that may exist.

8. The State division of highways reports that a number of the proposed projects in the comprehensive basin plan will cause revision and relocation of State highway facilities, in some cases requiring major and extensive changes in routes and that additional review of the project plans will be made and later comment will be given as soon as enough data and costs and highway interests are obtained.

The division of highways reports further that the most serious conflicts occur where relocation causes appreciable deflection of routing through adverse terrain. For example, the interference with primary State Route 2 by the proposed Santa Rosa reservoir may require a crossing of the reservoir rather than a detour of its flood line; that a reasonable replacement in kind of existing facilities disturbed will, in practically all cases, justify a careful investigation and consideration of highway requirements and that it is assumed the opportunity to review and discuss later reports of the bureau will be afforded on subsequent stages of plan preparation of authorized projects.

9. The State division of fish and game has made the following recommendations for the protection of the fishery resources on the Santa Ynez and the Santa Maria Rivers:

(*a*) No fishway be provided over Camuesa Dam.

(*b*) From the time when storage begins above the dam to the time of first flow over the spillway, a maximum of 5,000 acre-feet of water be made available for release during each water year as may be required for minimum stream flow maintenance.

If Cachuma Dam is constructed it is recommended that—

(*a*) Adequate provision be made for the passage of fish upstream and downstream past the dam.

(*b*) The outlet tunnel be adequately screened to prevent the passage of fish.

(*c*) A minimum release of 15 cubic feet per second of water be provided at the dam throughout the year.

(*d*) Provision be made for this release both through the fishway or low-level outlet, as required.

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(e) It is not recommended that a hatchery be constructed unless there is a certainty that stream flows can be maintained which will permit adult steelhead to pass upstream as far as Cachuma Dam. In any event construction of a hatchery should not be necessary until Cachuma Dam is constructed.

It is recommended that a survey be made to determine if the objectives sought by the construction of Santa Rosa Dam can be obtained by alternative methods. If Santa Rosa Dam is constructed it is recommended that—

(a) Adequate provision be made for the passage of fish upstream and downstream past the dam.

(b) A minimum release of 50 cubic feet per second of water be provided at the dam throughout the year.

It is recommended that—

(a) No fishway be provided over Vaquero Dam.

(b) Adequate provision be made for the passage of fish upstream and downstream past Round Corral Dam.

(c) During the winter season sufficient water be released from both Vaquero and Round Corral Reservoirs to permit steelhead to ascend from the ocean past Round Corral Dam.

(d) Provision be made for the release of water from Round Corral Dam both through the fishway or low-water level outlet, as required.

(e) Summer releases of water for ground percolation be spread over as long a period as possible to maintain proper conditions in the streams.

The director of natural resources, under date of November 13, 1945, in transmitting report of the division of fish and game, requested that "due consideration in future planning be given to the recommendations made therein in order adequately to conserve the run of fish in the streams involved."

It is desired to call attention to the water requirements recommended by the State division of fish and game for fish runs as compared to the requirements, for example, of the city of Santa Barbara and the dependable yields of the reservoirs proposed on the Santa Ynez River. In connection with the Camuesa Reservoir, a maximum of 5,000 acre-feet of water is recommended for release during each water year. This figure is one-fourth of the estimated dependable yield of the proposed Camuesa Reservoir and is almost equal to the present annual use of the city of Santa Barbara.

If the Cachuma Reservoir is constructed, it is recommended by the Commission that a minimum release of 15 second-feet be provided at the dam or a minimum of about 10,000 acre-feet annually, which is about one-half of the estimated dependable yield of the reservoir with Camuesa Reservoir constructed. If Santa Rosa is constructed, it is recommended by the Commission that a release of 50 second-feet be provided at the dam, or about 35,000 acre-feet per year.

10. In the report the direct benefits from irrigation are measured by the increase in gross-crop returns and not on net income to the irrigator. The soundness of calculating irrigation benefits on the basis of increased gross-crop returns is believed to be open to serious question.

11. One of the recommendations of the report is that the initial stage of the development be authorized for construction, operation, and maintenance pursuant to the Federal reclamation laws provided that any excess of the total estimated cost of the works over the aggregate of the estimated payments and returns together with any excess of actual costs over total estimated costs shall be nonreimbursable.

In connection with the foregoing recommendation, it may be pointed out that the Secretary of Interior has made no finding in the report on (1) the part of the estimated cost which can properly be allocated to irrigation and probably be repaid by the water users; (2) on the part of the estimated cost which can properly be allocated to municipal water supply or other municipal purposes and probably be returned to the United States as required by section 9 (a) of the Reclamation Act of 1939. Also, there is no financial statement or analysis in the report setting forth for the initial stage or the ultimate plan of development, the capital and annual costs, the nonreimbursable costs, the anticipated payments and returns, the sources of such payments and returns, and the deficits, if any, in such analysis.

Conclusions

The following conclusions are submitted with respect to the comprehensive basin plan, Santa Barbara County project, California, as reported by the United States Department of Interior:

1. There is immediate need for a supplemental water supply to the south-coast area of Santa Barbara County, including the city of Santa Barbara, and the

logical source of such supply is the Santa Ynez River. Early review should be made of the alternative plans, a final plan be selected and financial arrangements be made for its construction as soon as practicable.

2. The protection of the city of Santa Maria and the developments in the delta area of the Santa Maria River from floods is of prime importance in that river basin, and immediate steps should be taken to secure such protection. In this regard, it is believed consideration should be given to a plan whereby a system of levees would be constructed along the river from Fulger Point to its mouth which would provide a flood capacity of approximately 100,000 second-feet. Such procedure would furnish substantial flood protection to the area and permit in the interim an investigation of the feasibility of incorporating flood-control storage in the proposed Vaquero Reservoir on the Cuyama River, and, if found feasible, the construction of the reservoir, including space for such purpose.

With the Vaquero Reservoir constructed and operated for flood control the levee system as constructed would be capable of handling the estimated uncontrolled capital flood from the Sisquoc branch of the Santa Maria River of 90,000 second-feet, and the affected area then would have protection against a flood estimated to occur once in 100 years. If the incorporation of flood-control features in the Vaquero Reservoir were not determined to be feasible, then the levee system could be revised to carry the entire capital flood of the Santa Maria River.

3. In instances where the proposed plan as set forth in the report or as may be modified affects State highways, opportunity should be afforded the State Division of Highways to develop plans with the Bureau of Reclamation for revision and relocation of such highway facilities.

4. Due consideration should be given in the design, construction, and operation of the physical features of the proposed plan to conserve as far as may be practicable and economically feasible the run of fish in the Santa Ynez and Santa Maria Rivers.

5. The plans for the comprehensive basin development of water and land resources of Santa Barbara County should include the utilization of the underground basins to the fullest practicable extent and to that end before a comprehensive plan is approved for such development a complete and thorough hydrologic and geologic investigation of such basins be made with the view of determining methods and means for their utilization.

EDWARD HYATT,
State Engineer.

SACRAMENTO, CALIF., *February 9, 1946.*

SANTA BARBARA COUNTY WATER AGENCY,
March 29, 1946.

BUREAU OF RECLAMATION,
Interior Building, Washington, D. C.

DEAR SIR: This letter is written to endorse the report of the Bureau of Reclamation which recommends a county-wide water-development program for Santa Barbara County.

The Legislature of the State of California in the 1945 session created the Santa Barbara County Water Agency, the territorial limits of which are the same as the county of Santa Barbara. The governing board of the Santa Barbara County Water Agency is a board of directors of five; the supervisors elected from the five supervisor districts of the county are ex officio directors of the Santa Barbara County Water Agency.

When the report of the Bureau of Reclamation was nearing completion, the members of the board of supervisors who are now ex officio directors of the Santa Barbara County Water Agency held meetings attended by the city officials of the three incorporated cities within the county and attended by the directors of all of the special water districts located within the county. These meetings were held for the specific purpose of obtaining approval of the formation of a county water agency. This approval was obtained and the agency created as above outlined.

At these meetings the general program was likewise discussed and a theory of a county-wide development of the water resources of the county was approved by the councilmen of the three cities and by the directors of the various special water districts within the county.

The three incorporated cities within the county are the city of Santa Barbara, the city of Santa Maria, and the city of Lompoc. The various special water districts within the county are as follows: Carpinteria water district, Montecito

water district, Goleta water distr
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Respectfully submitted,

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Mr. M. W. STRAUS,
Commissioner, United States

DEAR MR. STRAUS: The comm
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Mr. H. W. Bashore, Commissi
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DWARD HYATT,
State Engineer.

WATER AGENCY,
March 29, 1946.

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water district, Goleta water district, Santa Ynez River water conservation district, and Santa Maria Valley water conservation district.

Since the original meetings held with the city councilmen and the board of directors of these districts, the city councilmen and the directors of the water districts have been advised from time to time of the progress made in the report of the Bureau of Reclamation and the progress made in furthering the development of a county-wide water program.

The city councilmen of these three cities and the directors of the various water districts named have indicated informally their approval of the Bureau's report and have also approved changing the site of the first dam on the Santa Ynez River from the Camuesa site to the Cachuma site as indicated in the letter of transmittal which accompanied the report. Obviously the parties mentioned have not approved any definite contracts as these contracts cannot be drawn until further detailed information is available.

The directors of the Santa Barbara County Water Agency propose to negotiate a contract with the Bureau of Reclamation for the construction of the Cachuma Dam and the construction of the Vaquero Dam as soon as possible. The directors of the water agency further propose to negotiate contracts with the city of Santa Barbara, Carpinteria water district, Montecito water district, Goleta water district, and the Santa Ynez River water-conservation district to assist in financing the Cachuma Dam and to allocate the water from this dam to said city and said districts. The board of directors of the Santa Barbara county agency further propose to negotiate a contract with the Santa Maria Valley water-conservation district to participate in financing the construction of the Vaquero Dam or the Cuyama River.

During the last 3 or 4 months the city councilmen of the city of Santa Barbara and the directors of the various water districts have been pressing for immediate action due to the urgent necessity of developing water for use by these districts. The need is urgent because a dry cycle is apparently commencing.

To date no major differences have arisen regarding the general program proposed by the Bureau of Reclamation, and I believe it is safe to say that the program is endorsed by the city councilmen of the three cities, all of the directors of the various districts, and by a great majority of the people within Santa Barbara County. Any minor differences of opinion, if they exist, can be agreed upon later.

Respectfully submitted,

SANTA BARBARA COUNTY WATER AGENCY,
By T. A. TWITCHELL,
Chairman of the Board of Directors.

FEDERAL POWER COMMISSION,
Washington, D. C., February 25, 1946.

Mr. M. W. STRAUS,
Commissioner, United States Bureau of Reclamation,
Washington 25, D. C.

DEAR MR. STRAUS: The comments herein with respect to the report of your department, dated June 1945, on "Comprehensive basin plan, Santa Barbara County project, California—Santa Maria, Santa Ynez and related basins—water resources and utilization," are transmitted in response to the letter from Mr. H. W. Bashore, Commissioner, dated October 30, 1945, requesting our comments on the proposed development. This is in accordance with the established procedures of the Federal Interagency River Basin Committee.

The report presents a plan for the comprehensive development of the water resources of Santa Barbara County, Calif., for the approval of the Congress, and recommends that construction of two reservoirs with their distribution systems and related works be authorized by the Congress as the initial stage of development to provide for domestic and industrial water supplies, irrigation, flood control, and silt retention.

The report shows the estimated cost of the comprehensive plan, based on January 1940 prices, at $46,400,000; estimated measurable direct annual benefits at $12,513,000; and the estimated annual costs at $2,043,000, the ratio of direct benefits to costs being stated at 6.12 to 1.

The Commission staff has carefully reviewed the report, and from data contained in the report, together with supplementary information from other sources and from its own studies, concurs in the Bureau's findings with respect to the lack of any possibility of justifying hydroelectric power installation at six of the seven

proposed dams. The best prospect for hydroelectric power development is from water stored in Cameusa Reservoir and diverted at Gibraltar Dam to Mission tunnel for the use of Santa Barbara and adjacent coastal area. The staff is of the opinion that consideration should be given to the eventual installation of about 1,500 kilowatts of hydroelectric generating capacity below the outlet end of Mission tunnel. No additional construction would be necessary in the early stages to make this project possible, and all action on it can be deferred, without detrimental effect, until such time as it would be desirable to undertake.

A comparison of the Bureau's plan with tentative plans of the War Department for flood control and water conservation on the Santa Ynez and Santa Maria Rivers described in the district engineer's "Preliminary examination report on Santa Ynez River," dated July 26, 1939, and "Survey report on flood control of Santa Maria River," dated February 10, 1939, indicates general similarity between them. It is presumed that such differences as exist and which may develop from present studies of the Corps of Engineers will be satisfactorily reconciled under the cooperative procedures which have been established.

Sincerely yours,

LELAND OLDS, *Chairman.*

DEPARTMENT OF AGRICULTURE,
Washington, March 4, 1946.

Mr. MICHAEL W. STRAUS,
Commissioner, Bureau of Reclamation.
Department of the Interior, Washington, D. C.

DEAR MR. STRAUS: We appreciate the opportunity to comment on the Department of the Interior's proposed comprehensive basin plan for the Santa Barbara County project, California, in response to Mr. H. W. Bashore's letter of October 30, 1945.

We have no comment to offer on the engineering aspects of the proposed developments but are wondering if the proposed reservoir capacity is adequate to permit carry-over storage to offset the effects of a drought such as occurred in the eighties when annual rainfall at Los Angeles was 5 inches or less for a period of 3 years.

The purpose and principle of the plan appear to be sound. Consideration is given in the report to alleviation of flood damage in the Santa Maria and Santa Ynez Valleys, the safeguarding of both surface and underground water sources which supply water for irrigation, and the prevention of salt water intrusion into ground water supply areas. These are interrelated problems which must be considered from the standpoint of wise land and water use in the area.

We are handicapped in attempting to appraise the proposed developments for agriculture because the amount which farmers will be required to pay for water is not indicated. The success of prospective farmers depends largely on this cost, especially where there is some question about the quality of some of the lands against which construction costs would be prorated.

The expected benefits from irrigation appear to be overestimated because of the gross crop value method used in calculating benefits and the fact that costs are based on 1940 conditions. Just how much the benefit-cost ratio might be changed by use of estimated net increased farm income and current cost figures is not known, but the change would probably be material since it is indicated that current construction costs would probably exceed the 1940 estimates by 62 percent. The important thing is to be sure that irrigation farmers can pay the cost of developments charged against them and still make a comfortable living.

Concern is appropriately shown in the report for the effect of sedimentation on useful storage capacity, which is expected to become serious by the end of the present century. During this period the population and development of the area will be intensified so the effects of storage-capacity reduction can be expected to affect the economy of the entire locality to a greater extent than at present. Construction of replacement storage capacity, if possible at that time, will probably be more difficult and costly than the original. In this connection, the watershed treatment program proposed by this Department, which is referred to in the report and which has been authorized by the Congress, is calculated to extend materially, by reducing the volume of sediment coming into them, the useful life of reservoirs which may be constructed on the Santa Ynez River. Similarly, the Department is also developing comparable plans for the Santa Maria River watershed.

Sincerely,

CHARLES F. BRAUMM,
Assistant Secretary.

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F. BRAUMM,
Assis Secretary.

UNITED STATES DEPARTMENT OF THE INTERIOR
HAROLD L. ICKES, *Secretary*

COMPREHENSIVE BASIN PLAN
SANTA BARBARA COUNTY PROJECT, CALIFORNIA

SANTA MARIA, SANTA YNEZ, AND RELATED BASINS

WATER RESOURCES AND UTILIZATION

Report by the Department of the Interior
Sponsored by and prepared under the general supervision of

BUREAU OF RECLAMATION
HARRY W. BASHORE, *Commissioner*

Region No. II
Charles E. Carey, *Regional Director*

June 1945

LETTER OF TRANSMITTAL

UNITED STATES DEPARTMENT OF THE INTERIOR,
BUREAU OF RECLAMATION,
Washington, October 10, 1945.

The SECRETARY OF THE INTERIOR.

SIR: I submit herewith a report of June 1945 on the comprehensive basin plan for the Santa Barbara County project, California. The plan of development outlined in the report, estimated to cost $46,400,000 on the basis of January 1940 prices, is feasible from an engineering standpoint, is sound economically, and it is recommended that construction of the initial stage of development, estimated to cost $22,000,000 on the same basis be initiated at the earliest practicable date. The report is submitted to you pursuant to section 9 of the Reclamation Project Act of 1939. Upon clearance with the affected State and with the Secretary of War, copies of the report, together with comments, if any, of the affected State and the Secretary of War will be submitted for your transmittal to the President and, subsequently, to the Congress, which, it is hoped, will enact legislation authorizing construction of the initial stages of the project.

The attached report is the result of the joint efforts and cooperation of numerous Federal, State, and local governmental agencies, water districts, and private citizens, all working toward the development of one comprehensive plan. Outstanding has been the contribution of such time, effort, and money by the Board of Supervisors of Santa Barbara County which entered into a series of contracts with the Bureau of Reclamation to share in the costs of the investigations. The officials of the city of Santa Barbara, representatives of local water districts, and many local citizens have made important contributions. Of equal importance has been the participation of the Geological Survey and the Fish and Wildlife Service of this Department, the Department of Agriculture, and the Corps of Engineers.

Santa Barbara County is now in urgent need of additional regulated water supplies to maintain existing irrigation, suburban, and domestic development and to provide for their normal expansion in the future. In the Carpinteria and Goleta County water districts and in Santa Maria Valley, water is being pumped from underground reservoirs faster than the average rate of natural replenishment. In these areas the existing developments cannot be maintained without securing additional water supplies. The present use of water by the city of Santa Barbara exceeds by one-third the dependable supply from all its existing sources. Also, there is need for flood control to alleviate the present flood damage along Santa Ynez and Santa Maria Rivers. The prevention of possible pollution of ground-water reservoirs by infiltration of salt from the sea, due to lowering of water tables by pumping, is likewise an urgent need. Economical development of hydroelectric power is not practicable and navigation is not a factor on any of the streams of Santa Barbara County.

The area covered by the proposed plan of development includes Santa Barbara County, and small portions of San Luis Obispo, Ventura, and Kern Counties, Calif., as shown in the regional director's report of June 18, 1945, and in the substantiating material. The comprehensive development of the water resources requires seven principal reservoirs, two tunnels and conduits, several lateral systems, and other works, including several small special purpose dams and regulating reservoirs, canals, and a fish hatchery. The reservoirs will materially reduce flood damages in the Santa Ynez and Santa Maria Valleys, and with the other works will serve the needs of irrigation by aiding in the replenishment of the ground-water reservoirs already supplying 60,000 acres of irrigated land. New irrigation of 30,000 acres of irrigable lands will be made possible. Supplemental irrigation water will be provided to 40,600 of the 60,000 acres mentioned above. A total ultimate municipal water supply of 16,600 acre-feet annually will be provided for the city of Santa Barbara, and other municipal water supplies will be improved.

In order to prevent a shortage of municipal water to the city of Santa Barbara, to relieve the critical depletion of ground-water supplies in the south coast area, to improve and protect the steelhead runs on the Santa Ynez River, and to reduce flood damages and the present overdraft of ground water in the Santa Maria Valley, it is urgent that the initial units of the comprehensive plan, as described in the regional director's report as modified hereinafter, be authorized for construction by the Congress at an early date, and be constructed as soon thereafter as detailed plans can be perfected. Other units of the comprehensive plan should be constructed later as the need for them becomes more pressing.

The direct annual benefits of the comprehensive plan are estimated as follows:

Irrigation (increase in gross crop returns)	$11,090,000
Municipal water (value to municipal users)	988,000
Flood control (reduction of flood damages)	435,000
	12,513,000

and the estimated annual costs of the comprehensive plan of development, 1940 prices, are:

Operation and maintenance of entire project	$240,000
Amortization of entire project, 50 years at 3 percent	1,803,000
	2,043,000

The ratio of direct benefits to costs, based on cost estimates as of 1940, is 6.12 to 1. Under present cost conditions, which reflect a 62 percent increase in costs during the war, the ratio of long-range benefits to costs is estimated to be about 4 to 1.

In addition, there are many very real benefits which are not appraised in terms of dollar return to the Nation. The plan is feasible as an engineering development and, with continuing guidance from later detailed investigations by other agencies as well as by the Bureau of Reclamation, the plan will become increasingly effective.

The people of the area have evidenced their desire to proceed with the plan, as attested by their current action in securing enabling State legislation, which empowers the county board of supervisors as ex officio directors to enter into contracts with the United States to carry

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out the plan of development as outlined and to repay the reimbursable costs.

Since receipt of the report of the regional director dated June 18, 1945, further conferences have been held with the officials of Santa Barbara County and the city of Santa Barbara. These conferences have dealt primarily with the sequence of construction of certain works in the initial stage of development outlined in paragraph 25 (b) of the regional director's report, particularly with the question whether Camuesa Reservoir and its related works should be constructed prior to or subsequent to construction of Cachuma Reservoir and its related works. Determination of this point will naturally depend, as in all such matters, upon the desires of the local people and their ability to make satisfactory financial arrangements for repayment with the United States.

I recommend that the plan as a whole be approved and that the particular units which compose the urgently needed initial stage of development be authorized, with the proviso that the order of construction of Camuesa and Cachuma Reservoirs, and works incidental to the use of waters from those reservoirs be determined by further agreement with authorities of Santa Barbara County. Accordingly, I recommend that you adopt this report as your proposed report on the comprehensive basin plan for the Santa Barbara County project, California, and that you authorize me, in your behalf, to transmit copies of this letter and of the attached proposed report to the affected State (California) and to the Secretary of War in accordance with the requirements of section 1 of the Flood Control Act of 1944.

Respectfully,

H. W. BASHORE,
Commissioner.

Approved: October 19, 1945.

H. L. I.,
Secretary of the Interior.

CONTENTS

REPORT ON THE PROPOSED COMPREHENSIVE PLAN

SUBSTANTIATING MATERIALS

SUBSTANTIATING MATERIALS—Continued

COMPREHENSIVE BASIN PLAN FOR SANTA BARBARA COUNTY, CALIF.

UNITED STATES DEPARTMENT OF THE INTERIOR,
BUREAU OF RECLAMATION,
Region II, Sacramento, Calif., June 18, 1945.

From: Regional director, region II, Sacramento, Calif.
To: The Commissioner, Bureau of Reclamation.
Subject: Comprehensive basin plan for Santa Barbara County, Calif.

TRANSMITTAL

1. The proposed plan for the comprehensive development of the water resources of Santa Barbara County, Calif., shown on the following pages, is designed to advance the maximum beneficial use of the water resources of Santa Barbara County in balance with over-all plans for the development of all the natural resources. The report has been prepared as a Department of the Interior report sponsored by and prepared under the general supervision of the Bureau of Reclamation. The report outlines a comprehensive plan of development for the approval of the Congress, and recommends that construction of two reservoirs with their distribution systems and related works be authorized by the Congress as the initial stage of development to provide for domestic and industrial water supplies, irrigation, flood control, and silt retention. For your convenience, and that of others who must consider the plan, the report is presented in brief form with appended substantiating materials. I recommend that you present the report for appropriate departmental action with a view of securing congressional approval of the comprehensive plan, and authorization of the urgently needed works outlined in the initial stage of development.

AUTHORITY FOR THE REPORT

2. This report is authorized to be made by virtue of the Federal reclamation laws (act of June 17, 1902, 32 Stat. 388, and acts amendatory thereof or supplementary thereto).

COOPERATION AND ACKNOWLEDGMENTS

3. This report is the result of the joint efforts and cooperation of numerous Federal, State, and local governmental agencies, water districts, and private citizens, all working toward the development of one comprehensive plan. Outstanding has been the contribution of much time, effort, and money by the Board of Supervisors of Santa Barbara County, which entered a cost-sharing contract with the Bureau of Reclamation (12r-13077 dated July 1, 1941 and amendments thereto), under which the investigations leading to this report

were performed. The officials of the city of Santa Barbara, representatives of local water districts, and many local citizens have made important contributions in the course of the investigations. Of equal importance has been the participation of the Geological Survey, the Fish and Wildlife Service, the United States Department of Agriculture, and the Corps of Engineers, the former two of which prepared reports that are incorporated herein as a part of this document. The primary responsibility and supervisory work in the preparation of the report was carried on by the Bureau of Reclamation. The helpful assistance of the following is acknowledged:

Santa Barbara County.
City of Santa Barbara.
University of California.
California Division of Fish and Game.
Carpinteria, Montecito, and Goleta County water districts.
Santa Maria Valley water conservation district.
Santa Ynez River water conservation district.
Department of the Interior:
- Geological Survey.
- Fish and Wildlife Service.
- Office of Indian Affairs.

Department of Agriculture:
- Forest Service.
- Soil Conservation Service.
- Bureau of Agricultural Economics.
- Bureau of Plant Industry.

Department of War: Corps of Engineers.
Department of Commerce:
- Weather Bureau.
- Bureau of Census.

Several consulting engineers who have furnished reports of great value.
And numerous individuals.

DESCRIPTION OF AREA

4. Santa Barbara County is located in the semiarid, mountainous coastal area of California about 100 miles northwest of Los Angeles. The watershed area of 3,600 square miles included in these investigations comprises practically all of Santa Barbara County and small portions of San Luis Obispo, Ventura, and Kern Counties. The area is about 50 miles wide north to south and about 80 miles long east to west, and includes the drainage areas of Cuyama River, Sisquoc River, Santa Maria River, San Antonio Creek, Santa Ynez River, and the long, narrow coastal area situated along the south edge of Santa Barbara County. More than half of the area is mountainous and unsuited to farming, somewhat less than a third is hilly and is utilized chiefly for dry farming and for raising livestock, and less than a tenth is included in irrigated farms.

5. The climate is characterized by a short rainy season in winter, and a long dry season in summer. Precipitation consists almost entirely of rainfall, but occasionally there is snow in the mountains. Annual precipitation has varied from 4.49 to 45.21 inches at Santa Barbara, and averaged 18.40 inches during the 77 years of record.

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Summers along the coast are of the cool Mediterranean type while the interior mountain valleys are hot and dry. At Santa Barbara, near which abundant citrus crops are grown, the mean annual temperature is 60 degrees, and the average frost-free period is 334 days.

6. Santa Barbara County produces large quantities of lemons, oranges, walnuts, avocados, vegetables, sugar beets, flower seeds, beans, alfalfa, honey, beef, and dairy products on its 1,340 farms which have a total cultivated area of 150,000 acres. Sixty percent of the cultivated land is dry-farmed and 40 percent is irrigated. The dry-farmed lands, devoted largely to beans, hay, and grain, produced an average annual gross crop return of $55 per acre during 1936–40 as compared to $339 per acre for the irrigated land. In 1943, the total gross crop value was $32,000,000 and the livestock and livestock products were valued at $10,000,000.

7. Petroleum production has been and still is important in the county. The diatomite deposit at Lompoc, now highly developed, is probably the largest and richest deposit not only in the United States but in the world. Production of these, and other minerals, was valued at $8,000,000 in 1940.

8. There was a total of 73 manufacturing establishments, including food-processing, printing, publishing, oil-refining, and other plants manufacturing building and industrial materials, which produced manufactured products valued at $8,700,000 in 1939.

9. The urban population in 1940 was 46,859, located in the three cities of Santa Barbara (34,958), Santa Maria (8,522), and Lompoc (3,379). The rural population in 1940 was 23,696, which included 8,436 persons living on farms. By 1990 the city of Santa Barbara is expected to have a population of 100,000, providing needed water is made available as proposed in this report.

10. The scant, undependable, surface-water supplies, from the winter rains of November to May, are not now utilized to any important extent, because of the lack of large storage reservoirs which are necessary to control the extremely variable run-off. Water pumped from underground basins is utilized for present irrigation and municipal supplies, except in the city of Santa Barbara and Montecito County water district. In these two areas, both of which are located on the south coast of the county, the residents have found it necessary to import water from Santa Ynez River. This is accomplished by means of reservoirs on that stream and tunnels through the Santa Ynez Mountains.

NEED FOR DEVELOPMENT

11. Santa Barbara County is now in urgent need of additional regulated water supplies to maintain existing irrigation, suburban, and domestic developments and to provide for their normal expansion in the coming years. In Carpinteria and Goleta County water districts and in Santa Maria Valley, water is being pumped from the underground reservoirs faster than the average rate of natural replenishment. If this overpumping continues, about 30 percent of the presently irrigated land in these areas may be forced to revert to dry farming, or the infiltration of toxic salts from ocean water may ruin the entire ground-water supply. In these areas the existing development cannot be maintained without securing additional water

supplies. The present use of water by the city of Santa Barbara exceeds by one-third the dependable supply from all its existing sources. It is fortunate that the past few years have been wet, because if drought years like 1898–1900 or 1929–31 had occurred, the city would have experienced a severe water shortage.

12. There is need for flood control to alleviate the present average annual flood damage of $80,000 along Santa Ynez River and $433,600 along Santa Maria River. The heavy silt load carried down the streams during floods would accumulate in storage reservoirs, reducing their effective life. The abatement of possible pollution of groundwater reservoirs by infiltration of salt from the sea, due to lowering of water tables by pumping, is also an urgent need. Economical development of hydroelectric power is not practicable because of the extreme variations in run-off and reservoir storage releases. Navigation is not a factor on any of the streams of Santa Barbara County.

PROPOSED COMPREHENSIVE PLAN OF DEVELOPMENT

13. As a result of extensive surveys made by the Bureau of Reclamation in cooperation with the county of Santa Barbara and others, a plan has been developed to meet the future as well as the present needs of the county. This plan includes: Seven principal reservoirs; Mission tunnel (constructed, but in need of rehabilitation); Tequepis tunnel; south coast conduit; Goleta conduit; south coast and Santa Ynez Mesa lateral systems; and other works, including several small special-purpose dams and regulating reservoirs, canals, and a fish hatchery, with such modifications as the Commissioner of Reclamation and the Secretary of the Interior may find advisable as the work progresses and the detailed investigations are carried further. The reservoirs will almost entirely eliminate the flood damages in Santa Ynez and Santa Maria Valleys, and with other appurtenant works will serve the needs of irrigation by aiding in the replenishment of the ground-water reservoirs already supplying 60,000 acres of irrigated land, and will make possible new irrigation of 30,000 acres more. Supplemental water will be provided to 40,600 acres (part of the 60,000 acres now irrigated) which have inadequate supplies. About 16,600 acres of the new land is located in the south coast area, 13,000 acres in Santa Ynez Basin, and 400 acres in Santa Maria Basin. A total ultimate municipal water supply of 16,600 acre-feet annually will be provided for the city of Santa Barbara, including 1,400 acre-feet from seepage into existing tunnels. This supply will meet the requirements of 100,000 people—the expected population by 1990. Other municipal water supplies will be improved.

14. The utilization of supplemental and new irrigation supplies in Santa Barbara County depends on the continued use of ground-water storage. In the south coast area additional water will be delivered by means of a gravity conduit for surface irrigation and groundwater replenishment, but pumping from wells will be necessary to make full use of both the supplemental and new water. In Santa Maria, Lompoc, and Santa Ynez Valleys, all supplemental and new supplies will be provided through ground-water replenishment and subsequent pumping. Only a portion of the water applied to the land for irrigation is consumed through evaporation and transpiration. Much of the remainder percolates to the underground basin and be-

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Description	
Camuesa Reservoir, Mission tunnel, S conduits, and other related works.	
Fish hatchery	
Cachuma Reservoir, Tequepis tunnel, tion.	
Santa Rosa Reservoir	
Salsipuedes Reservoir	
South Coast lateral systems	
Santa Ynez Mesa lateral system	
Vaquero Reservoir	
Round Corral Reservoir	
Cuyama Debris Reservoir	
Investigations, including but not limite for initial stage of development.	
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comes available for repumping. In this way, present, supplemental, and new water supplies largely will become a common supply which will be used and reused through ground-water pumping. Only through such use and reuse can the maximum conservation of the limited water resources of Santa Barbara County be attained.

15. The rights to store and divert waters for the comprehensive plan will be secured in accordance with established California water laws. The Bureau of Reclamation recognizes and respects existing water rights which have been initiated and perfected or which are in process of being perfected under States laws. Such a policy is required by the Reclamation Act of 1902 and has consistently been maintained since the inception of the reclamation program.

16. The principal purpose of Cuyama debris reservoir is silt control. All other reservoirs in the comprehensive plan will be used for irrigation, silt control, and flood control. In addition to these purposes, Camuesa Reservoir will provide municipal water. The capacities of the principal reservoirs shown on the map facing page 70, and the preliminary estimated costs of these reservoirs and appurtenant works, based on January 1940 prices are as follows:

TABLE 1.—*Reservoir capacities and construction costs*

Description	Stream	Reservoir capacity, acre-feet	Estimated cost
Camuesa Reservoir, Mission tunnel, South Coast and Goleta conduits, and other related works.	Santa Ynez	125,000	$10,000,000
Fish hatchery			200,000
Cachuma Reservoir, Tequepis tunnel, Goleta conduit connection.	Santa Ynez	200,000	10,000,000
Santa Rosa Reservoir	do	100,000	4,500,000
Salsipuedes Reservoir	Salsipuedes	30,000	2,000,000
South Coast lateral systems	Santa Ynez		800,000
Santa Ynez Mesa lateral system	do		100,000
Vaquero Reservoir	Cuyama	197,000	11,000,000
Round Corral Reservoir	Sisquoc	50,000	5,500,000
Cuyama Debris Reservoir	Cuyama	20,000	1,000,000
Investigations, including but not limited to preparation of plans for initial stage of development.			800,000
Total		722,000	46,400,000

SUMMARY OF ANNUAL BENEFITS AND COSTS

17. The following analysis is presented for convenience in appraising the economic justification of the comprehensive plan. It is expected that the basis for allocating costs as provided in section 9 of the Reclamation Project Act of 1939, and subject to the provisions of paragraph 25 hereof, will result in an equitable and appropriate distribution of allocable costs among the purposes to be served.

18. Direct benefits from irrigation, municipal water supplies, and flood control are measurable, and are summarized. The irrigation benefits are measured by the increase in gross crop returns. These benefits would accrue by reason of the irrigation of 30,000 acres of new land now dry-farmed or used for pasture, and by the provision of a supplemental water supply for 40,600 acres of land now irrigated from a ground-water supply which is sufficient only to meet the full requirements of 28,600 acres. Twelve thousand acres of presently irrigated land would be forced to revert to dry-farming if the supplemental

supply is not made available. The municipal benefits to Santa Barbara are estimated at $65 per acre-foot for 15,200 acre-feet of water to be imported from Santa Ynez River. Flood-control benefits resulting from the construction of the seven reservoirs are measured by the decrease in average annual flood damages along Santa Ynez and Santa Maria Rivers. Numerous other benefits not evaluated in dollars are outlined in the next paragraph. Even without these other very real benefits, the plan will have an economic return to the Nation of $6.12 for each dollar required to construct, maintain, and operate the program.

TABLE 2.—*Direct annual benefits*

	Total annual
Irrigation benefits:	
New water supply, 30,000 acres	$7,438,000
Supplemental water supply, 40,600 acres	3,652,000
Total	11,090,000
Municipal water-supply benefits: Santa Barbara, 15,200 acre-feet at $65	988,000
Flood-control benefits:	
Santa Ynez Basin (annual damage, $80,000)	50,000
Santa Maria Basin (annual damage, $433,000)	385,000
Total	435,000
Total measurable direct benefits from entire Santa Barbara County project	12,513,000
ANNUAL COSTS	
Operation and maintenance of entire project	240,000
Amortization of entire project in 50 years at 3 percent	1,803,000
Total annual costs of entire Santa Barbara County project	2,043,000

Ratio benefits to costs: 6.12 to 1.00.

NONREIMBURSABLE BENEFITS

19. There are numerous less tangible but nevertheless real benefits for which monetary values have not been computed. While the value of a stable agriculture and a sound basis for industrial and commercial expansion are not readily susceptible of dollar evaluation, their effects upon the community and the region would be important. Still other values would grow from improvements through better control of silt in the stream channels and from recreation. And far from least would be the value received from protecting the highly developed farm lands from abandonment due to salt-water intrusion or loss of supply from overdraft upon the ground-water aquifers. Further, this development would exert a beneficial effect on all phases of activity in Santa Barbara County and surrounding areas. A few of these extended benefits are—

(*a*) The addition of 30,000 acres of new high-value land to the tax base. This will provide increased return to State and local taxing institutions and through increased earnings will reflect favorably on income-tax receipts. The application of supplemental water to an additional 40,600 acres will enhance the tax-paying ability of persons now farming this land. The entire tax situation will be materially improved.

(*b*) The proposed
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(*c*) Fish runs ste
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(b) The proposed development will increase the annual agricultural income of Santa Barbara County by more than one-third. Irrigation of 30,000 acres of new land will result in an increase of nearly $7,500,000 annually in gross farm income, and the provision of a supplemental irrigation supply will prevent an annual loss of over $3,500,000 in agricultural income which will occur if a portion of the presently irrigated land is permitted to revert to dry-farming by reason of inadequate water supplies. This increased basic income of about $11,000,000 annually will result in increased requirements: for domestic and professional services; for common and skilled labor; for transportation and utilities; for processing and packing facilities; for the goods and services required by the hundreds of families who will participate directly in farming; and for an appreciably greater number of families who will provide services for the people. All this translates into increased purchasing and consuming power.

(c) Fish runs (steelhead) on the streams in Santa Barbara County have substantial commercial and recreational values, and constitute a resource which should be maintained, and if possible, improved as a part of the plan. In order to assure the maintenance of these runs during the interval of time between the construction of the Camuesa Reservoir and the Cachuma Reservoir, and in order to improve the value of these runs after Cachuma Reservoir is constructed, it is necessary to construct a fish hatchery estimated to cost $200,000, with an annual operation and maintenance cost estimated at $25,000; the hatchery to be located in the vicinity of Cachuma Dam site or at such other location as may be determined. While this facility is included in the cost of the plan, the values which will come from the maintenance of the steelhead runs may vary and are therefore not included in this report as a direct benefit. The annual value of the steelhead run now averages approximately $200,000, as estimated by the Fish and Wildlife Service. Without the hatchery there is grave danger that this resource may be lost or severely impaired. With the hatchery and the balance of the comprehensive plan, this fish resource may be benefited.

(d) Reconversion from a war to a peace economy will impose an extremely heavy burden on this west coast area. There will be a pressing demand for agricultural opportunity for both returning veterans and persons displaced from war aircraft and ship production and other war activities. The repercussion of reconversion on commercial enterprises will also be acute. The many jobs which will result from this program in construction, operation, and maintenance, and the stable income which will be available after completion will do much to assuage the difficulties of commercial interests and provide for the settlement and stabilization of many war-displaced persons.

(e) The extended benefits from the proposed increased reliable supply of domestic water will make possible an increase in excess of 150 percent of the present assessed valuation of urban property. In this area so richly endowed with climatic, scenic, and recreational resources, the supply of domestic water is one of the limiting factors in civic and industrial development. The difference in fire-insurance rates alone, for areas adequately supplied

with domestic water and areas having only a limited supply, is of direct and appreciable monetary value.

(*f*) The program as proposed will result in more stabilized community life for more people in this desirable residential area. Through the settlement of sparsely populated areas, the program will make possible better schools, roads, and systems of communication. Improved health and other services can be provided at a lesser unit cost per person served.

(*g*) The expenditure of public funds in Santa Barbara County in periods of economic adversity for relief and similar items will be lessened.

REIMBURSEMENT AND FLOOD-CONTROL ALLOCATION

20. The total estimated cost of the comprehensive plan outlined in this report is $46,400,000, based on January 1940 prices. It is not known what the postwar costs will be; therefore, costs as of 1940 are used throughout this report. However, in order to assure a complete understanding of the variations in costs affected by war, if the project were constructed under prices now prevailing, the project would cost approximately 62 percent more. Of the total cost, a nonreimbursable allocation of $11,192,000 may reasonably be made to flood control. The irrigation, industrial, and domestic water users should be able to repay directly between two and three times the amount allocated to flood control. The remaining portion of the project cost, including the additional costs affected by the war at the time of construction, would be nonreimbursable.

INITIAL CONSTRUCTION PROGRAM

21. In order to prevent a shortage of municipal water to the city of Santa Barbara and to relieve the critical depletion of ground-water supplies in the South Coast area, it is urgent that Camuesa Reservoir, Mission tunnel, South Coast and Goleta conduits, South Coast lateral systems, and related works be constructed. In order to maintain and improve the steelhead runs a fish hatchery is needed near Cachuma Dam site. Vaquero Reservoir and related works should be constructed to reduce the present serious overdraft of ground water in the Santa Maria Valley and to reduce flood damage. These units constitute the initial construction program of urgently needed works. Other units of the comprehensive plan should be constructed later as the needs for them become more pressing.

LOCAL COOPERATION

22. Local participation and interest in the preparation of plans for the comprehensive development has been excellent ever since Santa Barbara County entered the first of a series of contracts with the Bureau of Reclamation to share in the cost of the investigations for this report. The comprehensive plan and initial program have been well received locally. A bill was recently prepared by the district attorney and passed by the State legislature. This enabling act creates the Santa Barbara County Water Agency, embracing the whole of Santa Barbara County, and empowers the county board of super-

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RELATI

23. (*a*) In order to obtain
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visors as ex officio directors thereof to enter into contracts with the United States for carrying out the plan of development as outlined and for repaying the reimbursable costs.

RELATED INVESTIGATIONS

23. (*a*) In order to obtain basic facts related to both surface water and ground water of Santa Barbara County, the Geological Survey has recommended a continuation of the existing investigational program estimated to cost about $16,000 annually, with an additional cost for rehabilitation, readjustment, and expansion of $55,000 over a 2-year period. It is anticipated that Santa Barbara County will continue to pay one-half the cost of the continuing program, or $8,000 to $12,000 annually, as it has been doing since the inauguration of the cooperative program in November 1940 when the first steps were taken in preparing a comprehensive regional plan. The basic water facts obtained and to be obtained by the Geological Survey are needed for use not only in the design, construction, and operation of the plan herein recommended, but also in the planning, construction, operation, and administration of other structures, present and future, involving the use of water in the region. The Survey investigations should be actively prosecuted so that the data secured shall be continuous and representative. Also, the Geological Survey has recommended that plan and profile surveys be made of the Santa Maria, Cuyama, Sisquoc, and Santa Ynez Rivers and some of the larger tributaries at a cost of $16,000.

(*b*) The Fish and Wildlife Service has made preliminary studies of the streams in Santa Barbara County in connection with this report, and as a result has made a number of specific recommendations designed to improve fish life. The Bureau of Reclamation concurs in the objectives of these proposals. However, due to the very limited stream flows which prevail during the long series of dry years which occur in this territory, it is physically impossible to assure the minimum releases of water which are desired in some cases. In other cases, the recommended releases could only be made by the exclusion of 3,700 acres of new land, which otherwise would be irrigated with the water so released. Such differences do not represent conflicts between the purposes of these agencies both of which desire to secure the maximum over-all benefits. The use of water for fish-hatchery purposes is not a consumptive use, however, and by provision of a hatchery, the steelhead run can be maintained and perhaps improved. If provision is made for such a hatchery to be constructed concurrently with Camuesa Reservoir, neither agency sees reason to defer action on the basin plan pending the adjustment of detail to accomplish this objective. At a conference of officials of the two agencies on April 2, 1945, it was mutually agreed that further investigations are needed to ascertain the degree to which final designs should provide fishways and related facilities and provide for releases of water in the interest of fish life and to determine the best location for a hatchery. Accordingly, it was agreed that as the detailed plans progress, joint agreement will be reached between the Fish and Wildlife Service, the Bureau of Reclamation, and the appropriate State and county officials upon practicable and desirable methods of securing improvements for fish life, consistent with other purposes outlined in the plan.

(c) Investigations of the Department of Agriculture, and others, indicate a real and important need for the adoption and improvement of widespread upstream watershed conservation practices, with recommendations for the prevention of fires and soil erosion, and the reforestation and revegetation of burned-over areas. The Bureau of Reclamation concurs with these general recommendations because the useful life of the reservoirs will be prolonged if the rates of silt accumulation are reduced. Other upstream watershed conservation practices certainly will be valuable to the county and to the Nation. In the Flood Control Act of December 22, 1944 (Public Law 534, 78th Cong.), the Congress has authorized a program for water-flow retardation and prevention of soil erosion on the Santa Ynez River watershed.

(d) Through mutual cooperation between the Corps of Engineers and the Bureau of Reclamation, much valuable information has been exchanged throughout these studies. Flood-control benefits, evaluated by the Corps of Engineers, have been accepted and adopted by the Bureau of Reclamation.

(e) In order to be prepared to initiate construction of the initial stage of development as promptly as the material and manpower situations permit, and to provide for the orderly development of the features in the comprehensive plan, the Bureau of Reclamation must immediately prepare preconstruction plans and continue certain of the general investigations.

(f) Based upon information being collected by the Geological Survey, Santa Barbara County is investigating methods of regulating the pumping of water so that withdrawals will not exceed the safe yield of the underground basins. The Bureau of Reclamation encourages continuation of these studies.

CONCLUSIONS

24. The plan for development of Santa Barbara County is economically sound. As indicated by the estimates, the measurable benefits alone exceed the estimated costs by more than 6 to 1. In addition, there are many tangible benefits which are not appraised in terms of dollar return to the Nation but which are, nevertheless, equally real. The plan is feasible as an engineering development; and, with continuing guidance from later detailed investigations by other agencies as well as by the Bureau of Reclamation, the plan will become increasingly effective. The people of the area have evidenced their desire to proceed with the plan, as attested by their current action in securing enabling State legislation. Accordingly, it is concluded that the plan as a whole should be approved and that the particular units which compose the urgently needed initial stage of the development should be authorized.

RECOMMENDATIONS

25. It is recommended—

(a) That the comprehensive plan of development, as described in this report, be approved.

(b) That the following principal units, and such related works as may be incidental thereto, constituting the initial stage of develop-

ment in Santa Barbara County and adjacent areas in California, be authorized to be constructed, operated, and maintained by the Bureau of Reclamation, Department of the Interior, substantially in accordance with the plans set forth in this report, with such modification as may be recommended from time to time by the Commissioner and approved by the Secretary of the Interior, to wit:

Camuesa Reservoir, Mission tunnel, south coast conduit, Goleta conduit, and other related works.

South coast lateral systems.

Fish hatchery.

Vaquero Reservoir.

(*c*) That the additional investigations discussed in paragraph 23 and as hereinafter summarized be authorized:

(1) The Geological Survey to conduct a continuing investigation in cooperation with the county of Santa Barbara to obtain further basic data related to the water resources and to make suitable plan and profile surveys of the rivers.

(2) The Fish and Wildlife Service, with the cooperation of the Bureau of Reclamation and the State and county officials, conduct such investigations as are necessary to determine the location of the fish hatchery and the practical facilities and water releases for the improvement of conditions for fish and wildlife.

(3) The Department of Agriculture conduct such additional investigations as are necessary incidental to adoption and improvement of upstream land-use conservation practices and fire protection in the interest of increasing the life and utility of the proposed works.

(4) The Corps of Engineers continue to participate in the development of detailed plans related to flood-control problems.

(5) The Bureau of Reclamation to proceed with preparation of plans and specifications for the initial stage of development outlined in (*b*) above, and with general investigations leading toward orderly development of the comprehensive plan.

(*d*) That the principal units and related works constituting the initial stage of development, outlined in (*b*) above, be authorized to be constructed, operated, and maintained pursuant to the Federal reclamation laws (act of June 17, 1902, 32 Stat. 388, and acts amendatory thereof or supplementary thereto); provided—

(1) That this report shall be deemed to satisfy the requirements of the Federal reclamation laws governing the submission to the President and the Congress of a finding of engineering feasibility.

(2) That the allocation of costs shall comprehend the estimated cost of all of the works proposed in this report to be constructed by the Bureau of Reclamation for eventual development or control of the water resources of the Santa Barbara County area.

(3) That the water users shall not be required to repay that part of the estimated cost allocated to irrigation which, in the judgment of the Secretary of the Interior, upon consideration of all appropriate factors, exceeds the amount that the water users should be required to repay.

(4) That the excess, if any, of the total estimated cost of all of the works proposed in accordance with this report to be constructed by the Bureau of Reclamation for eventual full development and control of the water resources of the Santa Barbara County area, over the aggregate of the estimated repayments and returns, together with the

excess, if any, of actual costs over total estimated costs, shall be nonreimbursable.

(5) That submission to the President and the Congress of a report and findings on the estimated cost of the proposed construction, the part of the estimated cost which can properly be allocated to irrigation and probably be repaid by the water users, the part of the estimated cost which can properly be allocated to power and probably be returned to the United States in net power revenues, the part of the estimated cost which can properly be allocated to municipal water supply or other miscellaneous purposes and probably be returned to the United States, and the part of the estimated cost which can properly be allocated to flood control or navigation, shall not be deemed a condition precedent to proceeding with construction.

CHARLES E. CAREY.

SUBSTANTIATING MATERIAL—BUREAU OF RECLAMATION

GENERAL DESCRIPTION

LOCATION

Santa Barbara County is on the Pacific coast about 100 miles northwest of Los Angeles, Calif. It is bounded on the north by Santa Maria and Cuyama Rivers and on the west and south by the Pacific Ocean. To the east lie Ventura County and the headwater areas of Santa Clara and Ventura Rivers.

TOPOGRAPHY

Seventy percent of the county area is mountainous, and 20 percent is hilly. The remaining 10 percent is sufficiently level for cultivation; of this 10 percent about one-third is irrigated. There are three principal drainage areas; Santa Maria Basin, Santa Ynez Basin, and the south coast area.

Santa Maria Basin comprises the northern portion of the county and includes small areas of San Luis Obispo and Ventura Counties. It abuts to the northeast on the great Central Valley of California, from which it is separated by low hills. The San Rafael Mountains rise to heights of over 6,000 feet and extend southeasterly across the Santa Maria Basin into the headwaters of the Santa Ynez Basin. The latter basin occupies the southern portion of the county, excluding a narrow strip of land along the ocean known as the south coast area. Between the Santa Ynez Basin and the south coast area are the Santa Ynez Mountains, which parallel the ocean in an east-west direction for nearly 70 miles and rise to elevations of 4,000 feet. The south coast area, at no point more than 7 miles wide, is cut into short sections by numerous steep, intermittent streams which flow down the slope of the Santa Ynez Mountains to the ocean.

GEOLOGY

The rocks underlying Santa Barbara County are nearly all sedimentary, chiefly shales and sandstone. Conglomerates are important in some formations, and there are occasional small limestone beds.

Igneous rocks occur in small amounts; bedded volcanic tuffs are found east of Santa Maria, and there are some small bodies of serpentine. Geologically speaking, most of the rocks in Santa Barbara County are relatively young. Among the youngest that have been uplifted above sea level are some soft sands which contain sea shells and resemble the present beach sands.

The rock formations have been folded and faulted. Where this action has been the strongest the mountain ranges of Santa Barbara County have been uplifted by arching the sedimentary beds and by breaking the beds along faults. The Santa Ynez Mountains paralleling the south coast and the San Rafael Mountains and Sierra Madre in the northeastern half of the county have been so formed.

A relatively low triangular area in the northwestern part of the county, comprising the Santa Ynez, Lompoc, and Santa Maria Valleys and the mesas and hills which separate them, lies between the high mountains. The rocks in this low area and at the city of Santa Barbara are similar to the present sea deposits; this evidence, plus the occurrence of gravel-covered terraces along the streams and the occurrence of occasional earthquakes, indicate the youthfulness of the uplift of some of the area.

LAND USE

Santa Barbara County has an average east-west length of about 70 miles and a width of 40 miles. The total area is 1,757,000 acres, including 821,000 acres of farm land, 253,000 acres of other privately owned land, and 683,000 acres of public land. Most of the latter is in Los Padres National Forest. The forest cover of the mountainous area is composed of fir, spruce, pine, piñon, juniper, oak woodland, chaparral, sagebrush, grass woodland, and mustard. Live oak, sycamore, alder, cottonwood, willows, and underbrush grow along the streams. Much destruction of natural cover has resulted from the occurrence of frequent forest fires. The principal use of grassland is for cattle grazing.

The bottom lands, wide river valleys, and coastal areas are composed of fine loam, sandy loam, and fine sandy soils which are very fertile. They were formerly covered with native vegetation but are now cultivated. The total crop area is about 150,000 acres, of which 60,000 acres are under irrigation. An additional 30,000 acres would be supplied with water under the plan of development described herein. The principal irrigated crops are lemons, vegetables, flower seeds, sugar beets, alfalfa, beans, and walnuts. A portion of the area on the south coast of the county is developed for suburban estates and resorts, and this type of development is expected to expand.

CLIMATE

The climate is characterized by a short rainy season coincident with the winter months and a long dry season occurring during the summer. Summers along the coast are of the cool Mediterranean type, while the interior mountain valleys are hot. Winter rains are usually light and of short duration, but this region is subject to frequent cyclonic storms from the South Pacific Ocean which occasionally result in floods when the rainfall continues for several days. Seasonal rainfall varies widely from year to year. During the periods of record,

annual rainfall has varied at Santa Barbara from 4.49 to 45.21 inches, at Lompoc from 5.96 to 40.58 inches, and at Santa Maria from 4.50 to 30.64 inches.

The relative humidity is low in the interior, but on the coast it is quite high. At Goleta the annual average is 86.2 percent in the morning and 63.1 percent in the afternoon. This high humidity is due to the prevalence of fogs along the coast which sometimes last all day. The average annual percentage of clear days is 65 percent at Santa Barbara and Santa Maria. The average wind velocity is very low; and due to the proximity of the mountains, there are seldom any severe winds. Onshore breezes occur almost daily for several months in the summer. The air in Santa Maria, Lompoc, and Santa Ynez Valleys is heated during hot-summer days and rises, allowing the moist air over the ocean to move inland and cause sea breezes in the afternoon and fogs at night. The fogs extend inland a considerable distance and are not dissipated until the following forenoon and sometimes later. Frosts rarely occur from April through October and even in midwinter are infrequent and generally not severe. Lemons are the dominant crop in the south coast area. Because of the mild and equable climate, many hotels and resorts have been established in the vicinity of Santa Barbara.

Pertinent climatological data from characteristic Weather Bureau stations in the basin follow:

	Santa Barbara	Lompoc	Santa Maria
Elevation above sea level (feet)	130	100	217
Number of years of record	77	34	69
Mean annual temperature (degrees)	60.0	.....	58.2
Minimum temperature (degrees)	23.0	.....	24.0
Maximum temperature (degrees)	115.0	.....	109.0
Average annual precipitation for total period of record to July 1944 (inches)	18.40	15.27	14.38
Average annual precipitation for 1927–36 (inches)	16.16	12.42	12.84
Average precipitation May to September 1927–36 (inches)	0.73	0.50	0.87
Average number of days between killing frosts	334	273	273

SURFACE-WATER RESOURCES

The principal streams of Santa Barbara County are the Santa Maria and Santa Ynez Rivers. Santa Maria River is formed by the confluence of Cuyama and Sisquoc Rivers at Fugler Point, 8 miles southeast of the city of Santa Maria. From here the Santa Maria River flows nearly 25 miles in a general westerly direction to the ocean through the broad, flat Santa Maria Valley. Santa Ynez River also flows toward the west and parallels the south coast of the county at a distance of about 6 to 12 miles inland.

Run-off of Santa Barbara County streams results almost wholly from rainfall. Light snowfalls which occur occasionally in the mountains have little influence on run-off. Run-off, like rainfall, occurs almost entirely during the winter months from November to April. All of the streams are dry or nearly dry during the summer. Annual run-off shows extreme variations, fluctuating even more widely than annual rainfall. The following plate depicts the monthly and annual variation of run-off of Santa Ynez River into Gibraltar Reservoir. The maximum seasonal recorded run-off into Gibraltar Reservoir was 188,000 acre-feet in 1940–41, while the minimum was only 1,030 acre-

feet in 1930–31. Similar extremes occur on Santa Maria River and other streams. The plate clearly indicates the necessity for reservoirs of large hold-over capacity to store water in wet years for use in subsequent dry years. Undepleted run-off in acre-feet during the period of 25 years from 1918 to 1942 of important streams in the county is shown in the following table:

Stream	Point of measurement	Drainage area in square miles	Average annual run-off in acre-feet
Santa Ynez River	Juncal Dam	18	1,300
Do	Gibraltar Dam	219	33,300
Do	Cachuma Dam site	421	72,600
Do	Santa Rosa Dam site	704	106,900
Do	Robinson Bridge	790	121,100
Cuyama River	Cuyama Debris Dam site	823	11,000
Do	Vaquero Dam site	1,435	32,800
Sisquoc River	Round Corral Dam site	282	30,500

Securing an adequate water supply is a difficult problem in Santa Barbara County. Due to the almost total lack of dependable stream flow, irrigation by gravity canals from the streams has been impracticable. Irrigation by means of reservoirs is expensive because of the large storage capacities which are necessary to carry the run-off of occasional wet years over, into, and through the dry cycles, in order to assure a dependable yearly yield. Such dependable supplies are necessary for domestic use and for the protection of the valuable citrus groves and other tree crops which now exist in Santa Barbara County and which must have water each year. Due to the steep slopes of most of the streams in the region and the lack of favorable dam sites, construction of storage reservoirs has so far been limited to the Gibraltar Reservoir of the city of Santa Barbara and Jameson Lake of the Montecito County water district, both on the upper Santa Ynez River.

GROUND-WATER RESOURCES

Run-off follows precipitation and is dependent on the intensity and amount of rainfall. Some rain is absorbed immediately by the ground, but with heavy rainfall, run-off develops in stream and river channels. A considerable amount percolates into the gravel and sand of the river beds, causing an underground flow which supplies the water-bearing gravels or underground reservoirs beneath the stream channels and lower valleys. The capacity of any underground reservoir is dependent upon the character and amount of the water-bearing, unconsolidated formations. The yield is also dependent upon the character of the formations, the rate of percolation, and the amount of run-off available for replenishment.

Since dependable stream flow and cheap storage are lacking, irrigation in the county has been almost entirely from wells. The development of the California-type of well and the great improvement in pumps have made such irrigation possible in Santa Barbara County. Santa Maria, Santa Ynez, and Lompoc Valleys are underlain with extensive water-bearing sands and gravels; consequently, conditions are favorable there for securing productive wells. Most of the south

coast area is likewise underlain by water-bearing sands and gravels, but west of Ellwood the underground water is limited to stream channels only. In the city of Santa Barbara, well yields are limited and ground-water recovery is slow. Overpumping of the wells in Santa Maria Valley and in the south coast area has continued since 1919 with the result that the underground water supplies are being diminished to such an extent that the water table has been lowered beyond hope of recovery, a condition which may soon result in the encroachment of sea water.

A complete survey of the ground-water conditions and resources is now under way by the Water Resources Branch of the United States Geological Survey.

RESERVOIR SILTING

Most streams of Santa Barbara County transport large quantities of sediment during periods of flood run-off. Such sediment accumulates in storage reservoirs and reduces their effective life. The problem of reservoir silting has already become acute in the case of the existing Gibraltar Reservoir on Santa Ynez River, owned by the city of Santa Barbara. When constructed in 1920, the reservoir had a capacity of 14,500 acre-feet, but through deposition of sediment the capacity has been reduced to 7,773 acre-feet. The following table shows the silting of Gibraltar Reservoir as determined by periodical measurements:

Period	Sediment deposited in reservoir in acre-feet	Reservoir capacity at end of period in acre-feet
Original capacity		14,500
1920–41	1,786	12,714
1941–44	2,030	10,684
1944–46	410	10,274
1946–48	982	9,292
1948–40	189	9,103
1940–44	1,330	7,773

The sediment deposited in the reservoir would have been even greater than shown above if Mono debris dam and Caliente debris dam had not been constructed by the United States Forest Service on tributaries above Gibraltar Reservoir. These silting basins have held back about 1,000 acre-feet of debris, and another 428 acre-feet of sediment have deposited upstream in Jameson Lake, constructed by Montecito County water district for water storage.

Deposition of sediment in Gibraltar Reservoir has been particularly severe because a large part of the drainage area has been progressively burned by forest fires. Other streams in Santa Barbara County also carry heavy loads of sediment, particularly Cuyama River. Drainage-area erosion control and prevention of forest fires are apparently desirable to help reduce the amount of reservoir silting, but the provision of reservoir capacity expressly for storage of sediment appears to be a necessary part of any water conservation program.

FLOOD CONDITIONS

Actual measurements of the flood stages of the streams of Santa Barbara County are lacking prior to 1914. It is known, however, that serious floods occurred before 1914 in southern California. Records kept at the various old missions of southern California dating back to 1772, other written accounts, and actual stream measurements on San Gabriel River near Los Angeles since about 1895 indicate 34 large floods have occurred since about 1811. Of these, 9 were classed as great floods: 1825, 1862, 1868, 1884, 1886, 1907, 1914, 1915, and 1938.

It is believed that the greatest of all floods in Santa Ynez River occurred in 1907, with an estimated daily flow of 62,000 second-feet. The largest measured flood was on March 3, 1938, when a peak flow of 45,000 second-feet occurred at Robinson Bridge. The largest flood on Santa Maria River, estimated at 200,000 second-feet, is thought to have occurred in 1862. This was not a measurement.

The frequency of floods of various magnitudes and the damage they would cause under present conditions of development, if uncontrolled, has been estimated by the Army engineers. As shown in the table which follows, it was estimated that flood damage on Santa Maria River would average $433,600 annually and on Santa Ynez River $80,000 annually. Floods cause damage to homes, businesses, land, industrial property, highways, railroads, and public service systems.

Frequency, magnitude, and damage of floods

Number of floods in 100-year period	Santa Ynez River		Santa Maria River	
	Second-feet	Damage	Second-feet	Damage
1	125,000	$2,550,000	200,000	$8,050,000
1	87,000	1,250,000	180,000	5,400,000
1	70,000	830,000	160,000	3,600,000
1	63,000	630,000	140,000	2,880,000
1	56,000	450,000	120,000	2,880,000
1	47,000	850,000	100,000	2,100,000
3	40,000	180,000	90,000	2,520,000
1	35,000	180,000	80,000	7,500,000
5	30,000	80,000	70,000	600,000
1	25,000	195,000	60,000	1,350,000
3	23,000	50,000	50,000	240,000
1	20,000	40,000	40,000	120,000
1	(1)	275,000	(1)	120,000
(2)				
Total damage		8,000,000		43,360,000
Average annual damage		80,000		433,600

[1] 11 minor floods on Santa Ynez River and 20 minor floods on Santa Maria River causing slight damage

HISTORY

The Santa Barbara region was explored in 1542 by navigators under the Spanish Crown. No attempt was made, however, to settle the land until 1782, when Santa Barbara Mission was founded at the present location of the city of Santa Barbara. By 1802 this mission was the center of vast grain fields and the home ranch for immense herds of cattle, horses, sheep, and hogs. The lemon, orange, fig,

grape, and other fruit were planted and grew in abundance. Lompoc Valley near the present town of Lompoc was occupied in 1787 and extensively developed by the padres who in 1804 established a second mission in Santa Ynez Valley.

In 1806 a reservoir which is still in use by the city of Santa Barbara was constructed northeast of Santa Barbara Mission. The following year a dam was built across Mission Creek about 1½ miles above the mission. Here the water was diverted and carried to the mill pond above the reservoir by a well-constructed open conduit built of stone and mortar. Water diverted from the mill pond was used to furnish power to the mill for grinding grain before being stored in the reservoir for reuse.

From the founding of the first mission until Spanish rule was overthrown by Mexico in 1822, the predominant civil and religious authority was that of the padres. Mexican independence, which resulted at the end of the war with Spain, sounded the death knell of Franciscan authority. Then came the secularization of the mission lands and property by the Mexican Congress in 1834. Orchards and crops were ruined through neglect or theft by administrators and the lands of the missions were sold.

Mexican rule ceased in 1846 when Santa Barbara was captured by the Americans. American traders, who had put in freely at California ports at the time of the revolution in Mexico against Spanish domination, returned to dwell in the coastal towns. Also a second type of American immigrant, the fur trapper, crossed the Rocky Mountains to participate in a remunerative trade in sea otter skins, the otter being numerous at that time on the islands offshore. The chief source of income at that time was from cattle raising, which industry had built into a vast empire.

The Santa Barbara coastal area seems to have been the center of development in this period. As an American city, Santa Barbara began its legal existence April 9, 1850, when it was incorporated by act of the first California Legislature, although 5 months were to elapse before Congress voted on September 9 to admit the new State to the Union.

Santa Maria, second largest city in Santa Barbara County, is relatively new compared to Santa Barbara. Though the chronicles of the earliest Spanish explorers spoke of what is now Santa Maria Valley as an extremely fertile plain, it was not until near the end of the Mexican period in 1840, that the region was settled by white men. At that time the first residences were built on the 30,000-acre land grant in the western end of the valley known as Rancho Guadalupe. The lands of this grant were devoted mostly to cattle raising, and little farming was practiced until after the Civil War, when the first Americans began to arrive.

The decade of the sixties saw the gradual decline of the cattle empire throughout the county. When drought seared the land in 1862–64 most of the cattle died and the few gaunt-ribbed beasts remaining were devaluated by the sudden competition of midwestern cattle raisers. Destruction of this dominant industry seriously demoralized the whole county, and not until about 1869, when immigration provided a transfusion of new vigor, did the county advance with confidence in its future. Reports of the attractive climate and of the agricultural possibilities carried east by visitors, as well as improved

steamer communications
combined to lure settlers
of the large ranches were
immigrants. The consec
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Santa Barbara County,
of 1,185. By 1860 the po
the population for the th
as shown below:

Year	
1870	
1880	
1890	
1900	
1910	
1920	
1930	
1940	

The urban population i
23,696. Of the latter, 8,4
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It is probable that irrig
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steamer communications and the prospect of a coast-line railroad, combined to lure settlers. After the fall of the cattle barons, several of the large ranches were divided into small tracts and sold to eastern immigrants. The consequent transition from large-scale stock raising to grain growing, olive, and fruit culture on small acreages changed not only the face of the country but the character of its inhabitants.

In 1869 the San Marcos Pass toll road was built across the Santa Ynez Range thus providing a main avenue of travel from the coast to the interior valley. In the 1870's ships made Gaviota a regular landing place, serving the ranches of Santa Ynez Valley. A small settlement existed at Gaviota until ocean transportation was practically superseded by the coast-line railway in 1901.

POPULATION

The population, in 1786, of the area now comprising Santa Barbara County is said to have consisted largely of 90 tribes of some 10,000 to 20,000 Indians. Probably there were as many in 1822 in addition to a white population of about 3,000 people, but thereafter under Mexican rule the population decreased rapidly until by 1840 there were only 246 Indians and 900 white people left, practically all of whom resided in the south coast area. The 1940 Indian population was 122, most of whom lived on the Santa Ynez project of the Office of Indian Affairs.

Santa Barbara County, when created in 1850, had a total population of 1,185. By 1860 the population had increased to 3,543. Thereafter the population for the three principal cities and the county increased as shown below:

Year	Santa Barbara	Santa Maria	Lompoc	County
1870	2,889	----------	----------	7,784
1880	3,460	----------	----------	9,513
1890	5,864	----------	1,015	15,754
1900	6,587	1,200	972	18,934
1910	11,659	2,260	1,482	27,738
1920	19,441	3,943	1,876	41,097
1930	33,513	7,057	2,846	65,167
1940	34,958	8,522	3,379	70,556

The urban population in 1940 was 46,859 and the rural population 23,696. Of the latter, 8,436 persons lived on farms.

Since 1940 Santa Barbara County has experienced a large increase in population due to the construction of Camp Cooke (Army), Goleta Marine Air Base, Hoff Army Hospital, and other military works; the training of military personnel and the hospitalization of sick, injured, and convalescent men; and the influx of labor for the manufacture of airplane parts. The estimated civilian population of the county in November 1943 was 74,629, showing an increase in population in the 3 years since 1940 equal to three-fourths of the increase during the decade preceding 1940.

IRRIGATION DEVELOPMENT

It is probable that irrigation was first practiced in Santa Barbara County by the mission padres who by 1822 had planted 14,000 fruit trees. A reservoir constructed northwest of Santa Barbara

Mission in 1806 is still used by the city of Santa Barbara. Irrigation was first started in Santa Maria Valley in 1897 by drilling artesian wells and by pumping water from Guadalupe Lake near Betteravia. One year later a gravity canal was constructed from the Santa Maria River. In 1899 a gravity canal diverting from the Santa Ynez River at the Narrows was used for the irrigation of Lompoc Valley. Both canals were soon washed out by floods and were abandoned.

Artesian wells were drilled in Santa Maria, Lompoc, Carpinteria, and Goleta Valleys, but the pressure heads were soon reduced and pumps had to be installed. By the year 1912 irrigation development by pumping from wells had expanded until there were 11,441 acres under irrigation in Santa Maria Valley, 1,750 acres in Los Alamos and San Antonio Valleys, 1,590 acres in Lompoc Valley, 85 acres in Santa Ynez Valley, and 450 acres in the south coast area—a total of 15,316 acres. The extensive use of electric pumping plants started about 1920 and thereafter irrigation increased rapidly. Irrigation development was begun in the Cuyama Valley in 1941, and by 1943 some 4,000 acres were being irrigated. The total land under irrigation in 1943 amounted to approximately 60,000 acres.

AGRICULTURE

In the early years of California, the inhabitants of the area now comprising Santa Barbara County were engaged in the raising of stock, principally sheep and cattle. Livestock raising is still conducted on a large scale but is confined to the raising of cattle on the range and on grazing areas which cannot be readily cultivated. Sheep, hogs, and horses are raised on the farms. The total value of livestock and livestock products for the year 1943 amounted to about $10,000,000.

Coincident with the beginning of livestock raising, small farms were started. Agriculture gradually developed and expanded under dry-farming methods, producing wheat, barley, corn, hay, beans, peas, potatoes, mustard seed, garden vegetables, and fruit. Also there were produced large quantities of honey, butter, cheese, and eggs. Near the end of the century there was an extensive development of apple and pear orchards, but climatic and market conditions did not warrant the continuation of this industry and today hardly a trace exists. At the turn of the century irrigation began to develop, first for the production of sugar beets and alfalfa and then for the growing of vegetables, mustard, and flower seeds. The dairy industry was developed and expanded. On the south coast lemon, avocado, olives, and walnut groves were planted. Dry farming was continued as previously on lands not having a water supply for irrigation. In some areas advantage was taken of the winter rains and summer fogs to produce beans and tomatoes. The farm industry has been expanded to such an extent that in 1940 there were a total of 1,340 farms with 150,000 acres of cultivated land. Production in the year 1943 was valued at more than $32,000,000.

PRODUCTS, MARKETS, AND TRANSPORATION

A main line railroad and excellent paved highways afford good transportation to Los Angeles, San Francisco, and eastern markets.

The principal mineral products are oil, diatomaceous earth, and mercury; the total value of mineral products in 1940 was over $8,000,000, three-fourths of which was for oil. Lemons, oranges, avocados, olives, walnuts, lettuce, and other vegetables are packed locally. The beet-sugar industry is served by refineries at Betteravia, and at Oxnard in Ventura Country. Food processing is the principal manufacturing activity, but there are other industries including oil refining, manufacture of machinery, and printing. The value of manufactured products in 1939 was $8,700,000.

Food and livestock products, minerals, and manufactured articles are shipped by rail and by truck. The main Southern Pacific Railroad from Los Angeles to San Francisco passes through the county, following closely the shore line. It serves Carpinteria, Santa Barbara, Goleta, and Guadalupe directly, and branch lines serve Lompoc and Santa Maria. United States Highway 101 likewise follows the coast route from Los Angeles northward, passing through the south coast area and turning inland through Buellton and Santa Maria. All of the settled areas of the county are served by good State and county roads, including State Highways 150 and 166 which extend in an east-west direction across the county, and State Highway 1 which extends north through Lompoc and Guadalupe. United States Highway 399 cuts across the northeast corner of the county. The mountainous areas, largely in Los Padres National Forest, are mostly inaccessible to the general public.

GROSS CROP RETURNS

The principal irrigated crops grown in the south coast area are listed in the following table, together with the cropped acreage, average crop yield per acre, and average annual gross income to the farmer. Income is based on the average for the 5-year period 1936–40.

South coast area

Crop	Cropped acreage	Crop yield per acre	Gross income per acre	Total gross income
Lemons	8,657	240 boxes	$570	$4,934,000
Oranges	261	267 boxes	400	104,000
Avocados	342	4,000 pounds	260	92,000
Olives	265	5,000 pounds	150	40,000
Walnuts	1,550	1,500 pounds	180	279,000
Vegetables	1,915		175	335,000
Total	13,000			5,784,000

The average gross crop return from 13,000 acres of irrigated land in the south-coast area is $5,784,000 or $445 per acre.

There are about 6,200 acres of uncultivated land in the south-coast area which is used for pasture and which yields an income of $2 to $5 per acre. The present dry-farmed area is largely planted to beans, of which some 9,300 acres yield an average of 1,000 pounds per acre for a gross return of $55 per acre.

The principal irrigated crops in the Santa Ynez and Santa Maria Valleys, together with the cropped acreage, average crop yield per acre, and average annual gross income to the farmer are shown in

tables which follow. Income is based on the average for the 5-year period 1935–39.

SANTA YNEZ AND LOMPOC VALLEYS

Crop	Cropped [1] acreage	Crop yield per acre	Gross income per acre	Total gross income
Alfalfa	2,137	6 tons	$72	$154,000
Sugar beets	4,029	16 tons	90	363,000
Flower seeds	1,288		650	836,000
Vegetables	5,608		340	1,907,000
Total	13,060			3,260,000

SANTA MARIA VALLEY

Alfalfa	4,330	6 tons	$72	$312,000
Sugar beets	5,629	16 tons	90	507,000
Potatoes	3,213	180 hundredweight	225	723,000
Beans	5,197	2,000 pounds	113	587,000
Vegetables	18,093		340	6,152,000
Flower seeds	1,465		650	952,000
Walnuts	73	1,500 pounds	180	13,000
Total	38,000			9,246,000

[1] Some land is double-cropped, in which case the acreage is entered twice in this column.

In the Santa Ynez and Lompoc Valleys the actual irrigated area is 11,000 acres, but because of the double cropping of 2,060 acres, the cropped area shown in the above table is 13,060 acres. The average annual gross crop return from irrigated crops in these two valleys on 11,000 acres of irrigated land is $3,260,000 or $296 per acre. Similarly, in Santa Maria Valley 30,000 acres are irrigated but because of double cropping, the total cropped area shown in the table is 38,000 acres. The average annual gross crop return from irrigated crops on 30,000 acres in Santa Maria Valley is $308 per acre.

TYPES, SIZES, AND VALUE OF FARMS

The 1940 census reported 1,340 farms in Santa Barbara County totaling 821,000 acres valued at $55,100,000. Approximately half of the farms were classified as irrigated. About 150,000 acres were cultivated of which 60,000 acres are now irrigated. The size of the farms range from 1 acre to more than 1,000 acres. Much of the area now comprising Santa Barbara County was divided into a few relatively large Spanish land grants. A livestock ranch may still contain thousands of acres. There are many retired people of means living in Santa Barbara County, each owning from 1 to 100 acres, but not depending thereon for a livelihood. Land values range from $30 an acre for pasture and grain land to more than $3,000 an acre for lemons. The value of all irrigated land in 1940 was $36,000,000 and more than 50 percent of this value was placed upon 9,000 acres of citrus and avocado groves in the south-coast area. The 1941 assessed value of all property in Santa Barbara County outside of cities was $64,400,000 and the corresponding figure for property inside of cities was $48,300,000, giving a county total of $112,700,000.

Land utilization in Santa Barbara County varies from the large stock ranches using from 10 to 30 acres of land to produce one animal unit, to highly developed citrus groves in the south-coast area where

one acre produces a gross income of more than $500. Nearly 70 percent of all farming enterprises are owner-operated. The remaining 30 percent for the most part are cash tenants or sharecroppers who operate along the coast where dry-land beans or tomatoes are produced, or in the Santa Maria and Santa Ynez Basins where general farming is practiced.

The pattern of development on new land to be irrigated is expected to be about the same as the presently irrigated land, except in the south coast area. This area has the advantage of being a very desirable place to live and will, if water is made available, continue to attract people who wish to have country estates or homes with small acreages for gardens and family orchards. The crops and cropping practices are established in the other areas and there is nothing to indicate that future crops will differ greatly from the present crops.

LAND CLASSIFICATION

Land classification is an inventory and evaluation of the land that can be successfully developed with irrigation for the production of crops. The value of land for irrigated crops is dependent to a large degree on the inherent physical characteristics of the soil, kind of topography, climate, and drainage conditions. The class of land an area falls into is dependent on its value for irrigation as limited by the above factors. A semidetailed land classification was made of the south coast area and the Santa Maria Valley. The irrigable acreages shown in this report for the other valleys have been estimated since the classification is not yet complete for those areas.

In classifying the south coast area it has been necessary to depart in some respects from the standards used by the Bureau elsewhere in California. This is because the particular advantages afforded by the climate of the south coast area have encouraged and are supporting a different type of agriculture than that of other areas. Much of the land mapped as class 2 in the south coast area is definitely limited to citrus or avocado production. It would not successfully support general farming because the gross and net income from general crops would be too low to develop and maintain the land. The specialized nature of citrus production and the high value of the crop, coupled with climatic and economic factors not closely associated with the physical characteristics of the soil and topography, make it desirable to include land in class 2 which in other areas would be considered nonirrigable by reason of the steep slopes and depth of soil. The inclusion of this type of land is based upon the demonstrated capabilities of similar land in the same area.

The moderating effect of the ocean on the climate of the south coast area and the scenic southern foothills of the Santa Ynez Mountains overlooking the Pacific Ocean contribute to the popularity of this area for residential purposes. These natural advantages have attracted people of means who have built up an exclusive suburban area of medium and large estates, particularly in the vicinity of Montecito. Much of this acreage is unsuited for commercial agriculture and is maintained in its natural state. Each home or estate requires water for lawns, shrubs, small gardens, and family orchards. the amount of water used for this land is about the same as for the irrigated land. Similar development, but of smaller individual hold-

ings, can be expected to extend to other areas that afford the same attractive natural living conditions. Areas judged suitable for homes, and with enought soil to grow trees, shrubs, and lawns, were mapped by the Bureau and designated as class H.

The irrigable agricultural lands have been divided into two classes for both the south coast area and Santa Maria Basin. Class 1 land, in both areas, represents land adapted to a wide variety of crops with no specific soil or topographic limitations. It is the highest type of irrigable land suitable in all respects for the production of crops with irrigation. Class 2 land is intermediate to poor in character and its limitations are due to soil, topography, drainage, or a combination of these factors. Class H designates areas of inferior soil or topography which may not successfully support commercial farming but have a value due to climatic, scenic, or geographic location that makes the areas desirable for homes, suburban, or industrial development.

The following tabulation gives the areas of the different land classes as determined for the south coast area and Santa Maria Valley. Preliminary estimates have been made of the total area of irrigable land in other sections of the county, but the classification surveys are not complete as yet.

	Land classes in acres			
	1	2	H	Total
South coast:[1]				
Irrigated	4,600	5,500	2,900	13,000
Nonirrigated	800	8,000	7,800	16,600
Total	5,400	13,500	10,700	29,600
Santa Maria Valley: Irrigated	24,800	5,200	0	30,000

[1] Excludes city of Santa Barbara and area from Ellwood to Gaviota.

In the Santa Ynez and Lompoc Valleys there are 11,000 acres now irrigated and an additional 13,000 acres are estimated to be irrigable. None of the land in this basin will be included as class H. Cuyama Valley has 4,000 acres irrigated and there is a considerable area of additional land suitable for irrigation, but present estimates indicate the water supply is adequate to serve only 400 additional acres. In the Ellwood to Gaviota section of the south coast area, and in the San Antonio Creek Basin, there are 900 and 1,100 acres irrigated, respectively. Additional lands in these latter areas are suitable for irrigation, but economical water supplies are not obtainable.

Present Development of Water Resources

Municipal Water Development

Santa Barbara.—The early water supply of Santa Barbara was obtained from shallow wells supplemented in 1806 by a gravity diversion from Mission Creek. Seven artesian wells, 200 to 700 feet deep, were sunk in the eastern part of the city prior to 1889. The yield from these wells soon became entirely inadequate, and in the dry years of 1894 and 1895 there was a severe water shortage. To alleviate this condition, Cold Spring tunnel in 1896 was driven about 1

mile into the mountains to intercept ground-water flows, but developed only about 290 acre-feet per year. A sustained drought occurred in 1898, 1899, and 1900, and rigid restrictions had to be placed on the use of water. During the summer months of this period there was not even enough water for ordinary domestic use.

Mission tunnel was completed in 1912 to intercept underground flow and to later convey water from Gibraltar Reservoir to Santa Barbara. This tunnel develops an average annual water supply of 1,120 acre-feet from tunnel seepage. Gibraltar diversion and storage dam on the Santa Ynez River and a conduit from the dam to the entrance of Mission tunnel were completed in 1920. When first constructed, the capacity of Gibraltar Reservoir was 14,500 acre-feet, but silt encroachment has gradually reduced the storage capacity to about 7,800 acre-feet. The present safe yield of the reservoir is about 3,000 acre-feet annually.

Before Gibraltar Reservoir was completed the city water supply became so deficient that it was necessary to again use well water and to restrict the use of all available supply. These wells were not again used until the successive drought years of 1929–31, when the reservoir went dry with the exception of a small quantity of water retained against fire hazards. In 1931 other wells were driven along Mission Creek to help tide over that emergency. The wells have only a small safe yield and are used only as an emergency supply. Total dependable annual supply from all city sources is now 4,410 acre-feet. The present use of water is 5,900 acre-feet per year. This supply is available during the present series of wet years, when the reservoir has filled in every year but one. Should a drought similar to that of 1898–1900 or 1929–31 again occur, the city would experience a severe shortage of water.

Other communities.—Towns other than Santa Barbara and Montecito obtain their domestic supplies entirely from ground water. This source has been adequate in the past, but the overdraft on ground water, discussed in connection with irrigation developments, threatens the water supply of several small communities, particularly in the south coast area where there is danger of salt-water intrusions from the ocean.

IRRIGATION AND SUBURBAN DEVELOPMENT

Montecito County water district, adjoining Santa Barbara on the east, was organized in 1921 for the purpose of supplying water for domestic and irrigation use of the Montecito estates. Water is now largely obtained from local wells, from Doulton tunnel seepage, and by diversion from Jameson Lake formed by Juncal Dam on Santa Ynez River. Doulton tunnel was constructed in 1928 for the purpose of conveying water from Jameson Lake to Montecito. Jameson Lake, completed in 1930, had an initial capacity of 7,228 acre-feet but silt deposition has reduced this capacity to 6,800 acre-feet. The total dependable annual supply for Montecito from all sources is 3,440 acre-feet, including 1,800 acre-feet from Jameson Lake, 1,000 acre-feet from ground water, and 640 acre-feet from Doulton tunnel seepage. This is ample for the present service area of 2,400 acres, but will not be sufficient to meet anticipated future demands.

Carpinteria County water district, lying along the ocean east of Montecito County water district, was organized in 1940. Practically

all the water for this area for both domestic and irrigation use is pumped from 116 wells. The estimated dependable annual ground-water yield is 2,000 acre-feet, but about 3,100 acre-feet are now being pumped to serve 3,800 acres. As a result, the water table is gradually lowering. If additional water is not secured within the next few years, ocean water may invade the ground-water supply, making it unfit for domestic or irrigation use.

Goleta County water district, which includes the area west of Santa Barbara to Ellwood, was organized in 1944. Ground water is pumped from 232 wells for irrigation of 6,800 acres and for domestic uses. A small amount of stream flow is periodically available for diversion. Annual dependable yield from ground water is estimated at 4,100 acre-feet, with a present overdraft of 2,700 acre-feet. It is doubtful whether the natural ground-water yield can be increased. An imported supply is imperative to protect present developments and to allow for future growth.

Ellwood to Gaviota, in the south coast area, has only limited irrigation developments because good land is scattered and water supplies are limited. Some 900 acres are now irrigated from ground water.

Santa Ynez Valley and Lompoc Valley include a small area of mesa land in the vicinity of Santa Ynez, the river bottom and low bench lands along the Santa Ynez River from San Lucas Bridge to Robinson Bridge, and Lompoc Valley. The entire area is underlain by water-bearing gravels which are the source of water for irrigation of 11,000 acres, for domestic use, and for Camp Cooke in the Lompoc area. The present use of water is estimated to be 22,900 acre-feet including 4,000 acre-feet of outflow from Lompoc Valley to prevent accumulation of salts. The ground-water supply is adequate at the present time, but, as new lands are brought under irrigation, the demand for water will exceed the dependable yield, requiring underground replenishment at a faster rate than at present. Run-off of Santa Ynez River is ample for the purpose, but regulation of floodwaters will be necessary to assure the increased replenishment.

San Antonio Creek drains a small area between the Santa Ynez and Santa Maria drainage basins. About 1,100 acres are irrigated from ground water. No additional supply can be developed through ground-water replenishment.

Santa Maria Valley includes lands along the lower Sisquoc River and the main valley along Santa Maria River, including the Oso Flaco district in San Luis Obispo County. The entire area is underlain by water-bearing gravels which are drawn on for irrigation and domestic uses. Water is being pumped from the ground at a rate faster than the average annual replenishment, and from 1919 to 1935 the average lowering of the water table amounted to 47 feet. Since 1935 a series of years with above normal run-off have caused the water table to rise again, but without stream regulation there is little prospect that it will ever reach its former level. The present use of ground water for irrigation of 30,000 acres of land in Santa Maria Valley is estimated to be 60,000 acre-feet annually, including 15,000 acre-feet of drainage outflow to the ocean to prevent damaging accumulation of salts. It is estimated that at present there is an overdraft of 25 percent on the average ground-water supply.

Cuyama Valley on the upper Cuyama River has just recently been developed for irrigation. An area of about 4,000 acres is now served

from ground water using an estimated 6,000 acre-feet of water per year.

FLOOD CONTROL

Except for bank protection at scattered locations there are no flood-control works on Santa Barbara County streams at this time.

RECREATION AND FISHING

The city of Santa Barbara is a resort town with palatial seaside hotels and many private estates. Catering to tourist and recreationists is an important business. The water front is developed as a beach and yacht harbor, as part of the city park system, and is valued at nearly two and a quarter million dollars. Carpinteria beach, operated as a part of the State park system, is advertised as the safest in the world. It is one of the best beaches north of Los Angeles. Surf and deep-sea fishing are popular sports. A private ranch offers some trout fishing in the Sisquoc River.

The county maintains 18 parks with facilities for picnicking, and Los Padres National Forest offers backwoods recreation, except in summer when it is closed because of high fire hazard. However, that is the season when the crowds are at the beaches.

With fresh water at a premium for domestic use and irrigation, people give little thought to its use for other purposes. Steelhead come up the Santa Ynez in wet years but they are stranded when the river goes down and local opinion is not likely to favor sacrificing the water necessary to establish a permanent run. It is safe to conclude that recreation on the rivers and reservoirs will be of little significance with fresh water so precious for other purposes and a semitropical ocean at hand to enjoy.

POWER DEVELOPMENT

There are no hydroelectric power plants on any of the streams in the county, and none are planned. The wide variations in run-off and in reservoir storage releases prevent economical development of hydroelectric power.

PLAN OF FUTURE WATER DEVELOPMENT

WATER REQUIREMENTS

Additional water supplies are required in Santa Barbara County to safeguard large existing municipal, industrial, and agricultural developments, and to allow for their anticipated expansion. The procedure followed in the course of this study has been to estimate all foreseeable future water requirements and to prepare a comprehensive plan for meeting them. From this comprehensive plan, initial projects have been selected to meet current and near future needs for water. Additional projects in the comprehensive plan would be constructed progressively as the demand for water increases, until the fullest practicable use of the water resources of the county has been made.

Santa Barbara.—Future water requirements of the city of Santa Barbara have been estimated on the basis of a population of 100,000,

which is about three times the population in 1940. The growth of the city to this size may occur within the next 50 years. Assuming approximately the same per capita use in the future as at present, the requirement for Santa Barbara is estimated to be 16,600 acre-feet annually by about 1990.

Irrigation and suburban.—The areas of land which may be placed under irrigation in the future or developed for suburban uses have been determined from a semidetailed land classification described previously. Unit water requirements for these areas have been estimated from studies of present use on lands now receiving water. These studies indicate that in the south coast area 1 acre-foot per acre per year will be sufficient to meet the water requirements. Economical application methods and avoidance of all waste will be required to attain this low use. Fortunately, the rate of plant transpiration is low because of the cool, moist coastal climate and frequent fogs. The quantity of water actually applied to the land may exceed 1 acre-foot per acre, but the surplus water will be recovered through ground-water pumping.

Studies indicate that in the Santa Ynez, Lompoc, Santa Maria, and Cuyama Valleys, the consumptive use of irrigation water is about 1.5 acre-feet per acre. All of these areas are served from ground water and the consumptive use represents the actual requirement, except that in the Santa Maria and Lompoc Valleys additional outflows of 15,000 acre-feet and 6,000 acre-feet, respectively, may be required to prevent accumulation of salts.

The future water requirements for domestic and irrigation purposes in Santa Barbara County are summarized in the following table which also shows for comparison the estimated present use of water

Estimated present and future water requirements

Locality	Present use [1]		Total future use (including present)	
	Irrigated acres	Use in acre-feet	Irrigable acres	Use in acre-feet
Santa Barbara		5,900		16,600
Montecito	2,400	2,300	5,600	5,600
Carpinteria	3,800	3,100	5,600	5,600
Goleta	6,800	6,800	18,400	18,400
Ellwood to Gaviota	900	900	900	900
South coast area	13,900	19,000	30,500	47,100
Santa Ynez	3,000	4,500	12,000	18,000
Lompoc	8,000	[3] 16,000	12,000	[3] 24,000
Camp Cooke		2,400		2,400
Santa Ynez Basin	11,000	22,900	24,000	44,400
Santa Maria	30,000	[4] 60,000	30,000	[4] 60,000
Cuyama	4,000	6,000	4,400	6,600
Santa Maria Basin	34,000	66,000	34,400	66,600
San Antonio Creek	1,100	1,100	1,100	1,100
Total	60,000	109,000	90,000	159,200

[1] The present uses reflect the requirements for present development but the dependable water supply in the absence of project construction is inadequate to meet all present requirements.
[2] Includes 4,000 acre-feet outflow to prevent accumulation of salts.
[3] Includes 6,000 acre-feet outflow to prevent accumulation of salts.
[4] Includes 15,000 acre-feet outflow to prevent accumulation of salts.

The Ellwood to Gaviota, Cuyama, and San Antonio Creek areas, shown in the foregoing table, contain some additional land that could be irrigated except that the lack of adequate local water supply or economical imported supply will limit any appreciable future development.

Water rights.—All present gravity diversions from streams are small and irregular and the total is insignificant except those from Jameson Lake and Gibraltar Reservoir. There recently was one diversion from Sisquoc River of several second-feet, but it has been out of use since the flood of 1941. All existing water rights will be respected, and allowance for their requirements has been made in estimating future use.

The city of Santa Barbara has been decreed the right to develop an annual water supply of 14,000 acre-feet from the floodwaters of Santa Ynez River by means of storage, and to transport the same out of the basin. Likewise, the Montecito County water district was decreed a water right in the amount of 2,000 acre-feet per year to be developed from flood flows of Santa Ynez River. The right to conserve additional amounts of floodwaters will have to be secured in accordance with established California water laws in order to construct the projects which are proposed in this report.

SOURCES OF WATER SUPPLY

South-coast area.—As indicated previously, Santa Barbara and Montecito County water district are now importing water from Santa Ynez River, and other portions of the south-coast area are overdrawing their limited ground-water supplies. The streams of this latter area are short and steep and their valleys unsuited for reservoirs. Investigations were made of four of the more favorable reservoir sites, together with spreading grounds necessary to percolate the reservoir yields to ground water. Estimates for the three best dams and two spreading grounds disclosed that a combined yield of about 3,500 acre-feet could be secured, but that the cost was too high for present or near future development. The only practicable source of additional water is Santa Ynez River. Reservoirs, which will be described subsequently, could be constructed to store and divert floodwaters of Santa Ynez River to the south-coast area. Such diversions would not adversely affect the water supply required for irrigation and domestic use on Santa Ynez River. The following table indicates the proposed source of future water supply, including present requirements, of various sections of the south-coast area:

Locality	Supply in acre-feet			
	Ground water	Tunnel seepage	Santa Ynez River	Total
Santa Barbara		1,410	15,190	16,600
Montecito	1,000	640	3,960	5,600
Carpinteria	2,000		3,600	5,600
Goleta	4,100	1,850	12,450	18,400
Ellwood to Gaviota	900			900
Total	8,000	3,900	35,200	47,100

Santa Ynez Basin.—Run-off from Santa Ynez River, if conserved, will adequately meet all water requirements of the Santa Ynez Basin. Diversions to the south-coast area would be made in such a manner as to not adversely affect the water supply of the Santa Ynez Basin, but eventually a regulated supply from reservoirs will be required to assure sufficient ground-water replenishment to meet additional future demands.

San Antonio Creek.—The water supply of San Antonio Creek is meager, and there is little prospect of additional irrigation development in the basin, even though there are some additional irrigable lands.

Santa Maria Basin.—The water supply of the Cuyama and Sisquoc Rivers, if conserved, is ample to meet the requirements of Santa Maria Valley. Storage reservoirs will be required, however, to regulate large flows to rates that can percolate into the river bed. This would increase ground-water replenishment and help to prevent the lowering of the water table which now occurs in dry years.

Pumping from ground water for irrigation in Cuyama Valley was first started in 1941. The period of pumping has been too short to test the adequacy of the natural ground-water supply. There is grave danger the supply will prove insufficient for much if any expansion. Studies indicate that the maximum available supply probably will not exceed 6,600 acre-feet per year. One diversion and nine storage dams in the area were investigated, but none was found feasible for development at this time.

FLOOD CONTROL

As discussed previously, extensive flood damage occurs on both Santa Ynez and Santa Maria Rivers, particularly the latter. Under the plan of development, described subsequently, it is proposed to provide flood control on these two streams principally through storage in reservoirs, but supplemented by some channel improvements and bank protection. Studies indicate this to be the most effective and economical way of securing both flood control and conservation.

Both water conservation and flood control must be accomplished for the benefit of Santa Maria Valley because neither can stand alone. Water conservation is essential to maintain the present irrigation development but, unless flood control is provided, flood damage will continue to average $433,600 annually and the city of Santa Maria will continue to be threatened by the possible recurrence of a great flood like that of 1862. On the other hand, flood control alone cannot be justified, since without conservation the valley faces the prospect of a 25 percent reduction in its irrigated area with consequent decrease in property values. Conservation and flood control together are justified, however, and the plan of development includes reservoirs which would provide both.

In Santa Ynez Valley flood control alone is not economically justified under present conditions, but may be effected in the future in conjunction with a water-conservation program.

PLAN OF DEVELOPMENT, SANTA YNEZ BASIN AND SOUTH COAST AREA

The plan of development for the Santa Ynez Basin and south coast area includes the construction of storage reservoirs on Santa

Ynez River from which water would be diverted to the south coast area or released to the Santa Ynez and Lompoc Valleys. Investigations were made of 23 dam and reservoir sites in the Santa Ynez Basin. Four of these have been selected as the most favorable to regulate the stream: Camuesa Reservoir would control the upper drainage area, Cachuma Reservoir the middle drainage area, Santa Rosa Reservoir the lower drainage area, and Salsipuedes Reservoir would regulate Salsipuedes Creek, a main tributary which enters below Santa Rosa Dam site. The two upper reservoirs, Camuesa and Cachuma, would be used principally to supply water to the south coast area, but releases would be made as needed to meet requirements on the Santa Ynez River. Santa Rosa and Salsipuedes Reservoirs would serve the lower Santa Ynez Basin. The tentative capacities of the proposed reservoirs are as follows:

Reservoir	Reservoir capacities in acre-feet		
	Water storage capacity	Silt capacity [1]	Total capacity
Camuesa	100,000	25,000	125,000
Cachuma	175,000	25,000	200,000
Santa Rosa	95,000	5,000	100,000
Salsipuedes	30,000		30,000

[1] Available for water storage initially, but would gradually fill with sediment.

Camuesa Reservoir would be formed by an earth dam on Santa Ynez River about 2 miles upstream from the present Gibraltar Dam. The reservoir would inundate Mono Debris Reservoir which already has been filled with sediment. The proposed capacity of 125,000 acre-feet at Camuesa Reservoir would provide a dependable water supply of 20,000 acre-feet annually. This entire yield would eventually be required in the south coast area, but until Cachuma Reservoir is constructed downstream, releases would be made as needed to meet existing water requirements along Santa Ynez River.

Water from Camuesa Reservoir would be diverted to the south coast area by the existing Gibraltar Dam through the existing Mission tunnel. During the initial operation of the project water would be delivered to Santa Barbara, Montecito, Carpinteria, and Goleta, but later the Goleta area would be supplied from Cachuma Reservoir.

The capacity of Camuesa Reservoir is sufficient to carry water from wet years into dry periods. Although the reservoir would not be operated expressly for flood control, it incidentally would reduce somewhat the downstream flood damage.

Careful study has indicated that Camuesa Reservoir should be constructed as an initial development of the Santa Barbara project. The danger of water shortage in the city of Santa Barbara and the present overpumping of ground-water supplies in the Carpinteria and Goleta areas threaten existing developments on the south coast and point to the need for construction of Camuesa Reservoir at the earliest possible date.

South coast and Goleta conduits are proposed high-pressure pipe lines to deliver Santa Ynez River water for irrigation and suburban development in the south coast area. South coast conduit would extend 16 miles easterly from the outlet of Mission tunnel to serve the Monte-

cito and Carpinteria areas. Goleta conduit under initial development would extend 11 miles westerly from Mission tunnel to deliver water from Camuesa Reservoir to the Goleta area. After completion of Cachuma Dam and Tequepis tunnel, Goleta conduit would be connected to the latter tunnel. Both the south coast and Goleta conduits would include several small regulating reservoirs. Pipe-line lateral systems for the Carpinteria and Goleta districts would be required. Local interests may elect to construct these systems, but they have been included as a part of the comprehensive plan.

The south coast and Goleta conduits and the pipe-line lateral systems are necessary for the initial delivery of water to the south-coast area, and would be constructed concurrently with Camuesa Reservoir.

Cachuma Reservoir and Tequepis tunnel are proposed for second-stage development to meet increasing water requirements in the south-coast area and Santa Ynez Valley, after the yield of Camuesa Reservoir has been fully utilized. Cachuma Dam site is on Santa Ynez River 3 miles upstream from San Lucas Bridge. Construction of the reservoir would necessitate a 5-mile relocation of State Highway 150. The proposed capacity of 200,000 acre-feet would provide a dependable yield of 23,000 acre-feet annually.

Water from Cachuma Reservoir would be diverted to the south-coast area via the proposed Tequepis tunnel, which would extend 6¼ miles through Santa Ynez Mountains. A small regulating reservoir and a pressure pipe line from the tunnel to Goleta conduit would also be required. Tequepis tunnel probably would intercept ground water. The seepage into the tunnel based on the experience of Mission tunnel, might initially yield 5,000 acre-feet annually, but ultimately the dependable yield would probably not exceed 1,850 acre-feet per year. A little over one-half of the dependable yield of Cachuma Reservoir would be diverted to the south-coast area, and the remaining water would be released for use in the Santa Ynez Basin. Part of the latter supply may be delivered by a lateral system to lands on the Santa Ynez Mesa surrounding the town of Santa Ynez.

During its initial operation a large portion of the capacity at Cachuma Reservoir could be used to provide flood control on lower Santa Ynez River. Later, as the demand for water increased, flood-control operation would become incidental to conservation.

Santa Rosa Reservoir would be constructed on the lower Santa Ynez River when needed for water conservation and flood control in Lompoc Valley. It appears that the run-off of the lower drainage basin, supplemented by releases from Cachuma Reservoir, would be adequate to maintain the ground-water supply in Lompoc Valley for many years or until nearly complete development of the irrigable lands occurs. Storage for flood control alone does not appear to be justified at this time, but probably will be required later.

Salsipuedes Reservoir on Salsipuedes Creek would be constructed to provide an additional water supply to Lompoc Valley when irrigation expansion so requires.

PLAN OF DEVELOPMENT, SANTA MARIA BASIN

Storage reservoirs are needed in Santa Maria Basin for both conservation and flood control. Reservoir capacity reserved for flood control would be used temporarily to store flood peaks until they can

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be released at rates within the capacity of the river channels. This would reduce flood damage which now averages $433,600 a year and would eliminate the threat of a great flood that might destroy the city of Santa Maria. Conservation storage would be used to regulate the run-off as fully as possible to the percolation capacity of the river bed in order to secure a maximum amount of ground-water replenishment. This would eliminate the present overdraft on the ground-water supply.

Investigations were made of 14 dam and reservoir sites including 10 on the Sisquoc River, 3 on lower Cuyama River, and 1 on the main Santa Maria River. From these investigations Vaquero and Round Corral Reservoirs on the Cuyama and Sisquoc Rivers, respectively, were selected as the most favorable storage sites, and Cuyama debris reservoir was selected for debris storage. The proposed capacities are as follows:

Reservoir	Reservoir capacities in acre-feet			
	Conservation capacity	Flood control capacity	Silt capacity [1]	Total capacity
Vaquero	40,000	112,000	45,000	197,000
Round Corral	20,000	20,000	10,000	50,000
Cuyama debris			20,000	20,000

[1] Available for water storage initially, but would gradually fill with sediment.

Vaquero Reservoir would be constructed on Cuyama River 7 miles northeast of Santa Maria and 6 miles upstream from the junction of Cuyama and Sisquoc Rivers. The construction of this reservoir would necessitate a 4-mile relocation of State Highway 166, including the reconstruction of three bridges across Alamo Creek, Huasna River, and Cuyama River. Flood control would be accomplished by temporarily storing large floods until the peak flow of Sisquoc River had passed Fugler Point. This peak flow, if uncontrolled by Round Corral Reservoir, would be 90,000 second-feet in the 100-year flood of 200,000 second-feet. Vaquero Reservoir would retain the 100-year flood on Cuyama River until the Sisquoc River flow receded and would then release the water at a rate not to exceed a maximum flow of 50,000 second-feet at Fugler Point. Conservation would be accomplished by storing floodwaters for later release at the percolating rate of the river beds. The allowance for silt accumulation is believed sufficient for some 50 years, but additional data on the rate of silting are needed to make a close estimate.

Studies have indicated that Vaquero Reservoir should be constructed at an early date to offset to some extent the present overdraft on the average ground-water supply of Santa Maria Valley and to reduce flood damage.

Cuyama debris reservoir would be constructed on Cuyama River, 33 miles northeast of Santa Maria and 22 miles upstream from Vaquero Reservoir. Its purpose would be to retain the flow of silt, thus lengthening the useful life of Vaquero Reservoir. The time that Cuyama debris reservoir should be constructed will depend on the rate of silting of Vaquero Reservoir.

Round Corral Reservoir would be constructed on Sisquoc River 19 miles southeast of Santa Maria and 10 miles upstream from the junction of the Sisquoc and Cuyama Rivers. Flood control would be accomplished by temporarily withholding large floods and releasing floodwaters at such a rate that controlled flow would not exceed 50,000 second-feet in a maximum 100-year flood. This reservoir would be operated in conjunction with Vaquero Reservoir for both flood control and conservation. It is estimated that practically all the flow similar to that which occurred during 18 years from 1919 to 1936 would be percolated to ground water by means of Vaquero and Round Corral Reservoirs as proposed. During a period of wet years a large amount of water would escape to the ocean because long hold-over storage is not economical.

ECONOMIC ANALYSIS

Estimates of cost.—Accurate estimates of cost can be made after detailed plans and designs have been prepared for the proposed dams, tunnels, and conduits. Preliminary cost estimates, based on prices as of January 1940, are as follows:

Capital cost:	
Camuesa Reservoir, Mission tunnel, south coast conduit, Goleta conduit	
Cachuma Reservoir, Tequepis tunnel, Goleta conduit connection	$10,000,000
Santa Rosa Reservoir	10,000,000
Salsipuedes Reservoir	4,500,000
South coast lateral systems	2,000,000
Santa Ynez Mesa lateral system	800,000
	600,000
Total Santa Ynez Basin and south coast area	27,900,000
Vaquero Reservoir	11,000,000
Round Corral Reservoir	5,500,000
Cuyama Debris Reservoir	1,000,000
Total Santa Maria Basin	17,500,000
Total capital cost, Santa Barbara County project	45,400,000
Annual cost:	
Operation and maintenance	215,000
Interest and amortization (50 years at 3 percent)	1,765,000
Total annual cost of complete project	1,980,000

Water-conservation benefits.—Benefits from irrigation of new land are represented by the increase in gross crop returns. There are 15,500 acres of irrigable, nonirrigated land in the south coast area which would be supplied with water from the projects proposed in this report; another 1,100 acres would be served by existing works of the Montecito County water district. About 60 percent of the 15,500 acres of nonirrigated land is now dry-farmed, largely to beans producing an average annual gross income of $55 per acre. The other 40 percent is in pasture having a gross income of $5 per acre. The combined production has a weighted average annual gross return of $35 per acre. In the Santa Ynez and Lompoc Valleys there are 13,000 acres of nonirrigated, irrigable land having about the same present average annual gross return of $35 per acre. Presently irrigated crops in these areas yield a weighted average annual gross crop return of

$445 per acre for the south coast area and $296 per acre for the Santa Ynez and Lompoc Valleys. It is anticipated that in the latter valleys the crops grown on new irrigated land would be similar to the present crops and would produce about the same gross crop return. The present average gross crop return without irrigation is $35 per acre and the return with irrigation would be $296 per acre, giving a benefit of $261 per acre. The latter value applied to 13,000 acres of irrigable land gives a total annual benefit from new irrigation in the Santa Ynez and Lompoc Valleys of $3,393,000.

In the south coast area the best land is already developed, and new irrigation would probably not yield as high a gross crop return as does the present irrigated land. However, it is estimated the benefit from new irrigation in the south coast area would be at least as great as in the Santa Ynez and Lompoc Valleys, and the annual benefit is computed to be $261 per acre on 15,500 acres, or a total of $4,045,000.

In the Carpinteria and Goleta County water districts the present irrigated area is 10,600 acres, but the dependable annual water supply is adequate to serve only 6,100 acres. The difference of 4,500 acres between the area now irrigated and the area for which there is an adequate supply is the area which would revert to dry-farming if a supplemented water supply is not made available. Similarly in the Santa Maria Valley there are 30,000 acres irrigated but at the present rate of ground-water replenishment the water supply is adequate to irrigate only about 22,500 acres, leaving 7,500 acres which would revert to dry-farming if additional water is not secured. The benefits from a supplemental water supply are represented by the decrease in gross crop returns from that portion of the total land presently irrigated that would have to revert to dry-farming to leave an adequate water supply for the remainder, because of an insufficient water supply for the whole. The present average gross crop return in the south coast area from irrigated land is $445 per acre and the income if it were dry-farmed would be $55 per acre. The annual benefit from a supplemental supply to this land would, therefore, be $390 per acre for 4,500 acres or $1,755,000. Similarly, in Santa Maria Valley the present gross crop return from irrigated land is $308 per acre, the gross crop return if dry-farmed would be $55 per acre, and the annual benefit would be $253 per acre for 7,500 acres or $1,897,000.

The foregoing benefits have been computed on the basis that the new and supplemental water would be used for production of irrigated crops. Actually, as stated previously, part of the water would be used on class H land for homes and suburban development. The benefits from this type of development are estimated to be at least as large as those from irrigation.

Annual benefits from the Santa Barbara municipal supply are estimated at $65 per acre-foot for 15,200 acre-feet of water imported from Santa Ynez River, or $988,000. The total annual benefits from water conservation would be $12,078,000.

Flood-control benefits.—The benefits from flood control are measured by the decrease in average annual flood damage effected by the construction of flood-control works. As stated previously, the estimated average annual flood damage under present conditions of development is $80,000 on Santa Ynez River and $433,600 on Santa Maria River. During the initial operation of Cachuma Reservoir, a

capacity of 100,000 acre-feet could be used for flood control. This would effect an average reduction in flood damage on Santa Ynez River of about $50,000 annually. When Santa Rosa Reservoir is constructed it would be operated to result in about the same reduction in flood damage. At present the benefits which would result from a flood-control reservoir alone on Santa Ynez River are not sufficient to justify its construction. However, some time in the future a dual-purpose reservoir for conservation and flood control will undoubtedly be required.

The proposed Vaquero and Round Corral Reservoirs would control the flow of Santa Maria River to 50,000 second-feet and thereby reduce flood damages by an estimated $385,000 per year.

Summary of benefits and costs.—The foregoing benefits and costs are summarized as follows:

Annual water-conservation benefits:		
New water supply:		
Carpinteria, Montecito, and Goleta	$4,045,000	
Santa Ynez and Lompoc Valleys	3,393,000	
Subtotal		$7,438,000
Supplemental water supply:		
Carpinteria and Goleta	$1,755,000	
Santa Maria Valley	1,897,000	
Subtotal		3,652,000
City water supply (Santa Barbara)		988,000
Total water-conservation benefits		12,078,000
Annual flood-control benefits:		
Santa Ynez Basin	$50,000	
Santa Maria Basin	385,000	
Total flood-control benefits		435,000
Total annual benefits		12,513,000
Total annual cost		1,980,000
Ratio of benefits to cost		6.3:1

LAND HOLDINGS

In Santa Barbara County there are several factors relative to land holdings and water distribution which are different from conditions usually found on projects undertaken by the Bureau of Reclamation. The irrigable lands which would be served from the Santa Barbara project are all in private ownership. Two-thirds are already under irrigation, and practically all of the remaining one-third is devoted to dry farming. There are no public lands in the project area.

Nearly 70 percent of the area now irrigated in Santa Barbara County would be provided a supplemental irrigation supply under the proposed project. These lands are mostly in small holdings. In 1939 there were 682 irrigated farms in the county, only about 5 percent of which included irrigated areas in excess of 160 acres. In the south-coast area there are only four individual holdings, comprising less than one-tenth of the combined irrigated and irrigable lands, which are larger than 160 acres. In Santa Maria Valley more than 85 percent of the irrigated farms and well over one-half the irrigated area is in holdings smaller than 160 acres.

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All of the irrigated area in Santa Barbara County which is to receive a supplemental supply from the prospective project is now served by pumping from ground water. In accordance with the decisions of the California courts, each water user has an equal right with the other owners of the overlying lands to the use of the ground-water supply. Under the proposed project, the use of ground water would continue to be essential to the irrigation development of the county. The supplemental water supply to be provided for the south-coast area would be delivered by means of a gravity conduit, but to make full use of the limited supply, ground-water pumping will have to be continued to the extent that a dependable supply is available. With the project in operation, this supply would include both natural inflow to the underground basins, and percolation from the areas irrigated from the conduit. The successful operation of the project in the south-coast area depends on the combined use of ground-water pumping and gravity importation from Santa Ynez River. In Santa Maria Valley the supplemental water supply would be made available by the storage of flood run-off for subsequent release at rates which could be absorbed into the river bed, thus providing additional replenishment to the adjacent underground basins. In this area, ground-water pumping would continue, as in the past, to be the sole source of irrigation supply.

Since the supplemental water supply can only be made available and fully used through ground-water storage and pumping, as described above, the benefits from such a supply could not be withheld from any particular water user. Each irrigator could easily secure water for his land by pumping from the underlying aquifers. Since practically all of the irrigators would depend solely or partly on ground-water pumping, collections for the supplemental supply by means of a water charge would not be practical. Taxation appears to offer the only reasonable means for securing repayments. To equitably distribute the irrigation cost of the project, every water user in the area benefited by the supplemental supply would have to contribute his share through taxation.

The situation with respect to new water supply is similar to that for the supplemental supply, as described in the preceding paragraphs, because a new water supply can only be fully used by ground-water storage and pumping. Few, if any, large holdings would receive a new water supply. Under the initial project a new supply would be made available only to the south-coast area, where, as indicated previously, there are but four holdings of irrigated and irrigable land larger than 160 acres. Part of these holdings are already under irrigation.

REPAYMENT METHODS AND CONTRACT

The previous analysis of benefits and costs was prepared to show the over-all economic justification for the comprehensive plan of development of the Santa Barbara project. Not all the units of the comprehensive plan would be constructed at the same time. As indicated previously, the units proposed for initial development are Camuesa Reservoir, south-coast and Goleta conduits, south-coast lateral systems, and Vaquero Reservoir. If these projects are constructed by the Bureau of Reclamation, repayment of their cost

would be made in accordance with the Reclamation Project Act of August 4, 1939. Repayment of capital cost would be made on three different bases as follows:

Irrigation.—The portion of the capital cost allocated to irrigation would be repaid in 40 annual installments without interest.

Domestic water supply.—The portion of the capital cost allocated to domestic water supply would be repaid over a period of not to exceed 40 years, with interest not exceeding 3½ percent per year.

Flood control.—The portion of the capital cost allocated to flood control would probably be financed by an outright grant from the Federal Government, and little, if any, of this cost would be borne by local interests.

The allocations of capital cost to irrigation and domestic water supply would be made in cooperation with local interests; flood control, in cooperation with the Corps of Engineers. Such allocations have not been made as yet, but preliminary studies have been started.

In addition to the repayment of capital cost, there would be an annual cost for operation and maintenance which would be distributed among the various functions.

A repayment contract between the Federal Government and an organization representing the local water users is required in order that water may be delivered from the project. Santa Barbara County has recommended that the contracting agency for the construction and repayment of the proposed projects be organized on a county-wide basis. Such an organization would be advantageous to the Bureau in that only one contract would have to be drawn. There would be several advantages to the county in such an organization, particularly those relating to the financing and management of the works constructed by the Bureau. For example, those who do not directly use the water would benefit through the increased prosperity of the county as a whole and through increased valuation of the lands using the water, which would result in a decrease in the tax load on other lands. A county-wide organization would be in position to contribute to the cost of the project in proportion to these indirect benefits. The bulk of the project cost would be repaid by actual water users to existing local water districts, which in turn would make payments to the county-wide organization. In the management of the project, a county-wide organization offers the advantage of local control in the delivery and apportionment of water to the various districts and cities of the county, and at the same time provides for the unified control which is desirable where one project is used for the benefit of several organizations.

Conclusions

NEED FOR ADDITIONAL WATER

Santa Barbara County is in need of additional regulated water supplies to maintain existing irrigation, suburban, and domestic developments and to provide for their expansion in the coming years. In the Carpinteria and Goleta county water districts and in Santa Maria Valley, water is being pumped from the underground reservoirs faster than the average rate of natural replenishment. If this overpumping continues, the only result can be that part of the presently

irrigated land will have to revert to dry farming. In these areas the existing development cannot be maintained permanently without securing additional water supplies. The city of Santa Barbara also faces a serious problem, because the present use of water exceeds by one-third the dependable supply from all existing sources. If drought years like 1898–1900 or 1929–31 should recur, the city would experience a severe water shortage.

INITIAL CONSTRUCTION PROGRAM

To remedy the foregoing critical conditions, it is proposed to construct at the earliest possible date Camuesa Reservoir on Santa Ynez River, the south coast and Goleta conduits to deliver water to the south-coast area, and the south-coast lateral systems. The yield of Camuesa Reservoir would be ample to eliminate the present overdraft on ground water in the Carpinteria and Goleta areas and to remove the threat of a serious water shortage in the city of Santa Barbara. In addition, water would be available to take care of new domestic and irrigation uses which it is anticipated will develop in the next few years.

It is also proposed to construct in the near future Vaquero Reservoir on Cuyama River to offset to some extent the present overdraft on the average ground-water supply of Santa Maria Valley, to reduce flood damage on Santa Maria River, and to eliminate the threat of a large flood like that of 1862 which might cause great damage and possible loss of life in the city of Santa Maria.

The remaining units of the comprehensive plan would be constructed when the need for additional water supplies or flood protection arises.

REPAYMENT ORGANIZATION

Santa Barbara County has recommended that the contracting agency for the construction and repayment of the proposed projects be organized on a county-wide basis. It appears that such an organization would be advantageous to both the Bureau and to the county.

REPORT OF THE GEOLOGICAL SURVEY

Water Plans for Santa Barbara County, Calif.

As a Federal agency authorized to conduct fact-finding investigations of the Nation's mineral resources, including water, the Geological Survey makes surveys and issues factual reports that are basic to the water-development and water-utilization activities of all agencies, to the adjudication and administration of rights, and to the determination of equities. For these purposes, the Geological Survey measures the daily flow of streams and records fluctuations in the level of lakes and reservoirs; investigates ground-water conditions to ascertain availability, depth, recharge, discharge, and storage; makes chemical analyses of both surface and ground waters with special reference to their fitness for use in agriculture and industry and to their proper treatment for public and domestic supplies, industrial processes, and steam-boiler use; and prepares statistical and interpretative reports—all with a view to furnishing reliable information that is essential as a basis for the full and best use of the water resources.

The information collected and published by the Geological Survey is used by Federal, State, and municipal officials in connection with administration, operation, and utilization; by engineers and superintendents in connection with planning, design, construction, and operation; by financiers in connection with the security of investments; and by lawyers and by courts in connection with titles, equities, and damages. Its work is financed in part by direct congressional appropriation, in part by cooperative funds provided by States and municipalities, and in part by funds furnished by other Federal agencies.

GENERAL FEATURES OF SANTA BARBARA COUNTY WITH RESPECT TO WATER DEVELOPMENT

Nearly all the water that is available for municipal supply, for irrigation, and for other uses in Santa Barbara County is derived ultimately from rain that falls on the county. There is only a small outlying catchment area which contributes to the aggregate supply. Prudent use and conservation of that water supply will determine the integrity of the fairly extensive agricultural development in the county; in fact, the stable agricultural and economic development of the county will be limited by the adequacy of the water supply perennially available.

Of the total area of Santa Barbara County—some 2,740 square miles—somewhat more than half is ruggedly mountainous and unsuited to farming, somewhat more than a third is hilly and is utilized chiefly for dry farming and for raising livestock, and only about a tenth is included in irrigated farms. The latter, which includes the most intensively cultivated and highly productive lands, occupies alluvial plains in the principal valleys—chiefly the Santa Maria and Cuyama Valleys in the northern part of the county and the lower valley of the Santa Ynez River near Lompoc in the west-central part of the county. They also occupy a part of the narrow coastal plain in the southeastern part of the county, chiefly in two districts near Carpinteria and Goleta, respectively. The several valley plains and the two segments of the coastal plain just cited each overlie and are about coextensive with a substantial body of ground water.

In Santa Barbara County relatively little water is taken directly from the stream; rather, it is drawn mainly from the ground-water basins through wells. There are indications or suggestions that the withdrawals of water from certain of these ground-water basins have been greater than the replenishment—in other words, that the ground-water supply has been somewhat depleted. In the coastal area between Carpinteria and Goleta, ground-water depletion had become so stringent by the late thirties that plans were initiated to bring additional water to the area by transmountain diversion from the Santa Ynez River.

The average yearly rainfall in Santa Barbara County ranges from about 10 inches at places along the coast to 30 inches or more in the mountainous headwater areas. The variability in yearly rainfall appears to be from about 30 percent to nearly 200 percent of the average. With respect to seasonal distributions, about 75 percent of the yearly rain falls in the 4 months from December to March, inclusive; 15 percent falls in the 2 months November and April; and only about 10 percent falls in the 6 months from May to October, inclusive.

The streams of Santa Barbara County are flashy, and their run-off is derived largely from the more protracted winter storms; the Santa Ynez River is more or less typical. At the gaging station at Robinson Bridge on that stream, essentially at the head of the Lompoc Valley, the average yearly run-off from 1904–5 to 1936–37 (years ending September 30) was 176,000 acre-feet. This quantity is equivalent to 223 acre-feet from each square mile drained, or to a depth of 4 2 inches over all the drainage area. In that same 33-year period, the yearly run-off ranged from 2,390 to 815,750 acre-feet, or from 1.4 to 463 percent of the average. In 1937–38, the year of the latest major flood, the yearly run-off was about 352,000 acre-feet, or 200 percent of the average. In the 3 years ending September 30, 1907, to 1909, the total run-off was 1,797,910 acre-feet, or slightly more than 10 times the average run-off for a single year. In the 3 years ending September 30, 1929, to 1931, the total run-off was only 17,940 acre-feet; that is, only 10.2 percent of the average run-off for a single year. These two 3-year periods are, respectively, the periods of greatest and least run-off on record as of 1940.

With respect to seasonal distribution, one-half to two-thirds the yearly run-off occurs in the wettest month of winter, and only infrequently does the period of heavy run-off span 3 months. In the wettest year of record, only about 2.5 percent of the run-off in the Santa Ynez River occurred in the 5 months from July to November, inclusive; in the driest year the run-off in that 5-month interval was zero.

This extreme variability in both rainfall and run-off is a critical feature that must be adequately weighed in any program of water conservation and utilization in Santa Barbara County.

CURRENT INVESTIGATIONS OF WATER RESOURCES

Through collaboration and cooperation with several Federal agencies, the county of Santa Barbara has for several years been engaged in a comprehensive inventory of its water resources and in the formulation of a master water-utilization plan. Among the elements of this program are the following: (1) Preliminary flood-control studies along the Santa Maria and Santa Ynez Rivers, which have been completed by the United States Engineer office at Los Angeles; a final study of the Santa Ynez River by this agency, with reference jointly to flood control and to water conservation, has been authorized but has not been prosecuted aggressively owing to conditions of the war. (2) A county-wide study by the Bureau of Reclamation to formulate an integrated plan for the fullest possible utilization of the streams, also to formulate an orderly program for the construction of storage dams and other works—all to afford perennially dependable supplies of water for irrigation, for municipal supplies, and for other purposes in the largest quantity perennially feasible. These objectives have been reached in large part. (3) A county-wide investigation by the Geological Survey primarily to estimate the yields perennially available from the several ground-water basins; to determine the relation of the ground-water bodies to the streams, with particular respect to the manner in which and the extent to which the natural regimen of ground-water replenishment might be modified by the operation of reservoirs and other river-utilization works; and finally to appraise the

possibilities for artificial replenishment of the ground-water bodies in order that ultimately they might be used to the utmost. This intensive investigation was begun in 1941 and has been slowed somewhat by a shortage of technical personnel due to the war; it is now scheduled tentatively for completion in 1945 or early 1946.

These investigations have progressed sufficiently to indicate that within the relatively near future the water requirement of Santa Barbara County will necessitate the fullest possible conservation and use of all available natural waters of good quality, streams and ground-water bodies alike. Long-term storage of water beneath the land surface wherever feasible is essential, because it is impossible by means of surface reservoirs to hold carry-over storage in a volume sufficient to meet even minimum water needs during dry periods such as that of 1929–31. The stringency in water supply is so severe that within two or three decades it may prove necessary to utilize sewage effluent for irrigation in certain areas of greatest deficiency if present and prospective irrigation developments are to be sustained perennially.

The current activity in Santa Barbara County by the Geological Survey has involved the construction and operation of stream-gaging stations pertinent to the inventory of water resources; and with respect to ground water it has considered the depth, areal extent, and conditions of occurrence of the several bodies and will lead to estimates of their perennial yields. However, the chemical quality of the water, both surface and underground, has been considered only in general aspects. The need for analytical and interpretative studies of water information such as are included in the survey under the general head of water-utilization investigations is being met generally as an incident of the other investigations.

DEVELOPMENT PROGRAM

It is understood that the program of the Bureau of Reclamation for Santa Barbara County contemplates initial construction of certain basic reservoirs and their operation in conjunction with existing ground-water developments to abate urgent deficiencies in irrigation and domestic supplies, then successive construction of alternate supplemental works according to experience in operation of the basic works. In this program, the choice between the alternate plans for supplemental construction depends to a considerable degree on the capacities of the several ground-water bodies to sustain drafts that have been assigned to them tentatively in advance of estimates of the perennial yield by the Geological Survey.

For the postwar activities in Santa Barbara County by the Geological Survey, the fundamental objective is continually to secure and make available the additional basic facts with respect to surface-water and ground-water resources that are required for the orderly and effective accomplishment of the county's master plan for water utilization. Specific objectives are set forth beyond under four headings: "Surface water," "Ground water," "Quality of water," and "Water utilization." In part, the activities to reach these objectives are contemplated in a current program for continuing cooperation between the Survey and the county; in part, however, the activities contemplated would provide for some expansions beyond that scope of the cooperative program.

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Surface water

With respect to measurement of the daily flow in streams, 21 basic gaging stations are being operated currently in Santa Barbara County by the Geological Survey; these stations are listed below:

Stream-gaging stations in Santa Barbara County, Calif., as of 1944

(Except as indicated, operation and maintenance is through cooperation between the county of Santa Barbara and the Geological Survey.)

Alamo Creek near Santa Maria
Alascadero Creek near Goleta
Carpinteria Creek near Carpinteria
Cuyama River near Santa Maria
Huasna River near Santa Maria
La Brea Creek near Sisquoc
La Zaca Creek at Buellton
Salsipuedes Creek near Lompoc
San Antonio Creek at Harris
San Jose Creek near Goleta
Santa Agueda Creek near Santa Ynez
Santa Cruz Creek near Santa Ynez
Santa Maria River at Guadalupe
Santa Ynez River near Lompoc [1]
Santa Ynez River below Gibraltar Dam near Santa Barbara [1]
Santa Ynez River at Pine Canyon near Lompoc
Santa Ynez River near Santa Barbara [1]
Santa Ynez River near Santa Ynez [1]
Sisquoc River near Gary
Sisquoc River near Sisquoc
Tepusquet Creek near Sisquoc
Santa Ynez River at Jameson Lake near Montecito [2]

All the gaging stations just listed are equipped with water-stage recorders, but a number are temporary installations and should be replaced with more permanent construction. These stations are deemed sufficient to maintain a continuing inventory of the run-off to be conserved, controlled, and used in the ultimate accomplishment of the county's master water plan on the main stems of the Santa Ynez River below Gibraltar Reservoir and of the Santa Maria River. It is contemplated that all these basic stations will be operated indefinitely through cooperation with the county, both to afford an over-current basis for effective operation of the water-utilization works as they are constructed successively, and progressively to refine the tentative estimates of long-term average run-off that are embodied in the preliminary master water plan.

Santa Ynez River is the only large stream wholly in Santa Barbara County. Its drainage basin lies north of the Santa Ynez Mountains, extends about 80 miles parallel to the southern coast line of the county, and covers about 900 square miles. Four-fifths of this area is mountainous, including the north slope of the Santa Ynez and the south slope of the San Rafael Mountains, and furnishes practically all the run-off. Precipitation is almost entirely rain, there being only light snowfall on the highest part of the basin during some winters.

Surface water in Santa Ynez River Basin, used for municipal supply for the city of Santa Barbara, is stored in Gibraltar Reservoir and released through a tunnel to the coast drainage at Santa Barbara. The remainder of the run-off in Santa Ynez River serves mainly to replenish the ground-water supplies for irrigation and other uses in the middle and lower Santa Ynez Valley. The other streams in Santa Barbara County recharge the lowland ground-water bodies in the vicinities of Goleta and Carpinteria south of the Santa Ynez Mountains, also those ground-water bodies in the San Antonio, Santa Maria, and Cuyama Valleys to the north.

It has been stated that the gaging stations currently in operation are adequate for accomplishment of the main-stem utilization plans

[1] Cooperation with city of Santa Barbara.
[2] Complete record furnished by Montecito county water district.

for the Santa Ynez and Santa Maria River Basins. However, in the evolution of the ultimate utilization plan for the county, it may well prove necessary to consider the development of storage on certain tributaries of Santa Ynez River and perhaps on other minor streams which are not gaged in the current program. To meet this situation, 4 supplemental gaging stations are recommended in addition to the 21 stations now operated by the Geological Survey.

Ground Water

As has been stated, the cooperative ground-water investigation currently in progress has as one of its principal objectives the preliminary evaluation of yields perennially available from each of the several ground-water basins. Of necessity, these preliminary evaluations can be only approximate. Accordingly, through cooperation with the county, it is contemplated that there will be maintained indefinitely a continuous inventory of the quantities of water withdrawn from the several ground-water basins, also of the fluctuations in ground-water storage. This continuing inventory would be based on suitable periodic tests of the pumping plants in active irrigation and public-supply wells, and on periodic measurements of the depth to the water level in selected observation wells. Its objective would be progressive refinement of the preliminary estimates of ground-water yield until ultimately those yields are determined closely for the particular conditions brought about by operation of the basic reservoirs and initial works of the county's master water plan. The ground-water yields having been determined closely, the basic reservoirs and works can be operated for optimum effectiveness and a sound choice then made between alternate plans for the supplemental works of the master plan.

Beyond this scope of cooperative investigation, it is proposed to drill small-diameter test holes for exploring the character, thickness, and continuity of water-bearing zones in selected critical areas for which conclusive information is not otherwise available, also other such holes for use as temporary observation wells in connection with pumping tests. Some 50 test holes of this sort are contemplated. It is further proposed to construct permanent observation wells for continuing measurements of fluctuations in ground-water storage, such observation wells to be located in critical areas where wells suitable for observation do not exist and at places sufficiently remote from centers of heavy withdrawal to serve as key wells in the evaluation of ground-water yields. From 35 to 50 such observation wells would be justified.

The drilling should be done by a competent driller under the close supervision of a geologist with ground-water experience in order to obtain adequate samples of the water-bearing and other materials for pertinent laboratory tests and to assure that the intended function of each test hole or observation well is fulfilled.

Quality of water

In the investigations already completed or currently under way with respect to water utilization in Santa Barbara County, only general attention has been given to the quality of water in the streams and in bodies beneath the land surface. Ultimately, however, comprehensive information in this field will be essential to optimum operation of the county's master plan, because: (1) All available water resources

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of satisfactory chemical character, both in streams and from underground bodies, will be put to the fullest possible use; (2) the streams of the county transport considerable quantities of sediment during periods of storm run-off and this sediment, unless trapped, would accumulate in and limit the effective life of storage reservoirs contemplated to be constructed; (3) if irrigation is to be perennially stable, salts cannot be allowed to accumulate in the "soil solution" in quantities toxic to crop plants or harmful to the physical texture of the soil—in other words, the quantities of dissolved matter in the source water and in the drainage water must be known before the irrigation projects can be operated at optimum effectiveness; (4) the ground water of the county are, and will continue to be used extensively for irrigation and not all these are entirely suitable in chemical character; and (5) the master water plan for the county contemplates extensive artificial replenishment of the ground-water bodies, whose chemical character thereby may be modified substantially over a period of years. Owing to these conditions, an intensive study of water-quality problems in Santa Barbara County is proposed as a postwar activity, beyond the scope of the cooperative program now in effect or contemplated. Following paragraphs specify the scope of this proposed study.

Sediment transportation.—To initiate a factual basis for the design of measures to prolong the life of reservoirs now constructed or proposed to be constructed in connection with the county's master water plan, the amount and nature of the sediment carried by the respective streams would be determined at key gaging stations. Comprehensive measurement of sediment loads is contemplated because no such study has been made heretofore, although agencies other than the Geological Survey have measured the volume of sediment accumulated in the Gibraltar Reservoir on the Santa Ynez River at intervals of several years. Even these measurements are not considered to be widely representative because they pertain to a drainage area of only 219 square miles whose slopes were extensively denuded by fire early in the life of the reservoir.

For the continuous determination of sediment loads in the streams of Santa Barbara County it is proposed to collect samples at three, or possibly four, stream-gaging stations. During storm run-off, several samples would be taken daily at each station; during the fair-weather season, less frequently. Supplemental stations for intermittent sampling probably would be found desirable. In a local field laboratory each sample would be analyzed for total sediment content, and a representative number of samples would be analyzed for mechanical composition.

Agricultural and industrial utility of waters.—As has been implied, the ultimate extent of agricultural and industrial development in Santa Barbara County will be limited by the adequacy of water supplies of suitable chemical quality. In other areas, farm lands irrigated with large quantities of water have frequently been injured and sometimes ruined by the improper use of water, the chemical character of which was not known. Some crops are less tolerant to high proportions of certain mineral constituents than are other crops. Inasmuch as the drainage water from irrigated lands is more concentrated than the water applied to the land, it becomes increasingly important to know what chemical changes are taking place as the water is consumed by the crop plants. As irrigation is practiced more

intensively in Santa Barbara County, there will be an ever-increasing demand for comprehensive records of the quality of the irrigation water, whether derived from streams or from wells.

Industrial development in Santa Barbara County is possible and is even more dependent on the availability of sufficient quantities of water having desirable chemical characteristics. Certain industrial processes have rigid requirements as to the chemical composition of the water, and these requirements differ widely for the various industries. Locations selected for these industries are frequently decided upon after comparing the cost of treating an unsuitable water in an otherwise desirable location with the cost of pumping a suitable water requiring little or no treatment in an undesirable location.

In order to decrease the losses from injudicious allocation of waters for irrigation and from injudicious location of industrial plants, full knowledge of the chemical character of the waters from streams and from underground bodies in Santa Barbara County is needed. Past experience indicates that when a need for such information arises, there is insufficient time to obtain the needed data.

The chemical quality of most surface waters is so variable through the year that single analyses may be of little value or may even be worse than none, unless full consideration is given to possible variations in composition. It has been found that, in general, analyses of 10-day composites of daily samples yield the normal minimum of information needed. For the flashy streams of Santa Barbara County, sampling for a number of years would be necessary to afford a close evaluation of average chemical character, but sampling for only a few years would afford useful approximations. The chemical quality of ground waters is much less variable than that of streams. However, because ground waters are and will be used extensively for irrigation in Santa Barbara County, and because their quality may ultimately be modified substantially by artificial replenishment, periodic sampling of representative irrigation wells over a term of years would be fruitful.

For a comprehensive study of the chemical character of stream waters in Santa Barbara County, it is proposed to make a series of complete chemical analyses on composites of daily samples at three gaging stations. Additional analyses would be made on samples collected less frequently from irrigation-drainage systems and from miscellaneous stations on the streams. For a corresponding study of the ground waters, it is proposed to make complete chemical analyses on single samples from as many wells as necessary for fully representative coverage, in conjunction with the incomplete information now available. Ground waters of inferior quality would be explored intensively by sampling and chemical analysis. In all the intensively developed areas, it is further proposed to select key wells from which samples would be taken periodically for complete analysis.

Water utilization

The program of the Geological Survey includes analytical and interpretative studies of water facts to increase their utility and to assure that the program shall meet the needs as adequately as possible. An essential feature is the compilation of water information and particularly of critical events such as floods and droughts, in a form suited to convenient and effective use in water problems. The reports

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of these activities would contain information regarding storage diversions, and types of water use. The need for these studies is largely met incident to the other investigations. However, a modest continuing program of additional work of this kind involving a nominal cost is desirable for Santa Barbara County.

ESTIMATES OF COST

The present investigations by the Geological Survey of the water resources of Santa Barbara County are conducted in cooperation with the county at a cost of $16,000 annually. They related to the quantity of surface water and ground water and are conducted through a field office in Santa Barbara. These investigations should be continued and should be expanded to include chemical quality and utilization of water as well as quantity. Observation stations should be rehabilitated and new stations and facilities installed. Rehabilitation and expansion are necessary to supplement the present program. The additional cost will be about $55,000 distributed over a 2-year period. Thereafter, the expanded program should be continued in cooperation with the county, at a cost estimated to be $20,000 to $25,000 annually.

STATUS OF MAPPING AND OF HORIZONTAL AND VERTICAL CONTROL FOR SANTA BARBARA COUNTY, CALIF.

(1) Status of mapping

(*a*) Santa Maria River Basin: The approximate area of the watershed is 1,850 square miles.

No plan and profile surveys of streams in this basin have been made by the Geological Survey. The basin is covered entirely by topographic maps of recent date. Those issued by the Geological Survey are indicated in red tint on the attached index map.[1] The remainder of the area is covered largely by maps prepared by the Twenty-ninth Engineers, United States Army, mapped in 1941 to 1942, and the eastern end by the Forest Service in 1942–44 in connection with a War Department assignment. All of the topographic maps are published on the 1:62,500 scale.

(*b*) Santa Ynez River Basin: The approximate area of the watershed is 1,180 square miles. No plan and profile surveys of streams in this basin have been made by the Geological Survey. The basin is covered by topographic maps of recent date. Those issued by the Geological Survey are indicated in red tint on the attached index map.[1] The remainder of the area is covered by topographic maps issued by the Twenty-ninth Engineers, United States Army, mapped in 1940–42, and by the United States Forest Service in 1942–44 in connection with a War Department assignment. All of these topographic maps are published on the 1:62,500 scale.

(2) Status of horizontal and vertical control

The status of the horizontal and vertical control for both river basins is indicated on the attached tracing.[1] It appears that there is ample basic control for plan and profile surveys and dam site and reservoir site surveys.

[1] Maps not reproduced for the report.

(3) *Recommendations*

(a) Santa Maria River Basin: A completely new plan and profile survey of the basin is recommended. This would be for 30 miles of the main river, 60 miles of the Cuyama River, 25 miles of the Sisquoc River and about 10 miles of other tributaries, including some dam sites and reservoir sites not yet selected.

(b) Santa Ynez River Basin: A completely new plan and profile survey of the main stream for 60 miles with some work on the larger tributaries is recommended, similar in scope to that of the Santa Maria Basin.

For both of these basins, the surveys should be made on the standard scale of 1:24,000 with a contour interval of 25 feet on land and 5 feet on the water surface. The height to which topography should be taken will depend on conditions encountered, such as reservoir and dam sites. In general the topography should be taken up to 100 to 200 feet above the water surface as required.

No additional topographic mapping of quadrangle areas and extension of existing control is recommended, unless that which is available should prove insufficient. In general the quadrangle maps prepared by the Twenty-ninth Engineers do not show section lines and grant lines.

REPORT OF THE FISH AND WILDLIFE SERVICE

Effect on Fish and Wildlife Resources of the Proposed Projects in Santa Barbara County, Calif.[1]

The Santa Ynez River is the best steelhead (*Salmo gairdnerii*) river in southern California. Not only does the run provide fine angling in the Santa Ynez River, but young steelheads from this river are used to stock other streams, less favored with spawning areas, in Santa Barbara, Ventura, and San Luis Obispo Counties. In 1944, over 1,000,000 young steelheads were rescued from drying portions of the Santa Ynez and distributed to the Santa Ynez and other streams. Ninety-two thousand were planted in the Santa Maria River. The run of adult steelheads, providing splendid fishing in the lower 34 miles of river, is estimated to average about 20,000 annually. These large gamey fish, comparable in size and fighting qualities to the Atlantic salmon, are worth conservatively $10 apiece, both as sport fish and as brook stock for this three-county conservation program. This yields an annual value of $200,000, which capitalized at 4 percent indicates a total value of $5,000,000.

The latest available data show that in 1941, 4,375 anglers took 262,000 trout including the above-mentioned adult steelhead in Santa Barbara County. The Santa Ynez and the Sisquoc (tributary to the Santa Maria) are the streams of greatest importance. It is difficult to appraise the value of this fishing for immature and resident trout, but it is comparable to the $5,000,000 for adult steelheads. The greater part of the Santa Ynez system and a large part of the Santa Maria Basin lie in the Los Padres National Forest and their sport fisheries constitute one of the chief attractions to visitors.

In the Santa Ynez River the Camuesa Dam will flood out the present spawning grounds for trout in the old Gibraltar Reservoir. How-

[1] The principal source of material is a report by Drs. H. W. Rich and P. R. Needham of the U. S. Fish and Wildlife Service, and Mr. A. C. Taft and Dr. R. Van Cleve of the California Division of Fish and Game. Mr. E. E. Horn of the U. S. Fish and Wildlife Service reported on wildlife, which was not materially affected by these projects.

ever, the Camuesa Dam will provide a much larger reservoir for trout and the high water level will drown out the debris dam on Mono Creek, thus reestablishing this creek as a spawning area.

The greatest problem on the Santa Ynez River is the protection of the sea-run steelhead. These fish spawn in the main river and its tributaries, the major portion of the run spawning above Cachuma Dam and formerly ascending above the Gibraltar Dam. Since the Gibraltar Dam is impassable for fish, the Camuesa Dam will not cut off any more of the spawning grounds. However, these runs will be harmed to a considerable extent unless some provision can be made to provide for their reproduction after the flows in the main river have been curtailed by the storage and transportation out of the area of the large amounts of water to be stored in Camuesa Reservoir.

To maintain the present fishery a flow from Camuesa Reservoir would be needed during the winter and spring months in some years to permit the adult steelhead to spawn and the eggs to incubate without being washed out or dried up. During the summer months the portion of the Santa Ynez above Cachuma Dam often dries almost completely necessitating expensive fish-rescue operations.

Because of the intermittent character of the rainfall in this region, the Camuesa Dam, with an active storage capacity of 100,000 acre-feet, is estimated to have a safe yield of only 20,000 acre-feet due to the necessity of storing water to tide over the years of scant rainfall. This makes it difficult to provide sufficient stream flow for fish production without cutting down considerably the water available for other purposes.

A study of the flows at Camuesa, Cachuma (Santa Ynez gage), and in Santa Cruz Creek during the water year October 1941 to September 1942 shows clearly that to completely cut off the flow at Camuesa Dam would jeopardize the spawning of steelhead above the confluence of Santa Cruz Creek, except in years of above-average rainfall. As a safeguard against this condition it is proposed that supplemental water as needed be released from Camuesa Dam sufficient to insure flows in the Santa Ynez above the confluence of Santa Cruz Creek according to the following schedule: Flows to increase steadily from December 15 to a minimum of 20 cubic feet per second by January 15 and to be maintained at or above that level until May 1 and then be decreased steadily to 0, or whatever natural flow remained by June 1. In the water year studied this would have required about 3,500 acre-feet.

This flow would serve to protect the runs until the construction of Cachuma Dam. At that time a decision must be reached as to whether fishways for upstream and downstream migrants are to be constructed over Cachuma and water releases from Camuesa continued, or whether it would be practical to maintain the run by artificial propagation. In either case continuous releases of at least 15 cubic feet per second would be needed below Cachuma Dam.

A preliminary estimate of the cost of the hatchery is $200,000 for construction and $25,000 for annual operating costs.

The proposed Santa Rosa Dam will undoubtedly destroy the steelhead runs unless proper provisions are made for their up and downstream passage. Considering the great value of the fishery resources affected, it is questionable whether the Santa Rosa Dam should be constructed if the same objective can be otherwise accomplished.

The Santa Maria River is populated with both sea-run steelhead and resident trout. The steelheads spawn chiefly above the proposed site of the Round Corral Dam which will, therefore, need fishways. Because the Vaquero and Round Corral Dams are being constructed for flood control and ground-water percolation there will be no question of the streams receiving the full amount of the flows that are stored. This will undoubtedly have some beneficial effect during the drier months of the year. However, there will need to be provision for sufficient releases, in addition to that absorbed by the water table, during the months of upstream migration of the adult steelhead (December to April) to permit them to ascend from the ocean up the Santa Maria River and its tributaries.

It is recommended for the Santa Ynez River that—

1. No fishway be provided over Camuesa Dam.
2. Temporary provision be made for the maintenance of the valuable steelhead run that spawns chiefly above Cachuma Dam by supplemental releases of water from Camuesa Dam as described above, these releases to be continued until such time as an alternative practical method of protecting the runs can be provided.
3. If, when Cachuma Dam is constructed, provision is made for spawning above Cachuma Dam by means of supplemental winter releases of water from Camuesa Dam fishways be provided over Cachuma Dam. If propagation of the run above Cachuma Dam is by hatchery as described above, it is recommended that no fishways be provided, but 15 cubic feet per second be continuously released from Cachuma Dam, and releases from Camuesa Dam be no longer required.
4. A survey be made to determine if the objectives sought by the construction of Santa Rosa Dam can be attained by alternative methods.
5. If Santa Rosa Dam is constructed it be provided with adequate fishways and screens, and 50 cubic feet per second be released below the dam at all times.
6. A study be made of the needs of fish protection at the proposed Salsipuedes Dam.
7. That means be provided for releasing water from close to the bottom of the reservoirs to maintain low-stream temperatures.
8. That the necessity for screening be studied for Camuesa and Cachuma Dams.

It is recommended for the Santa Maria River that—

1. Adequate fishways be provided for the Round Corral Dam.
2. During the winter season sufficient water be released from Vaquero and Round Corral Reservoirs to permit steelheads to ascend from the ocean to the Round Corral Dam.
3. That the summer releases of water for ground percolation be spread over as long a period as possible to maintain proper conditions in the streams.
4. That the necessity for screening be studied.

It is further recommended for both the Santa Ynez and Santa Maria Rivers that for all reservoirs in which reservoir fishing can be maintained provision be made for sport fishing and recreation by means of suitable public roads, boating facilities, and recreational areas.

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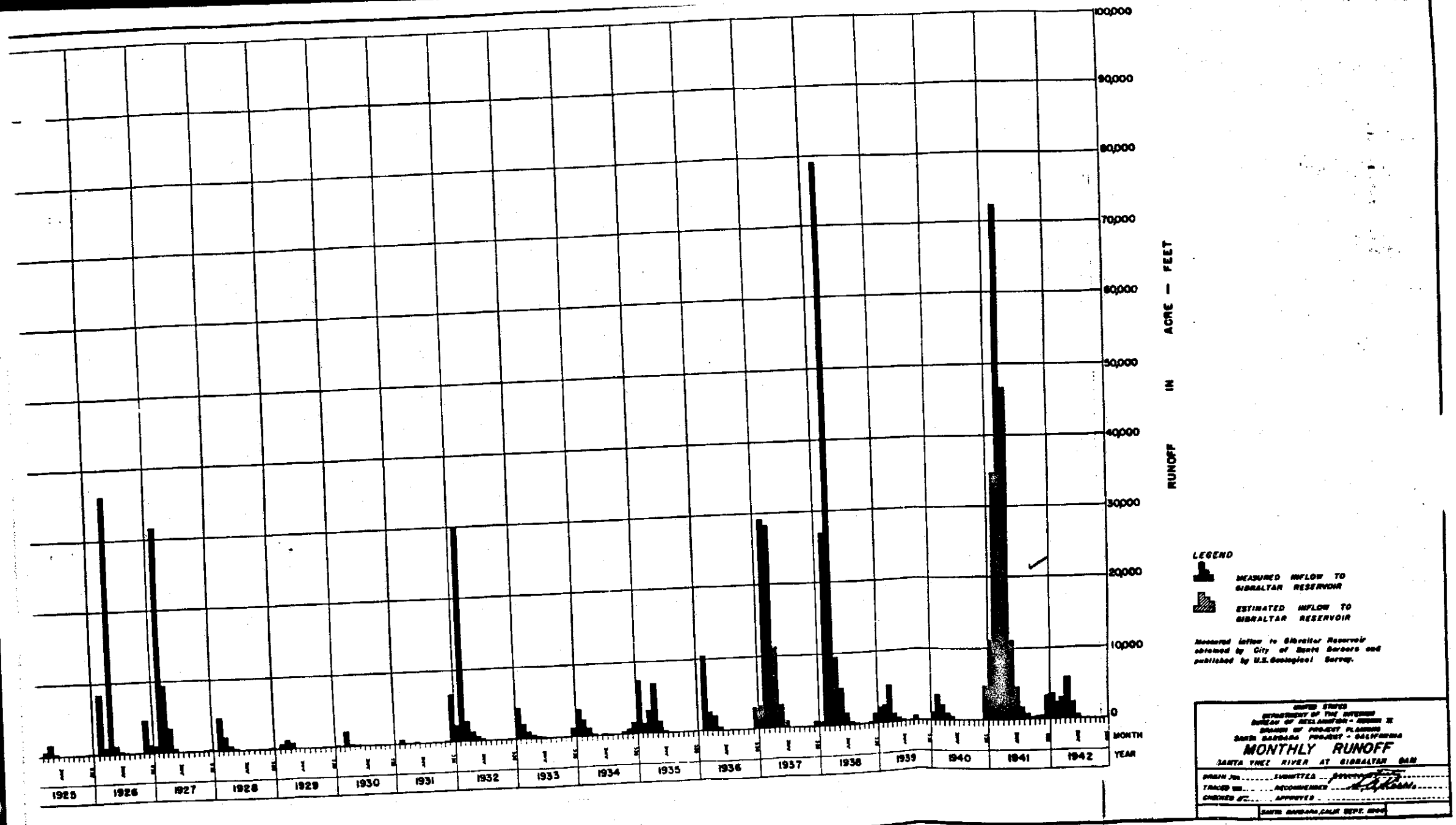
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LEGEND
MEASURED INFLOW TO GIBRALTAR RESERVOIR
ESTIMATED INFLOW TO GIBRALTAR RESERVOIR
Measured inflow to Gibraltar Reservoir obtained by City of Santa Barbara and published by U.S. Geological Survey.
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION - REGION 3
BRANCH OF PROJECT PLANNING
SANTA BARBARA PROJECT - CALIFORNIA
MONTHLY RUNOFF
SANTA YNEZ RIVER AT GIBRALTAR DAM
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TRACED BY ..... RECOMMENDED .....
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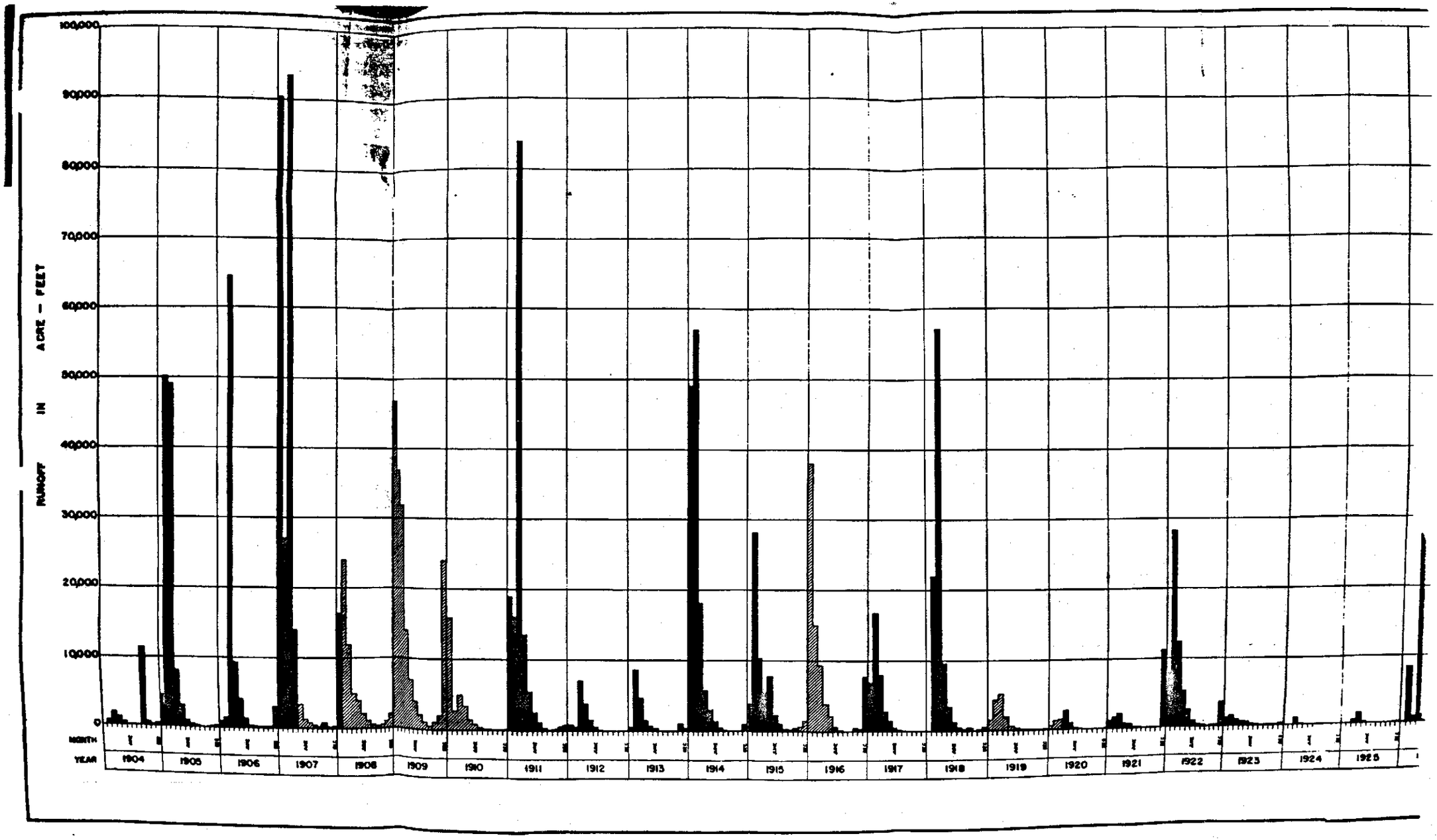
SANTA BARBARA, CALIF. SEPT. 1944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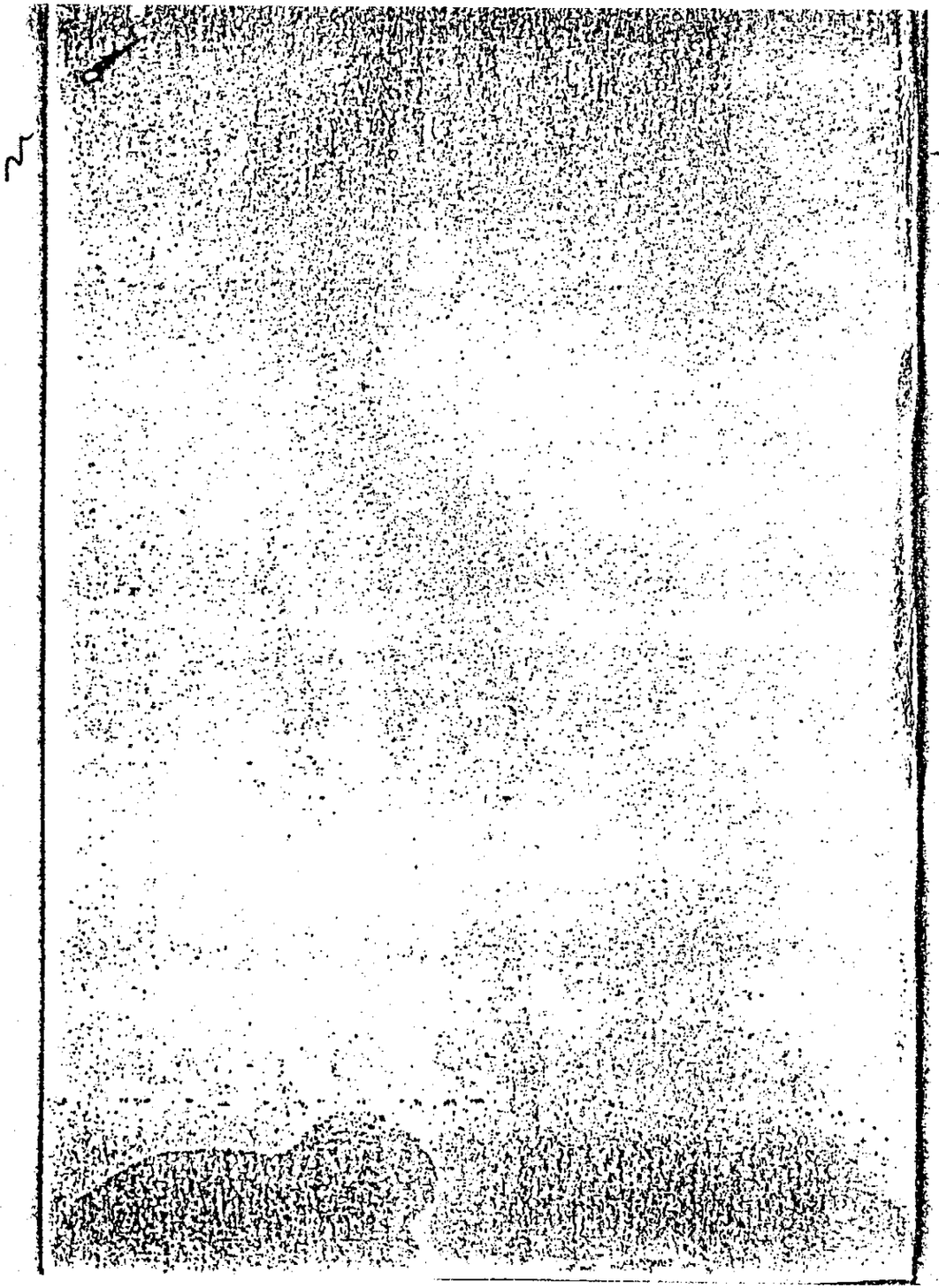


A Water History

and

THE CACHUMA PROJECT

Part One

GENERAL WATER HISTORY

1782 - 1949

Part Two

Proceedings Relating to, and Features of

THE CACHUMA PROJECT

1939 - 1949

FOREWORD

This booklet was originally issued by the County Water Agency as a matter of public record. By special permission of the Agency we have re-printed it in a limited edition, entirely at the expense of the Citizens' Committee for Cachuma Water.

We urge every reader to study the contents carefully, believing that everyone who does so will vote "yes" for Cachuma water at the polls on November 22. All of us can further cooperate by seeing to it that our friends and acquaintances are as well informed as we are on the serious necessity for Cachuma water.

Since the livelihood of the majority of us depends on the prosperity of our community, certainly each one of us can afford to do our share towards the fulfilment of this, our first real opportunity to insure an adequate water supply for many years to come.

Without Cachuma water our future is uncertain, and the consequences may be very serious. *With Cachuma water we can look to the future with the utmost confidence.*

CITIZENS' COMMITTEE FOR CACHUMA WATER

Don Welch, *Chairman*
Edgar R. Robinson, *Vice-Chairman*
L. W. Ackerson, *Treasurer*
Francis P. O'Reilly, *Secretary*

737 State Street • Santa Barbara • Telephone 3137

October, 1949

Contents

PART ONE

GENERAL WATER HISTORY*
1782 - 1949

*Proceedings relating to the Cachuma Project, together with its features, will be found in Part Two

PART TWO

THE CACHUMA PROJECT

APPENDICES

Part One

GENERAL WATER HISTORY

1782–1949

1782-6

Mission Creek. The written history of Santa Barbara begins with the settlement of the region by Spaniards, and the establishment of the Presidio in 1782 by Captain Jose Francisco Ortega. Water was supplied through a ditch from Mission Creek, near the site of the Mission, and running to the location of the Presidio.

Father Junipero Serra established the Mission on December 4, 1786, using the same creek as a water supply. By 1802, the Mission was the center of vast grain fields and the home ranch for immense herds of cattle, horses, sheep and hogs. The lemon, orange, fig, grape, and other fruit were planted and grew in abundance.

1806-7

First Dam and Reservoir. The water supply soon became a problem, due to the concentration of the Spaniards and Indians into a smaller area. This led to the building of the first dam (still standing in the Botanic Garden) by the Padres and Indians, across Mission Creek about 1½ miles above the Mission. Of rock and masonry construction and topped with hand-made tiles, the dam was approximately 20 feet high, 80 feet long, and from 12 to 15 feet in width. An aqueduct conveyed the water to a reservoir constructed north of the Mission, holding some 500,000 gallons of water. This reservoir is still in use as one of the six serving the City's water system. Here water was diverted and carried to the mill pond above the reservoir to furnish power to run a crude grist mill. Undoubtedly this water was again returned to the reservoir for re-use, or for the irrigation of small tracts or gardens.

1820-50

De la Guerra Springs. Between 1820 and 1850 the De la Guerra Springs were used to supplement the Mission works, and water was distributed by horse-drawn carts and sold by the bucketful for domestic use. Water for larger holdings and farms was usually supplied by private wells or springs.

By 1822, the City of Santa Barbara had a white population of about 483 families. In this year Spain lost control of California to Mexico, and

Franciscan authority ended. Then came the secularization of the Mexican lands and property by Mexican Congress in 1834. Orchards and crops were ruined through neglect or theft by administrators, and the lands of the Mission were sold. Thereafter, the population diminished considerably until 1846 when the American flag was run up over California.

Santa Barbara became an American city in 1850, and was incorporated by act of the first California State legislature. At this time, Santa Barbara again began to grow rapidly, transforming from a city of adobe structures to one of brick and wood.

1870 **Population, 2,889**

1872

Mission Water Company Organized. An attempt to organize a "Town Water Co.," a few years earlier had not materialized. However, in 1872, local investors got together and organized the Mission Water Company, which later served a limited number of citizens through a lateral pipe system. Mission Creek was the water source, and water was conserved in two large reservoirs with a total capacity of about 4,000,000 gallons. From 1883 to 1889 the Mission Water Company's authorized rates were $1.00 per 1,000 gallons ($325.80 per acre-foot).

1880 **Population, 3,460**

1887

De la Guerra Water Company Formed. This new company used the De la Guerra Springs for its first resources. Seven artesian wells were then drilled in the eastern part of the city to a depth of about two hundred feet. The heavy withdrawal necessitated further drilling to around 700 feet, and a temporary flow of about 1,000,000 gallons per day (3.07 acre-feet) was obtained.

1888

Early Survey. City Engineer George F. Wright was appointed by the Common Council of the City of Santa Barbara to make a survey of all possible water supplies, and his comprehensive report was submitted to the City Commissioners on October 19, 1889.

Mr. Wright noted that he had failed to find an adequate supply of water on the South side of the San Ynez range, and had extended his investigations to the North side of the range, into the basin of the Santa Ynez River. He reported in detail on two reservoir sites, one known as the Juncal, near the head of the Santa Ynez, and the other as the Main River reservoir site, below the mouth of Blue Canyon, but he particularly favored Juncal. *In conclusion, he stated that the only feasible source of supply was from the Santa Ynez River,* and urged upon the City authorities the desirability of purchasing the part of the land grant which covered the available sites for storage reservoirs and controlled the head waters of the Santa Ynez River, and to issue bonds for the construction of the necessary works. The City then proclaimed an election to vote on the proposition of using bonds to the amount of $300,000 for executing the work. This proposition, however, was defeated by a vote of 536 to 205.

1889

Santa Barbara Water Company Formed. The Santa Barbara Water Company was incorporated in January, 1889, acquiring and consolidating the Mission Water Company and the De la Guerra Garden Water Company. They then installed a Worthington pump of 1,000,000 gallons per day capacity at De la Guerra Garden Wells, and laid lines to connect with its city distribution system. Service was thereby improved, but no new sources of water supply were created.

The Santa Barbara Water Company next bought a tract of about 17,000 acres of land on the headwaters of the Santa Ynez River, embracing all practicable reservoir sites (including that recommended by Mr. Wright), and obtaining control of all available sources of water supply for the City. The Water Company's properties then consisted of lands and water rights in Mission Canyon, land covering a reservoir site in Lauro Canyon, the De la Guerra Garden wells and pumping station, the city distribution system of pipes, meters, etc., about 17,000 acres of land on the Santa Ynez River, and other incidental rights and property.

Severe Shortage. The demand for water by a population of more than 5,000 exceeded the supply. The City was forced to use salt water to sprinkle the streets, and the local paper announced the hours during which water would be turned on, that consumers might fill every available receptacle to tide them over until the next day. The fortunate owners of bathtubs used them to great advantage, and some homes and business places were equipped with float tanks that would run automatically until the tank was full.

Despite the fact that the rainfall for the three year period from 1888 to 1890 was above average, the water situation remained so serious that the City took immediate steps for a comprehensive survey of further possibilities.

1890 **Population, 5,864**

PERIOD OF PROGRESS

1896

A progressive era of the City's water development commenced in 1896 under the leadership of Eugene F. Sheffield. A water shortage in 1894 was exceedingly severe (7.02 inches of rainfall), and that of 1895 nearly as bad (16.34 inches). Realizing that an adequate water supply was necessary

for the growth and development of the City, Mr. Sheffield devoted much time to the organization of a movement to promote a municipally-owned water supply.

Cold Spring Tunnel. Through the donation to the city of 320 acres of land in Cold Spring Canyon by Mr. Sheffield and some adjacent land deeded by Mr. C. F. Eaton (for which he received 1½ miner's inches of water annually), the City began boring the Cold Spring Tunnel in January, 1896, under the direction of John Harrington, City Engineer. At an elevation of 1,400 feet, the tunnel was driven about one mile, and at first developed a flow of 20 miner's inches, equal to about 290 acre-feet per year.

Due to the construction of the tunnel the natural flow of Cold Spring Creek was diminished. and this resulted in litigation. The action was settled out of court for the sum of $5,000 and miscellaneous water rights, and the City received deeds to the land adjacent to Cold Spring Tunnel.

By 1897, sufficient water was developed to install a main supply pipe line from the tunnel to the City, to construct a reservoir and to install the necessary distribution system to provide for fire protection, street sprinkling and other municipal uses. Growth in population and development of the City was apparent after the completion of the first portion of the water system.

A contemporary chronicler reported on the Cold Spring Tunnel as follows:

> While many veins of water were struck and for a while yielded an abundant flow, those veins were soon depleted and were found to depend entirely on the Winter rains, and so feeble became the Summer flow, *that it soon became evident that the mountain itself would not furnish the needed supply and that the only possible solution was to reach the Santa Ynez River.**

First City-Owned Water. Cold Spring Tunnel furnished the first water supply established by the City, and the next step involved setting up a proper distribution system. The great demand for city service made it necessary to create an administrative agency, and in January, 1900, Mayor C. A. Storke appointed a Water Commission composed of E. S. Sheffield. President; J. N. Miller, Vice President; Thomas D. Wood, Secretary. (Mr. Sheffield served as President of the Board of Water Commission until his death in 1905.)

Ernest J. S. Purslow Survey. On July 2, 1896, while the City was boring the Cold Spring Tunnel, Ernest J. S. Purslow, engineer for the Santa Barbara Water Company, submitted to the City his report on the development of a further water supply, which concurred with the findings of George F. Wright in 1889. By way of introduction he stated:

* Italics inserted.

> The present water supply of the City is from two sources, one a gravity supply—Misison Canyon and its easterly tributary Rattlesnake Canyon; the other from a group of wells and pumping station situated in the lower levels of the City in what is known as the De la Guerra Gardens. The present water supply is so inadequate and incomplete, that it is a physical impossibility for the City to increase in size or population, or for the surrounding country to advance in development until water is procured from a source other than those in the immediate vicinity, which are now all used to their fullest capacity. The scarcity of water is the first impression that visitors receive, and many who have desired to make this their home have abandoned the idea owing to the gravity of this drawback.

After a study of dam sites at Blue Canyon, Main River (2.5 miles above present Gibraltar Dam), and Juncal Canyon, selected on the basis of ownership by the Santa Barbara Water Company, Mr. Purslow's surveys confirmed the capacity of the Juncal reservoir site as reported by George F. Wright. He then proposed the development of a new water supply to be obtained from the Santa Ynez River by the construction of a masonry dam thereon, a one mile tunnel through the Santa Ynez mountain, the necessary pipe lines and pertinent works at an estimated cost of $300,000. He valued the holdings of the Santa Barbara Water Company, including its city distribution system and also 17,000 acres of land in the upper Santa Ynez basin, at another $300,000.

On July 28. R. B. Canfield, President of the Santa Barbara Water Company, issued a supplementary report which confirmed the recommendations of both Purslow and Wright. Mr. Canfield also stated that the going water rate of 20c per 1,000 gallons ($65 per acre-foot) in the City was reasonable compared to other like communities, and that a further water supply would materially aid in the development of the City.

1900 Population, 6,587

Drought. As had been the case on a number of occasions in the past, a sustained drought occurred in 1898, 1899 and 1900, necessitating rigid restrictions concerning the watering of lawns and gardens, and the sprinkling of streets. During the summer months of this period there was not even enough water for ordinary domestic use.

FURTHER INVESTIGATIONS

1902

Mono Dam Site Favored. City Engineer J. Linn Moyer completed a survey of the Santa Ynez area and concluded that Mono dam site (now a debris dam) would be desirable for use in conjunction with Cold Spring Tunnel, and that the water impounded would be ample to meet the necessities of the City.

1903

First Lippincott Report. Acting on the Moyer report, the City Board of Water Commissioners engaged J. B. Lippincott, head of the hydrographic branch of the U. S. Geological Survey, to make a thorough investigation of the storage possibilities of the Santa Ynez Valley. It was felt that the direction and grade of the Cold Spring Tunnel might be changed for use as a conduit for water from the Santa Ynez Valley, as well as obtaining seepage from the mountains.

Mr. Lippincott's report, issued in March, 1903, reviewed previous reports and included a discussion as to the possibility of bringing water from the Ventura River to Santa Barbara by means of a "barrel stave" conduit. He concluded that it could be built for approximately $450,000, including sinking funds and interest. The report stated:

> . . . would be possible for a gravity line to direct the headwaters of the Ventura River from a point near the junctions of the Main and North forks of Matilija Creek by gravity through Casitas Pass to Santa Barbara (foot of State Street).

However, with the supply of water from the Ventura River not being constant, and with the great additional expense necessary to increase it, the project was considered impractical.

The report then eliminated the Main River and Juncal sites because they were owned by the Santa Barbara Water Company. It recommended Mono as being superior to any other reservoir site on the Santa Ynez River that had so far been surveyed. Mr. Lippincott favored the lengthening of Cold Spring Tunnel in order to tap the Valley at the point of the greatest tributary watershed and advised excavating nearly three more miles of tunnel, and the erection of an 85 foot rockfill dam across the Mono gorge. It was estimated that this would store a nineteen month's supply for ten thousand people at a rate of consumption of 150 gallons per person per day, about twice the consumption then in effect. A bond issue was recommended in the sum of $200,000 to cover tunnel excavation, land and rights-of-way, and to carry the work forward to the beginning of the dam construction.

Cold Spring Tunnel Sealed. In the meantime, under the direction of Mr. Lippencott the entrance of Cold Spring Tunnel was sealed to build up a pressure reserve of water, serving as a storage reservoir. The first bulkhead was not successful and later a second one was built, which served the purpose. For a short time the supply of water from the tunnel was satisfactory, but even then it was evident that at the rate of community growth, which had doubled to 7,000 in little more than twenty years, something further would soon have to be done. (The Tunnel now produces about 100 acre-feet annually).

Incidental Note. At this time (1903) there were 709 taps serving water from the Municipal waterworks, and 900 taps served from the Santa Barbara Water Company, a total of 1,609 taps for a population of about 8,045. The average daily per capita consumption was estimated to be 81 gallons, as compared to a present estimate of about 140 gallons.

LIPPINCOTT'S SECOND REPORT

1904-5

Mr. Lippincott's second report, published by the U. S. Geological Survey in 1905, was a very comprehensive revision of his 1903 report, again prepared in cooperation with the City of Santa Barbara, which bore part of the general expense.

The report stated that the amount of water available for the City could be taken in average years as 300,000 gallons daily from Mission Creek, 300,000 gallons from the De la Guerra wells, and 350,000 gallons from Cold Spring Tunnel, making 950,000 gallons to meet the estimated normal demand of 1,200,000 gallons (based on a daily per-capita use of 150 gallons), or a *deficit daily of 250,000 gallons.*

Further considering the possibilities of continuing Cold Spring Tunnel through the mountains and using it as a conduit for water from Mono dam site on the Santa Ynez, Mr. Lippincott had found, in the light of subsequent surveys and investigations, that this would not be feasible. A number of important factors were involved, mainly that several angles occurred in the alignment of the tunnel, and that the grade would not be satisfactory because it was too high above the bed of the stream at the mouth of the Mono.

Mission Tunnel and Gibraltar Dam Recommended. A detailed study was made of five possible dam sites—Juncal, Main River, Blue Canyon, Mono and Gibraltar. The report finally concluded that the only extensive addition that could be made to the water supply of the Santa Barbara coastal plain would be the construction of a tunnel (Mission) from the Santa Ynez River to the coast side of the mountains, and the building of an impounding reservoir at the most desirable site on the Santa Ynez River, namely, Gibraltar. This offered a much cheaper storage capacity and a much larger available supply than Mono.

Mr. Lippincott observed that all of the dam would not have to be built at once, and showed comparative costs of both masonry and rockfill dams that could be be built in a series of raises as water needs increased, i.e., 95 feet, 125 feet, 155 feet. However, he favored the 155 foot masonry dam impounding 15,793 acre-feet, and estimated its cost at $381,044; Mission Tunnel was estimated at $230,690, making a total estimate of $611,734 for the project.

MISSION TUNNEL

1904

It was recognized by the Board of Water Commission that serious obstacles would be met in following through with Mr. Lippincott's recommendations. A tunnel from the Gibraltar reservoir site would necessarily have to pass through extensive holdings of land of the Santa Barbara Water Company, with which the municipality was in competition. The tunnel would also drain the lands of Mission Canyon and deplete the natural flow of Mission Creek, interfering with the rights and property of the Water Company.

Here again the loyal interests of Mr. Sheffield entered the picture, for not only did he successfully negotiate a contract with the Santa Barbara Water Company, but under his leadership the people were encouraged to vote bonds to support the project. Furthermore, on behalf of the City and neighboring lands, he claimed the water flowing in the Santa Ynez River to the extent of 250,000 miner's inches. This claim has always been recognized by the courts and is the cornerstone of Santa Barbara's and Montecito's water rights in the Santa Ynez River.

In preparation for the new tunnel the City of Santa Barbara passed an ordinance on January 7, 1904, authorizing a contract with the Santa Barbara Water Company. This contract permitted the Company to convey water through the proposed tunnel at a certain toll which would aid in the cost of the work and provided for the necessary rights-of-way over their land for the tunnel, roads, pipelines, etc. It was also agreed that any available water from the driving of Mission Tunnel by the City of Santa Barbara should be used to maintain for the Water Company a summer flow in Mission Creek of 14 miner's inches, and a winter flow of 22 miner's inches. No monetary consideration was paid to the Santa Barbara water company either for the rights-of-way for the tunnel or for permits to the water supply.

The contracts for the boring of Mission Tunnel, amounting to $200,000 were let in February, 1904. During the construction the contractors ran into serious difficulties with sulphur gas which was so strong that a number of workmen were temporarily incapacitated. Because of this and other difficulties, the City released the contractors and proceeded with the work itself. This necessitated raising more funds, and in 1908 and 1910 a second and third bond issue raised the total cost to $600,000.

Mission Tunnel, about 3.7 miles in length, was designed to intercept the underground flow and to later convey water from Gibraltar reservoir to the City of Santa Barbara. Completed in 1912, the tunnel has developed an average annual water supply of about 1,120 acre-feet from seepage, except during the drought periods when it has dropped to about half this amount.

1910 **Population, 11,659**

1912

Purchase of Water Company by City. In January, shortly before the completion of Mission Tunnel, negotiations were concluded through which the City of Santa Barbara purchased the Santa Barbara Water Company's holdings. The latter included the distribution system, pumping plant at De la Guerra wells, land and water rights in Mission and Las Canoas Canyons, three reservoir sites on the upper Santa Ynez River drainage basin, certain lands in the City of Santa Barbara, the Old Mission Reservoir and Dam, and rights-of-way. Valuation of the holdings was set at $150,000, which the City agreed to pay at the rate of $15,000 annually.

GIBRALTAR DAM

1913

The Beginning. Hired by the City as Consulting Engineers, the plans for Gibraltar were submitted jointly by Mr. Lippincott and the firm of Quinton, Code & Hill. A $120,000 bond issue was voted, and contractors for the Gibraltar diversion dam in the Santa Ynez River, and a conduit from the dam to the entrance of Mission Tunnel were awarded in 1913. The diversion dam was a concrete structure built to serve as the foundation for the present dam, and was completed in 1914. At this time it was not legally possible to vote sufficient funds to build the remainder of the dam because the bonded indebtedness of the City was close to the maximum allowed by the City charter.

1915-19

Water Shortage. Before Gibraltar was completed, the City water supply became so deficient that it was necessary to revert to and limit the use of well water. This was a period of anxiety despite the fact that it was during a "wet cycle" with the rainfall above average.

1920 **Population, 19,441**

1920

Completion of Gibraltar. The bonding limit of the City was raised in 1915, and late the same year a $590,000 bond issue was voted for the purpose of completing Gibraltar Dam and building Sheffield Reservoir. The storage dam was begun in May, 1918, and the works completed in May, 1920. Prior to its completion, additional money was needed to put the system in working order, and on June 17, 1919, the citizens approved a $110,000 bond issue for a pipeline from Mission Tunnel to Sheffield Reservoir. Included in the pipeline cost was the foundation for a hydroelectric plant (never built), and money to strengthen Mission Tunnel.

Warning. At the celebration of the completion of Gibraltar, Lippincott warned the City that the reservoir would silt in, and that enlargements should be made to offset the resultant loss of storage capacity. Furthermore, he advised consideration of the construction of additional dams in the Santa Ynez River.

The original Gibraltar Dam rose 175 feet from bedrock, and 150 feet above the level of the stream, with a capacity of approximately 14,500 acre-feet, and a safe yield of about 5,000 acre-feet per year. In addition to the dam proper there is a 270 foot spillway built 10 feet below the crest of the dam.

Sound Investment. Many years later, Raymond A. Hill, City Water Consultant, remarked:

> If Gibraltar had not been built in 1920, the growth of Santa Barbara would have been stopped and about twenty million dollars would have been the assessed valuation of property within the City. Actually, the assessed valuation (1944) has increased to probably 50 million, equal to a gain of more than 30 times the investment required for the Gibraltar addition to our water supply.

Filling of Gibraltar Reservoir. In the winter of 1920-21, the first rainy season after the completion of the dam, the reservoir failed to fill because the rainfall was below average. In the season of 1921-22, with the rainfall only slightly above average (19.25 inches), the reservoir filled to capacity and a large volume went over the spillway causing extensive damage. The cost of repair, $90,000, was raised by special tax. (The records show that since its construction Gibraltar has filled some 21 times, a score of about 75%.)

1922-25

Watershed Cover Destroyed. During this period, 42% of the Gibraltar drainage area was burned over.

WATER RIGHTS

1928-30

The Gin Chow Case. On March 20, 1928, at a special municipal election the electors of Santa Barbara authorized the execution and delivery to the Montecito County Water District of a deed conveying the Juncal dam and reservoir site, together with the right to all waters of the Santa Ynez River appurtenant thereto or which might be impounded or stored thereby. As consideration for the City's conveyance of the Juncal dam site, and the water rights, the Montecito County Water District agreed to deliver 300 acre-feet per year into the City's distributing system from the waters impounded behind the Juncal Dam.

On August 6, 1928, the action of Gin S. Chow, et al., vs. the City of Santa Barbara and the Montecito County Water District was commenced. The plaintiffs, forty in number, were the owners of 38 parcels of land

claimed to be riparian to the Santa Ynez River. The City and Montecito united in defense of this action. Two companion cases were also consolidated with the Gin Chow case. The City and Montecito conducted a joint defense of the trial of these actions and the expenses of the trial were borne equally by the City and the District. The findings of fact and conclusions of law were signed September 22, 1930, in each of these cases.

By the findings and judgments, the City was found to have a prescriptive right to impound sufficient water to fill Gibraltar Dam to its maximum capacity of 15,374 acre-feet (actual survey showed 14,500 acre-feet) and to divert therefrom varying quantities, as its needs require, to an annual maximum amount of 4,189 acre-feet of any water of the river with the requirement that the City release below Gibraltar Dam the ordinary inflow of the river during the summer and fall months, but not in excess of 616 acre-feet each year.

In addition to this prescriptive right the City was declared to be possessed of the right, by means of dams hereinafter to be enlarged or constructed, to impound storm, flood and freshet waters of the river in sufficient amounts as will make available for diversion each year 14,000 acre-feet inclusive of a prescriptive right.

It was further found that both the City and Montecito, as the needs of their population increased can without injury to the plaintiffs, impound storm, flood and freshet waters sufficient in amount to enable the defendants in the aggregate to divert annually 16,000 acre-feet of waters, including the 4,189 acre-feet of which the City is the owner by prescription.

It was also declared that the water of the Santa Ynez River originating below Gibraltar Dam is more than sufficient to serve all beneficial and riparian use.

In view of the provisions of the California Constitution the above finding means that none of the waters originating above Gibraltar Dam is subject to riparian rights of properties located down stream.

Montecito was found possessed of the right to impound storm, flood and freshet waters having their source above Gibraltar Dam in such amount as will make available for diversion therefrom, 2,000 acre-feet in each year. In conclusion the court decided that:

> . . . there can be no doubt that the use to which the plaintiffs insist they have the right to put the flood waters of the Santa Ynez River appropriated and used or to be used by the defendants is an unreasonable use as contemplated by the constitutional amendment, . . . that the appropriation and use of said water by the defendants will not result in any injury whatever to said riparian lands; that the waters of the river, exclusive of those taken or to be taken by the defendants, will be more than sufficient to supply all of the riparian needs of the plaintiffs; and that even after the proposed appropriation and use by the defendants an annual runoff of 121,000 acre-feet of water will be washed into the sea.

1930 **Population 33,613**

A. E. Sedgwick Survey. An underground water survey within the area of the City was recommended by the Board of Water Commission, and upon approval of the City Council the Board employed Geologist A. E. Sedgwick for the investigation. Mr. Sedgwick's report included this statement.

> This source of water cannot be considered as a water supply but only as a storage reservoir from which water may be obtained for emergency purposes, and which if once exhausted would require many years to replenish.

Mr. Sedgwick's findings were borne out and further amplified by Professor C. F. Tollman, Stanford University geologist, employed by the City to check Mr. Sedgwick's survey. Professor Tollman stated in respect to salt water encroachment:

> There is no doubt in my mind that the emergency supply of the City of Santa Barbara could be increased by the drilling of additional wells. On the other hand, I am equally satisfied, and all available evidence tends to confirm the view, that no material continuous supply could be so developed. Of course wells could be put down and water could be pumped for a considerable period of time, but sooner or later trouble would certainly arise and wells near the ocean would begin to be affected by infiltration of sea water, which if continued would ruin the underground supply and destroy its value for emergency use.

1931

Gibraltar Bond Issue. On June 2, 1931, a bond issue to increase the water storage in Gibraltar Reservoir from 14,000 to 40,000 acre-feet failed by carry by 28 votes. Fortunately for Santa Barbara, the year 1931 proved to be near the end of a dry cycle.

Drought. During the drought years of 1929 to 1931, Gibraltar Reservoir slowly went dry with the exception of a small quantity of water retained against fire hazards. The population in 1930 was 33,613, as against 19,441 when Gibraltar was completed—an increase of almost 73%. Since Gibraltar was designed in 1913 for a population of 20,000, prolonged dry spells, even as far back as this, were a serious hazard to the well-being of Santa Barbara.

Wells Supplementing. On October 21, 1931, it was again necessary to supplement the water supply using local wells, and to restrict the use of all available water. To tide over the emergency, five new wells were driven along Mission Creek, on Rancheria Street. These wells were used from October 21, 1931, until January 12, 1932, at which time their pumping levels dropped seriously, and the City was preparing to lower the pumps when rain came and replenished the water in Gibraltar. The wells were then shut down. The first 10 days pumping of the Rancheria wells produced 2.2 million gallons per day; November production dropped off

to 2.0 million; December went to 1.5 million, with eleven days in January delivering 1.4 million gallons per day.

A number of reasonably wet years followed this drought period and carried the City over from 1931 without a severe shortage until 1947-8.

1932-33

More Watershed Cover Destroyed. During this period an additional 37 percent of the area was burned, making a total of 79 per cent of the Gibraltar drainage area burned over since the completion of Gibraltar Dam. The entire area was then closed to the public to further prevent damage to the watershed cover.

SILT DAMS

1936-7

Settling Ponds to Collect Silt. Siltation and erosion had begun to take their toll of Gibraltar Reservoir. At the end of 1934, the original capacity of 14,500 acre-feet had decreased to 10,684 acre-feet. By the end of 1936, the capacity was down to 10,274 acre-feet.

At this time, Mono and Caliente silt dams were built to create reservoirs to retain silt from their two tributaries. They almost filled with silt the first winter after completion, during the record flood of 1938, but were of inestimable value, for without them the capacity of Gibraltar Reservoir would have been reduced more quickly.

SURVEY FOR COUNTY BOARD OF SUPERVISORS

1939

Early in 1938, the County Board of Supervisors directed the engineering firm of Quinton, Code & Hill—Leeds and Barnard, to make a comprehensive survey of the available water supply, of the use and need for water, and of the feasibility of conserving flood waters in the southern portion of the County. The report as submitted to the Board by Mr. Raymond A. Hill on February 27, 1939, recommended a cooperative plan to provide both the City and adjoining areas with ample water for agricultural and domestic needs.

The report stated that the ground water level was dropping at an alarming rate where well water was used extensively for irrigation, and that the Gibraltar Reservoir was inadequate for future City requirements. It was shown that a sufficient supply could not be obtained in the coastal area itself, and that an adequate supplementary supply would have to come from the Santa Ynez River.

The report also analyzed supply from the river and the quantities necessary for City and agricultural use on the coast. It was found that the necessary water could be feasibly secured by the construction of additional dams on the Santa Ynez. Two projects were proposed: one was

the enlargement of Gibraltar Reservoir by an earth-fill dam which would provide more than 40,000 acre-feet of additional storage; the other, a new dam at Tequepis between the mouth of Santa Cruz Creek and Cachuma Creek, with a potential reservoir capacity of 85,000 acre-feet. The total cost of the Gibraltar enlargement, Tequepis dam, the tunnel and conduits, was estimated at $11,836,000.

In his recommendation, Mr. Hill stated:

> In our opinion the future of Santa Barbara County depends upon the prompt execution of a plan for the storage of the flood waters of Santa Ynez River in a reservoir at Tequepis and for the diversion of water so conserved to the South Coast area where the available supplies are so deficient that a critical situation exists. To the end that this program may be expedited, an organization should be formed with authority to represent all lands along Santa Ynez River which might be affected by the operation of a reservoir at Tequepis, and another organization—perhaps patterned upon the Metropolitan Water District of Southern California—should be formed to act for all of the agricultural and urban communities in the South Coastal area which would benefit from the conservation of flood waters that now waste to the ocean.

1940 **Population 34,958**

1940-41

Investigations for County-wide Water Plan. In order to utilize all water resources and to develop a plan for all areas of the County, the Board of Supervisors authorized two important investigational contracts, one with the U. S. Geological Survey, and the other with the Bureau of Reclamation.[1] The recommendations which followed in 1944 formed the basis for the final Santa Ynez-South Coast water plan.[2]

1941-44

Silting of Gibraltar. The capacity of Gibraltar Reservoir had, by 1941, shrunk to little more than 8,000 acre-feet, and by 1944 was reduced to almost one-half of the original 14,500 acre-feet. Mono and Caliente silt dams were holding back 1,100 acre-feet of silt from the reservoir.

1945

Dredging Gibraltar Silt. On August 25, 1945, the American Dredging Co., wrote to the Water Commission suggesting that nine million cubic yards (the correct figure should have been more than 11 million) of Gibraltar silt could be removed by hydraulic dredging. The job would take two years and cost some $2,600,000, or nearly three times what it cost to raise Gibraltar and restore its original capacity.

[1] p. 21
[2] p. 22 ff.

At that time City Consultant Raymond A. Hill analyzed that the cost of dredging would be $375 per acre-foot, while storage in a new reservoir would cost about $100 per acre-foot. (The actual cost was about $130).

It takes a great deal of water to dredge and remove a little silt; 10 parts of water to 1 of silt is the accepted maximum held in suspension. On this basis, 70,000 acre-feet of water would be needed to remove 7,000 acre-feet of silt, or an amount equal to about what was withdrawn in a dozen years. In addition the City would be faced with a legal and financial problem almost impossible of solution, involving the disposal of such a huge amount of debris and silt.

Engineers claim that most reservoirs eventually fill with silt, and that unprotected watersheds, after forest fires, speed the silting process. Reservoirs should be big enough so that silting is a minor factor over a long period. Further protection is afforded through silt dams and proper watershed cover.

RAISING OF GIBRALTAR DAM

1946

The population of Santa Barbara was now estimated at about 42,000. The rapid population growth and consequent water withdrawal, together with the serious decrease in the capacity of Gibraltar lake made it necessary for the City to seek the quickest and best means of securing additional water. Further, it was obvious that the proposed County water project would take several years to complete. Wells and tunnels were recognized as only a supplemental supply for emergencies. The storage capacity of the reservoir, through siltation, now contained little more than twelve month's supply, and with the unpredictable rainfall and the existing "dry cycle" it meant living under the constant threat of a severe shortage and possible water rationing.

Engineering authorities agreed that by raising Gibraltar Dam there would be fair assurance of an adequate water supply pending the completion of the County water project. Too, the Bureau of Reclamation had estimated that by 1954, unless enlarged, Gibraltar Reservoir would fail to supply the demands of Santa Barbara by some 4,000 acre-feet per year. Eventually, having served its original purpose, Gibraltar would act as a huge silt and debris catching dam prolonging the life of any downstream dam which might be built in the future.

Water Reserve Low. During August, 1946, local residents were urged to cut lawn sprinkling to a minimum owing to unusually heavy withdrawal from the reservoir. Water-needy farmers were seeking to protect their valuable investments by lowering their pumps and drilling new wells. Virtually all ranchers agreed that their individual projects in the form of private reservoirs and wells were proving more costly than the estimated cost of water from the proposed County water project.

First Bond Election. On September 27, the City Council voted to call a bond election to raise the level of Gibraltar Dam, concurring with City Water Consultant Raymond A. Hill that "it is insurance for City water supplies, but not complete coverage . . . protection against a two year drought but not a three year rainfall shortage." The program involved raising the level of Gibraltar Dam 13 feet (the peak level of the water being ten feet below the top of the dam, this step would increase the water height approximately 23 feet); doubling of the buttresses on the spillway side of the dam; installation of three gates, and equipment to remove logs and driftwood which had accumulated before the face of the dam.

A contract was let on October 10, to Leeds, Hill & Jewett for engineering supervision and administration of the work, and to get preliminary engineering work under way, contingent upon the special election.

On December 17, 1946, the people of Santa Barbara voted $600,000 in bonds to raise Gibraltar Dam for the purpose of restoring its original capacity. But the lowest bid was $843,420, as against Hill's estimate of $592,315, and since all bids were considered too high, they were rejected.

1948

Second Bond Election. On March 2, the voters of Santa Barbara turned down a $2,000,000 water bond issue, of which $500,000 was earmarked to add to the previously voted $600,000 for the raising of Gibraltar. The balance of the money was to be used for the repair and extension of the City water distribution system. This special election lost by a margin of 980 votes.

State Funds in the amount of $300,000 were then made available through a bill passed in March, and in April the City called for new bids. With the lowest bid of $797,587.50, the contract was awarded to the V. D. Case Co., and work was started on the project May 13.

1949

Raising of Gibraltar Completed. On February 18, 1949, the raising of Gibraltar was officially completed. The project took eight months, and the total expenditure was approximately $900,000.

THE WATER SITUATION

1947-1949

1947

Emergency Wells Re-opened. With only 13.35 inches of rain during the 1946-7 season the runoff to Gibraltar was insufficient to provide for the City's needs. On May 29, at a joint meeting of the City Council and the Water Commission, it was decided to put into service the City's emergency wells, for the first time since the water emergency of 1931, in order to meet the current crisis.

It was pointed out that some of the wells were objectionable due to the excessive content of hydrogen sulphide gas, making the water malodorous. Consequently, the well with the best water was to be used first, with others pressed into service as conditions warranted. This well, when last used, produced 360,000 gallons of water daily. Officials stated that its use throughout the year could leave some 3,500 to 4,000 acre-feet in Gibraltar Reservoir, instead of an estimated 3,000 acre-feet if this emergency underground supply was not drawn upon. Use of water during the summer season was about 25 acre-feet per day, or at the rate of 9,000 acre-feet yearly.

Gibraltar Level Critical. Toward the end of 1947 Gibraltar Reservoir was at the lowest level since November, 1931, according to official records, with water 22½ feet below the spillway. In December there was only enough water to last until April 1948, unless replenished by sufficient rainfall. A voluntary water conservation or rationing program for Santa Barbara was urged by Percy Heckendorf, Chairman of the City Water Commission.

Other Districts Suffer. Montecito's Juncal Reservoir was 27.23 feet below the spillway. Well pumping levels continued to drop at an alarming rate, and the result of many years of overdraft of the well supply was becoming more and more evident. Figures released in June concluded that the coastal area of Santa Barbara County was overdrawing its underground water almost twice as fast as Nature was replacing it. This was interpreted to mean that such a condition was not only a definite factor preventing the development of farm-home acreages, but the Carpinteria and Goleta areas could not long continue to pump out more water than nature could replace by rainfall without disastrous results.

CRITICAL WATER SHORTAGE

1948

Voluntary Conservation. On January 9th, the City Council moved to establish a City-wide voluntary conservation program and asked all citizens to cooperate in saving dwindling water supplies, warning if the program was not effective, water rationing would be necessary. (After this warning, the actual use of water for the first 5 days *increased* by 20.7% over the preceding 5 days.)

Rationing Begins. On January 15, for the first time since 1931, an emergency water rationing ordinance was passed. Prior to the ordinance the daily use of water for the City of Santa Barbara was 5 million gallons, (15 acre-feet), and the rationing was an endeavor to reduce this amount to 3 million gallons (9 acre-feet).

Gibraltar lake was now only two miles long as against a normal five. There was only sufficient water, 545 million gallons (1,670 acre-feet),

which for safety could not all be withdrawn, to last until early in May. *Mission Tunnel* was producing approximately 600,000 gallons (1.4 acre-feet) daily.

Commercial Restrictions. On January 21, it was announced that all commercial users of water must obtain special permits from the Water Emergency Committee or become liable to prosecution. More than 200 applications were made in a few days, and more than 1,000 were expected to comply. With the level of Gibraltar now 30.34 feet below the spillway, the situation became so serious that the City revoked a number of permits to persons or firms who had asked for a single watering to save commercial crops and fruit trees.

Wells Drilled. At this time it became necesary to drill additional emergency wells. Some of the test holes had to be abandoned either as dry, or because they did not indicate a sufficient volume of water. A total of six wells were brought in during the year and these were good producers: San Roque No. 1, De la Guerra Nos. 1, 2, & 3, Soledad No. 1. Voluntero No. 1.

The Rancheria Street wells were re-opened, and after slightly more than three weeks pumping showed a drop of 30 feet in the pumping level.

Restrictions Relaxed. On May 3, water rationing was relaxed in steps as new wells were put into production. Irrigation by residents was allowed in certain districts at specified hours, but this was not satisfactory due to the inability of the distribution system to handle such heavy peak loads. The relaxation of rationing was soon modified so that each consumer was given a seasonal quota which could be drawn upon as needed. until the quota was exhausted.

Water Rates Increased. The costly well-drilling program (estimated at about $250,000) and the necessary equipment, which eventually led to the 24 hour operation of 11 City wells, caused a deficit of some $50,000, plus another $100,000 for additional pipe and material. This was aside from the more than $10,000 per month operating costs for wages and power bills, and the loss of water revenue due to rationing.

In order to offset this drain on the Water Department, the City Council passed an ordinance in June adopting a $1.00 emergency service charge, and in July a second ordinance was passed in which the water rates were increased approximately 75% in the City, and 100% outside the City.

Rationing Ends. City water rationing officially ended on August 6, although caution in the use of water was still urged. At this time, the City's potential daily water supply (other than Gibraltar) from all wells, Mission Tunnel and Montecito was around 7,200,000 gallons, barely sufficient to supply the City. Only 1,900 acre-feet of water remained in Gibraltar, and this was reserved for emergency use and against any sudden decrease in well production.

By September, the average daily consumption was 6,900,000 gallons, as against 6,050,000 gallons for the same time in the previous year.

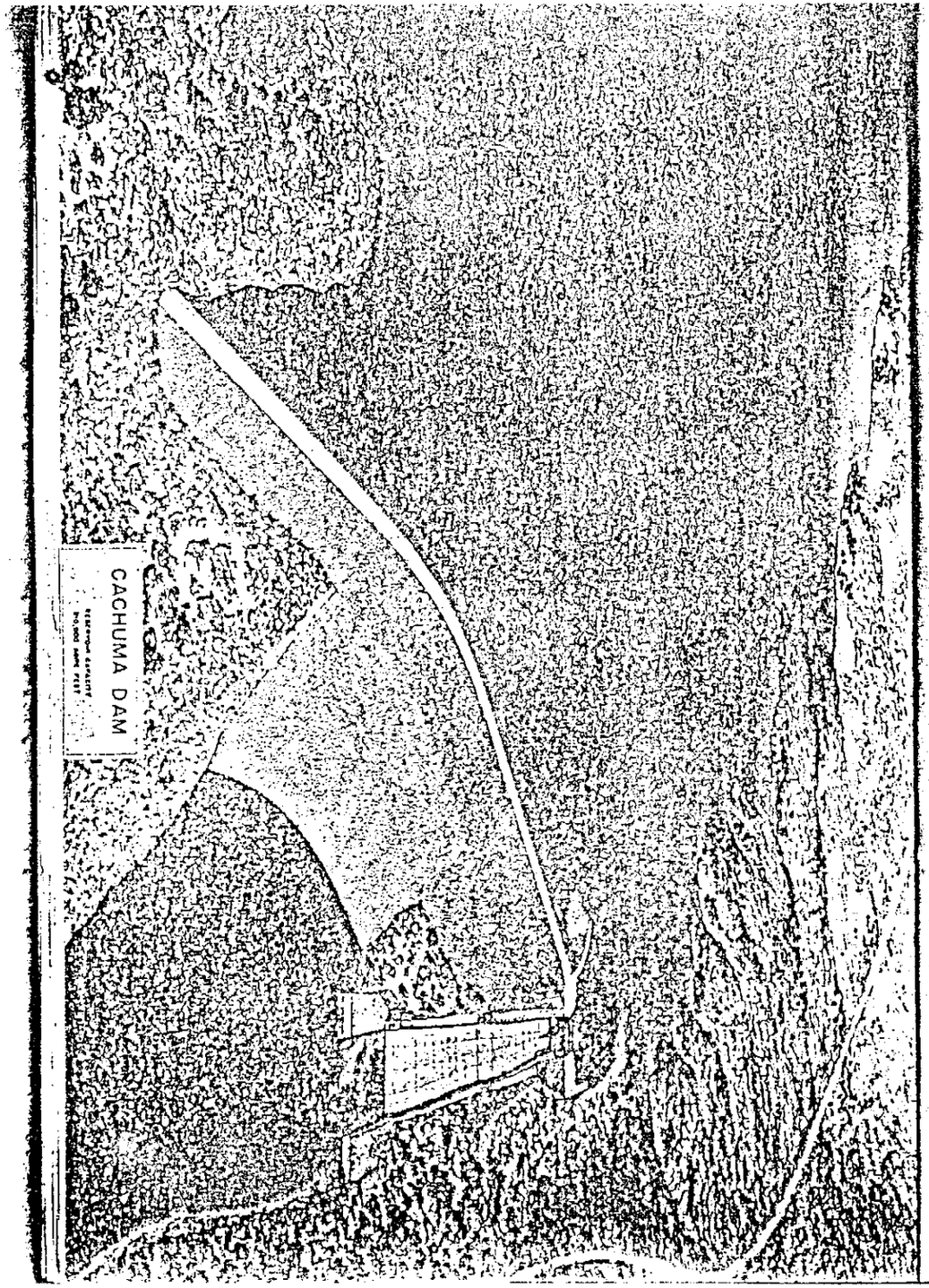
1949 Estimated Population 44,000

THE 1949 SEASON

Up to May 31, 1949, the coastal area received only about 11 inches of rainfall, continuing the sub-average which had prevailed since 1944. Consequently, with no appreciable runoff into Gibraltar and Juncal Reservoirs, these main supply sources are unable to carry the City of Santa Barbara and Montecito this year. Thus, the City faces heavier drafts on wells and a further search for new ones, while Montecito has likewise resorted to a well-drilling program. The wells have not proved adequate for the purpose and the City has been forced to draw upon the meager supply in Gibraltar Reservoir.

The wells in the outlying areas show dangerous drops from 10 to 80 feet since 1945 because of lack of water replenishment.[1]

[1] p. 62



Part Two

Proceedings Relating to, and Features of THE CACHUMA PROJECT 1939–1949

1939

Impartial Study Recommended. The Hill report to the Board of Supervisors in 1939[1] recommended that water districts be organized both on the Coast and in the Santa Ynez Valley to provide official agencies for water negotiations. The Santa Ynez district was formed in 1939 and officials recommended that a more thorough study of the water resources be made by an impartial Government agency, to determine how much water could safely be removed from the Santa Ynez River without damaging the Valley agriculture.

1940

U. S. Geological Survey Contract. In order to obtain basic facts related to both surface water and ground water of the County, the Board of Supervisors entered into a contract with the U. S. Geological Survey. These basic data were necessary for use in connection with the planning, design and operation of the proposed water program. The contract called for the Government and the County to share equally the cost of the investigation.

1941

Bureau of Reclamation Contract. Believing that all areas of the County needed a feasible water development plan, the Board of Supervisors entered into a similar cost-sharing contract with the Bureau of Reclamation for a report on a County-wide plan which would utilize all water resources. It was estimated that this program would require four years to complete.

The Bureau was chosen because it was recognized as a Government agency well qualified to solve water supply problems, and because it

[1] pp. 13-14

could plan, build and finance an adequate long-range water program conforming to the area's capacity to pay.

Investigational work was commenced, involving the study of all previous plans, the survey and core-drilling of dam sites, and the compilation of records and hydrological data.

1944

County-wide Plan. The first recommendation by the Bureau was for a comprehensive and County-wide plan for the eventual construction of seven reservoirs on the Santa Ynez and Santa Maria Rivers for the ultimate development of County water resources, estimated to cost some $46,400,000 on the basis of 1940 prices.

Both the Hill report of 1939 and that of the Bureau placed emphasis on the fact that all coastal areas should cooperate in the building of a water supply, because no one district could do an adequate job alone. On this basis, both the Goleta and Carpinteria areas had organized County Water Districts. These, with the City of Santa Barbara and the Montecito County Water District, gave four official agencies along the coastal area and the Santa Ynez River Water Conservation District as interested parties to any cooperative plan for the southern portion of the County. Later, in 1948, the Summerland County Water District was formed to complete the coastal districts. A water conservation district had been formed in 1937 in the Santa Maria Valley to sponsor projects in that area.

CAMUESA DAM PROPOSAL

1944

Because of the dire need of the south coastal area, and also because of problems arising from the proposal to combine water conservation with flood control on the Santa Maria project, it was decided by the Bureau and the Board of Supervisors to concentrate first on bringing water to the south coastal area and to make a supply available to the Santa Ynez Valley, if residents of the latter area so desired. To accomplish this, the first proposal of the Bureau of Reclamation was for a dam above Gibralter called Camuesa, with a capacity of 100,000 acre-feet, and which would supply the coastal area through a conduit leading from Mission Tunnel. This would have required acquisition of Gibraltar Dam and Mission Tunnel. from the City of Santa Barbara.

A tentative design, estimate and repayment plan was made for Camuesa and submitted to the member districts by the Board of Supervisors at a meeting on December 4, 1944. At this meeting, the history, engineering and financial plan were explained in detail and a proposal was made

to set up a County Water Agency to negotiate a contract with the Government and the various districts as a means of making the plan effective.

SANTA BARBARA COUNTY WATER AGENCY FORMED

1945

To contract with the U. S. Government and the respective water districts for the purchase and distribution of water, the Santa Barbara County Water Agency was established by the State Legislature and signed by the Governor on July 18, 1945, becoming effective September 15, 1945.

The County Board of Supervisors serve as ex-officio directors thereof with authority to enter into contracts with the Government on water development plans for the entire County, and in turn to enter into contracts with municipalities and the several organized water districts (to be called "member units" after the contracts are executed), for the means of constructing works and supplying water; the Agency to sell water only to the proposed member units.

The County Water Agency was also authorized to act as collecting agent, and to remit payments to the United States Government.

SANTA BARBARA COUNTY WATER AGENCY

(as Originally Constituted)

Board of Directors

T. A. Twitchell, Chairman.....Santa Maria
C. W. Bradbury.....Carpinteria
Paul E. Stewart.....Santa Barbara
J. M. Rutherford.....Goleta
R. B. McClellan.....Lompoc

Member Units. It was agreed that the first project of the County-wide plan should be built for the southern part of the County, and that the Santa Maria project would follow. The proposed member units for the first project were therefore: The City of Santa Barbara; Montecito, Carpinteria, Goleta and Summerland County Water Districts; and the Santa Ynez River Water Conservation District.

County Water Agency Discount. To assist the various districts in their financial problems, and believing that County-wide benefits would result from the water program, the Water Agency agreed to levy a County-wide tax; the money to be apportioned between the member units in accordance with the amount they owe the Agency each year for the minimum number of acre-feet of water they contract to buy.

The Agency proposed to levy $100,000 yearly from general county taxes for the program for the southern part of the county, and $50,000

for the Santa Maria Valley program, as each became effective, and subject to the tax limitations of the Agency. (This tax, based on total 1943 assessed property valuation, will be about six cents per hundred dollars of valuation, but will not exceed ten cents.)

1946

Camuesa Rejected. The proposed transfer of Gibraltar dam and Mission Tunnel to the Camuesa project raised many questions of water rights. Engineer Raymond A. Hill was retained by the City to advise on these and incidental engineering questions. Matters of cost, annual yield and water rights led the Water Agency and proposed member districts to reject Camuesa for the time being in favor of a dam near the Cachuma Creek, about twenty-five miles downstream from Camuesa.

The Bureau of Reclamation agreed to this proposal but recommended a dam at the Cachuma site rather than at the Tequepis site recommended by Mr. Hill. (The Cachuma site is approximately two miles downstream from Tequepis.)

Statement on Camuesa. Jerome Fertig, Project Engineer for the Bureau of Reclamation, later stated:

> This (Camuesa) plan was estimated at 1940 prices. It was estimated that the water requirements in about 25 years would necessitate the construction of Cachuma Dam at that time . . . Under present conditions, where costs have about doubled, that proposed plan is no longer feasible. After making further investigations we found that the only feasible plan now is to construct Cachuma dam first, with a capacity as proposed . . . if Camuesa is built first, its comparatively small yield would necessitate the undertaking of a double financial burden for part of the repayment period because of the necessity for building Cachuma.

Furthermore, the larger safe annual yield of 33,000 acre-feet at Cachuma would be possible, because in the absence of Camuesa dam, the Cachuma dam would be impounding the flood waters from some 400 square miles of drainage area, instead of 219 square miles at Camuesa.

1946

Cachuma vs. Tequepis. In June, the Bureau submitted figures to the Water Agency showing that the Cachuma Dam, with a 275,000 acre-feet proposed capacity, the Tequepis Tunnel and a conduit to supply the coastal area would cost $37,400,000. It was proposed that this cost be repaid under a contract based on the 9(e) section of the 1939 Reclamation Law, providing for the purchase of water at set prices, not over a specified maximum, and scheduled minimum amounts for a 40 year period. At the end of that period a new contract would have to be negotiated on the balance of about 17 million dollars to be paid out in about 20 years more. This plan was unfavorably received by the majority of City officials

and directors of the various water districts involved, mainly on account of the size and cost.

Some of the officials were in favor of Mr. Hill's suggestion for a dam at Tequepis which he estimated to cost from 18 to 20 million dollars, including the tunnel and conduit. Mr. Hill stated that this could be built with Government interest-free money to be entirely repaid on a 9(d) ordinary 40 year contract with the Bureau. Therefore, in November, the Water Agency requested the Bureau to estimate the cost of the Tequepis dam as proposed by Mr. Hill, and also to estimate a comparable dam at Cachuma.

Stop-Gap Action. In the meanwhile, to lessen the immediate water supply problem pending the ultimate solution, the City authorized a plan for the enlargement of Gibraltar Dam.[1]

1947

Agreement Near. In June, the Bureau submitted new figures both for the Tequepis and Cachuma Projects which were considerably below those of the previous year, and comparable with Hill's estimates. From the standpoint of both plan and cost, there was now a possibility of agreement.

Tentative Basis for Approval. On August 25, 1947, a meeting was called between all proposed unit directors and the County Water Agency. The Bureau engineers then presented comparative estimates of the cost of Tequepis Dam and Cachuma Dam. The following is a summary of alternate design provisions, and estimates:

CACHUMA DAM

Total Reservoir Capacity Acre-feet	Estimated Construction Cost For Dams and Appurtenances Exclusive of Reservoir Items	Remarks
150,000	$11,965,000	Without provision for future enlargement.
210,000	14,145,000	Without provision for future enlargement.
150,000	13,730,000	With provision for future enlargement to 185,000 acre-feet.
185,000	1,460,000	Cost of enlargement to indicated capacity.
210,000	1,505,000	Second stage enlargement to indicated capacity.
210,000	$16,695,000	Total cost by three-stage construction.

[1] p. 15

TEQUEPIS DAM

Total Reservoir Capacity Acre-feet	Estimated Construction Cost For Dams and Appurtenances Exclusive of Reservoir Items	Remarks
125,000	$10,500,000	Without provision for future enlargement.
200,000	13,960,000	Without provision for future enlargement.
125,000	12,370,000	With provision for future enlargement to 160,000 acre-feet.
160,000	390,000	Cost of enlargement to indicated capacity.
200,000	1,970,000	Cost of enlargement to indicated capacity.
200,000	$14,730,000	Total cost by three-stage construction.

Cost allocation and repayment figures were presented at the meeting by the Bureau representatives, and it was indicated that neither of the smaller dams would pay out on a 50 year water charge basis. Further, inasmuch as the geological formations at Cachuma had been tested by borings and those at Tequepis had not been as thoroughly investigated, the Cachuma site was recommended by the Bureau. All districts were asked to meet and decide upon what basis a project could be agreed upon. The districts came to an agreement on the 210,000 acre-feet dam at Cachuma, and an allocation of water with costs mutually acceptable. This allocation agreement became the basis for the later proposed contract between the Agency and the United States. The Board of Directors of each proposed member unit approved this agreement in principle, subject to a vote of the electors of each member unit, and the drafting of satisfactory contracts.

Approval by Districts and Agency. On November 19, the Bureau submitted to the County Water Agency an amended report recommending Cachuma Dam with the capacity of 210,000 acre-feet, and incorporating the agreements of cost and allocation of water.

This report, in general as submitted, was approved by all interested districts by December 8, 1947, and in turn was then approved by the County Water Agency as the official plan.

1948

Approval of Secretary of Interior. On January 7, Secretary of the Interior Julius A. Krug approved the Bureau of Reclamation's report superseding the 1945 comprehensive County-wide Basin Plan, and confining the Project to Cachuma.

Aproval of State. On February 18, Governor Earl Warren forwarded State approval of the Cachuma project to Washington with a strong appeal for the urgent necessity for speed in making an appropriation for its construction.

Approval of U. S. Army Engineers. The Army Engineers reviewed the Bureau of Reclamation's report recommending the Cachuma project, as required by law, and approved it on March 2.

Local Officials Go to Washington. Earl in March the House Appropriations Committee had scheduled hearings on the 1948-49 Federal budget, in which the Cachuma item was included. Four representatives of the County went to Washington to ask for early Budget Bureau approval and Congressional approval of an initial appropriation for the project. These representatives were: Supervisor T. A. Twitchell, Chairman of the County Water Agency; Supervisor Chairman C. W. Bradbury; Steering Committee Chairman Fred Stevens; Wallace C. Penfield, engineering consultant for the County Water Agency.

On their return, the officials stated that the Budget Bureau had cleared the report, making possible a declaration of feasibility to Congress. It was further stated that they had then appeared before the Appropriations Committee asking for an initial construction appropriation of $3,000,000.

Cachuma Project Authorized. Upon approval by the various Bureaux of the Interior Department, the Army Engineers, the State of California and the Bureau of the Budget, the Secretary of the Interior authorized the Cachuma Project for construction on March 24, 1948. This was accomplished by a declaration of feasibility, provided under the Reclamation Law. Now, for the first time, the Project was given authorized approval making an appropriation possible. The authorization was officially submitted to the House of Representatives on the same day, and referred to the Committee on Appropriations. Before the Committee was able to act, however, it was necessary for the Bureau of the Budget to approve the appropriation bill. To press for this action, which was finally accomplished in April, Francis Price, Attorney for the Montecito, Carpinteria and Goleta Water Districts, Supervisor Chairman C. W. Bradbury, and Supervisor Paul E. Stewart made a special trip to Washington.

Initial Funds Approved by House Group. On May 26, 1948, the House Appropriations Committee allowed $1,000,000 cash, and contract authorization of $1,500,000 for the Project, instead of the $3,000,000 requested. The use of this money was restricted to the construction of Tecolote Tunnel. The bill, as agreed to in conference, provided $1,000,000

for initiation of construction, and granted additional contracting authority of not to exceed $1,600,000. The bill in this form was passed by both houses and sent to the White House on June 19.

Truman Signs Appropriation Bill. On June 30, President Truman signed into law the Interior Department appropriation bill in which was included the Santa Barbara County Project funds.

Local Contract Negotiations. After receiving confirmation of agreements on cost and allocation of water from proposed member districts in March, the County Water Agency passed a resolution requesting negotiations for the execution of a master contract between the Agency and the Bureau of Reclamation for repayment of the cost of the Project, and so that the Project could be constructed and water sold to member units. The first draft was completed by the middle of July and forwarded to the several districts for inspection and comment. This was to be followed by subsidiary contracts between the Agency and each member unit, relative to the water for each such member unit.

The remainder of the year was devoted to clarifying and attempting to reach mutual agreement on specific provisions of the contract.

1949

Appropriation Asked. On January 10, $6,100,000 was included for the Cachuma Project in President Truman's request for the fiscal 1950 reclamation budget.

Amendment to Water Agency Act. On January 10, an amendment was introduced into the State Legislature whereby the Water Agency Act was broadened to provide different repayment plans. The original Act as drafted in 1945 provided for repayment under a 9(d) plan whereby the Water Agency and its member units would repay the actual dollar construction costs in full, in 40 equal annual payments. The new amendment provided for an alternate repayment plan whereby the Agency and its member units could repay the cost by purchase of water at rates mutually agreed upon. The latter plan was chosen as permitting a longer repayment period than 40 years, with smaller annual payments in the initial years conforming to the actual use of water. The amendment became law on February 3.

Final Contract Ready. On January 27, the eleventh draft of the Master Contract was completed. This draft, like the others, was the result of a long period of conferences between the Bureau of Reclamation attorneys and attorneys Lawrence M. Parma, Francis Price, Harold A. Parma, Arden Jensen, Percy Heckendorf, and Charles Jamison, representing the County Water Agency, the water districts and the City Water Commission. Many changes were agreed upon, and the contract was clarified to the satisfaction of all parties.

City and Districts Approve Master Contract. On March 3, the Santa Barbara City Water Commission, followed by the city council on March

10, approved as to form the eleventh draft of the master contract between the Bureau of Reclamation and the Santa Barbara County Water Agency. Goleta, Montecito, Summerland and Carpinteria districts had already approved the form of the contract.

Santa Ynez Withholds Approval. At this time, the directors of the Santa Ynez Water Conservation District withheld their approval of the master contract, pending the working out of a separate contract with the Bureau of Reclamation by which the Bureau would define the method of protecting existing water rights of the Santa Ynez District and its whole lands.

Supervisors Approve Master Contract. On March 21, the County Board of Supervisors acting as ex-officio directors of the Santa Barbara County Water Agency approved as to form the eleventh draft of the master contract. This contract was then sent via the Regional Director's office, to Washington for approval by Department of Interior and Bureau of Reclamation attorneys.

Subsidiary Contracts Submitted. Drafts of the subsidiary contracts between the County Water Agency, the City, and the various water districts, were then prepared for negotiation. These are the contracts to be voted upon by the people of each district.

$5,185,000 Appropriation. On March 28, the House Appropriations Committee approved this sum for the construction of the dam, Tecolote Tunnel and other works included in the initial phase of the water project.

Form of Cachuma Contract Approved by Government. On May 11, it was announced by Secretary of the Interior Julius A. Krug that the master contract between the Government and the County Water Agency had been approved on May 10. The contract was returned to Santa Barbara and found to be approved substantially as submitted. Accordingly, at a meeting of the Chairmen of the Water Districts on May 25, attorneys for the coastal districts advised that the contract was substantially the same as that already approved, and that it was therefore suitable as a basis for the subsidiary contracts.

Santa Ynez Valley Water Rights Agreed Upon. At a meeting on May 17, between the Bureau of Reclamation and Santa Ynez District officials, a principle was agreed upon for the preparation of a subsidiary contract between the two parties concerning the method of releasing water from the project to protect riparian rights. The principle was as follows:

> The Cachuma Reservoir will be operated in such a manner as not to interfere with the flow of the San Ynez River whenever such flow, under natural conditions would replenish the underground water basins. So long as there is an inflow into Cachuma Reservoir, whether from surface or underground contributions, such flow, in whole or in part, as may be required, will be passed through the reservoir whenever there is not a 'live' stream of water flowing at all points between the reservoir and Robinson's Bridge to the extent that the measured flow at Robinson's Bridge does not equal 3 cubic feet per second.

Officials pointed out that the principle means that this release of water would as nearly as possible maintain conditions just as Nature did before the dam was built. Agreement was also reached on a trial operational period of several years, following construction of the dam, to establish a practical procedure for future release of water from the dam in order to protect riparian rights. At the end of the trial period, the agreement could be terminated by either party upon notice to the other. If no solution had been reached after termination, the parties would have all the legal rights to which they are entitled under the law.

Tentative Date of Cachuma Elections. With the Santa Ynez Valley water rights agreed upon in general, and the $5,185,000 appropriation soon expected to gain Senate approval, a special meeting was called on May 25, to set a date for the Cachuma water elections. At this meeting, the steering committee, made up of representatives of the various water districts and the City of Santa Barbara, set the tentative date as September 6, 1949. (This date was expected to allow sufficient time to clear all the preliminary local and State details, but subsequent difficulties in negotiating the various contracts made the date impossible to keep).

Santa Ynez Approves Master Contract. On June 8, the board of directors of the Santa Ynez River Water Conservation District approved the Master Contract for the Cachuma Project as to form. This approval resolution was similiar to those adopted by the south coast Water Districts, and the City of Santa Barbara.

Master Contract Revision. The eleventh draft of the Master Contract, as approved in Washington, was submitted to the California Districts Securities Commission on June 14, 1949, for a report which was issued July 7. Pursuant to the suggestions of the Commission, the United States agreed to insert a revision clarifying the fact that Project water reaching the underground strata of excess lands, and pumped therefrom for use on excess lands, would not violate the excess land provisions of the Master Contract.

Senate Group Strikes Out Cachuma Funds. The $5,185,000 budget request for the Cachuma Project was deleted on July 13, by the U. S. Senate Appropriations Committee. (The original request for $6,100,000 had been cut 15 per cent along with other Bureau of Reclamation budget requests).

Officials Again Go to Washington. On July 19, County Water Agency Chairman T. A. Twitchell, and Director C. W. Bradbury left for Washington in an attempt to have the appropriation reinstated.

Member Contracts Submitted. At a meeting of the Water Districts Steering Committee on August 2, the provisions of the member contracts were explained. The contracts were submitted to the city and the various districts the following week, and given tentative approval.

Officials Report on Appropriation Status. Water Agency Chairman T. A. Twitchell, and Director C. W. Bradbury returned from Washington

on August 22, stating that the appropriation would not be reinstated by the Senate as a whole. However, it was planned to make a later attempt to reinstate the appropriation in committee conference.

Special Elections Set. During the first three days of September a series of conferences were held by members and attorneys of the County and District Water Boards, County Clerk J. E. Lewis, City Clerk Faye Griffin, and other County and City officials. These conferences resulted in the preparation of a program for calling the Cachuma Project elections in the City of Santa Barbara and the Water Districts by September 26, and holding the special elections simultaneously on Tuesday, November 22.

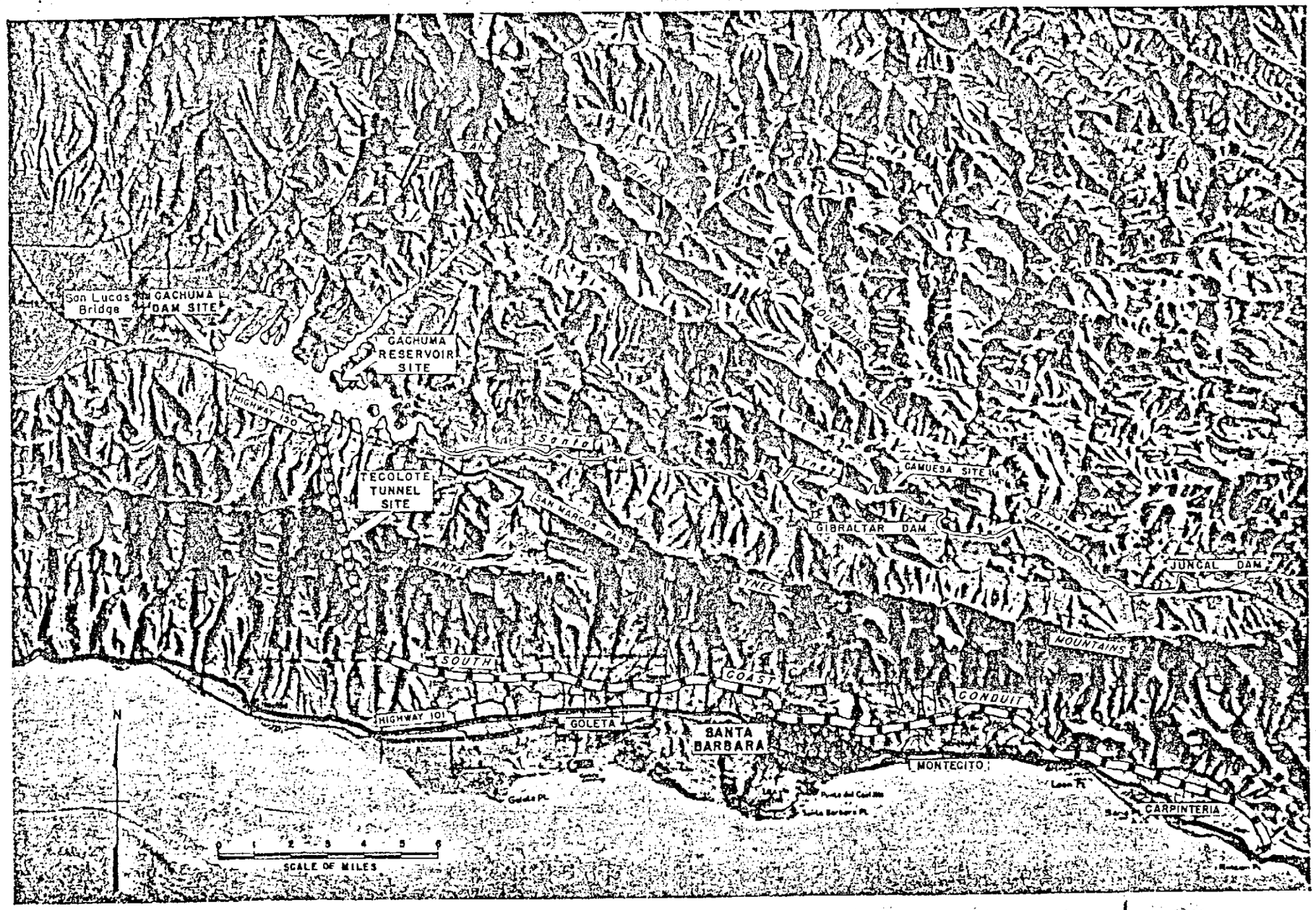
The program and the dates set were formulated on the earliest possible schedule in which to complete the numerous details. These included the execution of the Master Contract between the Federal Government and the County Water Agency; the execution of the member unit contracts by the Agency; the completion of the Santa Ynez River Water Conservation District negotiations of its contract with the Bureau of Reclamation; the adoption of election resolutions and ordinances in the City of Santa Barbara and the various Water Districts.

Master Contract Signed. On September 12, 1949, the Master Contract was signed for the County Water Agency by Chairman T. A. Twitchell, and County Clerk J. E. Lewis. In turn, Richard Boke, Regional Director of the Bureau of Reclamation, signed for the Federal Government. Under this contract the Government agrees to construct the 210,000 acre-feet Cachuma Dam, the Tecolote Tunnel, and the South Coast Conduit. The Agency agrees to purchase for the City and the Water Districts specific amounts of water over a 40-year period. The Master Contract becomes effective upon execution of sufficient member unit contracts.[1]

Also signed by the Agency were the six subsidiary contracts with member units; the City of Santa Barbara, the Montecito, Carpinteria, Summerland and Goleta County Water Districts, and the Santa Ynez River Water Conservation District. These subsidiary contracts will be put to the people for approval in the City and each District at the special elections scheduled for November 22.

Santa Ynez Water Right Contract Approved. The water right contract between the Santa Ynez River Water Conservation District and the Bureau of Reclamation was negotiated in Washington during the week of September 5. This contract recognizes water rights, and establishes operating criteria guaranteeing protection of such water rights of the District, and water users therein. The Secretary of the Interior approved the contract the following week, enabling Santa Ynez to sign it and hold an election on its member unit contract on November 22, along with the other Districts.

[1] p. 52



The Cachuma Project

FEATURES OF THE CACHUMA PROJECT

Purpose. The Cachuma Project will fulfill the urgent need for substantial and long-range municipal and irrigation water supplies for the South Coast area, the Santa Ynez Valley, and the City of Santa Barbara whose present water use exceeds the City's dependable supply from all sources.

By impounding the Santa Ynez flood waters which are now wasted, the Cachuma Reservoir will provide outlets for passing the normal flow of the river to the users below the dam, and will supply additional water which they may wish conserved at reasonable cost.

CACHUMA DAM AND RESERVOIR

General Features of Reservoir. The reservoir site lies along the Santa Ynez River about three miles above the San Lucas Bridge on State Highway 150. Eight miles of this highway will have to be relocated in the upper Santa Ynez Valley to make way for the lake.

The reservoir will be approximately 7 miles in length, varying in width from about one-half mile at the damsite to one mile in the main body of the water, gradually decreasing in width as the river meanders up the stream. The Reservoir will be about fifteen times the size of Gibraltar.

On the North side the reservoir will back up into two stream beds, the Cachuma and the Santa Cruz, distances of about two miles. One prominent island scattered with oak trees will be formed on the South side of the reservoir about 1¼ miles upstream from the dam.

ENGINEERING FEATURES AND TENTATIVE COST ESTIMATES

Cachuma Dam and Reservoir

Type of dam: Earth and rock fill; seven million cubic yards of earth, faced with 130,000 cubic yards of rip-rap.
Height: 216 feet above stream bed.
Reservoir Capacity: 210,000 acre-feet.
Safe yield: 33,000 acre-feet per annum.
Dead Storage: 34,000 acre-feet for accumulation of silt.
Area: Varying from 900 to 3,020 acres.
Estimated Cost: $17,533,000, including reservoir right-of-way and relocation of highway.*

NOTE: *Silting Estimate.* It took some 28 years for Gibraltar to accumulate some 7,000 acre-feet of silt. The Cachuma Reservoir is designed with a dead storage capacity of 34,000 acre-feet, set aside for silt deposit. On the basis of past records, engineers estimate that it may be from 85 to 100 years before the usable capacity of Cachuma Reservoir is affected by silt, and possibly longer, since Gibraltar will be of great aid in slowing up the process. After that time, there may still remain a capacity of some 176,000 acre-feet.

* *Bureau of Reclamation tentative cost estimates, 1949.*

TECOLOTE TUNNEL

This tunnel, for carrying water from Cachuma reservoir to the South Coast, will begin at "Chalk Rock" opposite the mouth of Santa Cruz Creek in the Santa Ynez Valley, and end in the west fork of Glen Anne Canyon in the Goleta area, joining the South Coast Conduit.

Estimated Yield. It is impossible to state specifically how much water will be tapped by the initial or even the final boring operations. From the studies of the geology of the area, Bureau of Reclamation engineers estimate that a supply ranging from 500,000 to 1,000,000 gallons per day may be reached within a year from the commencement of drilling from the south portal. This rate of acceleration may greatly increase as the tunnel is extended, and may reach a rate of four to five million gallons per day between the second and third year of drilling operations. It may be expected to decline to a rate of one to two million gallons per day thereafter.

Tecolote Tunnel will be the first unit of the Cachuma Project to be constructed.

Tunnel Features
Length: 6.4 miles.
Size: Horseshoe shaped section, 7 foot diameter.
Capacity: 100 cubic feet per second.
Estimated Cost: $5,512,000.

SOUTH COAST CONDUIT

This conduit, which will include several small regulating reservoirs, will be a high-pressure pipe line from Tecolote Tunnel near Goleta, to the lower end of the Carpinteria service area. It will serve the water districts of Goleta, the City of Santa Barbara, Montecito, Summerland and Carpinteria.

Conduit Features
Length: 28 miles.
Diameter: 48 inches for first ten miles, 24 inches for remainder.
Capacity: 70 cubic feet per second.
Estimated cost: Conduit, $5,232,000; Regulating Reservoirs, (4), $2,204,000.

LATERAL DISTRIBUTION SYSTEM

This system is needed to distribute water from the conduit to the crop lands in the water districts of Goleta and Carpinteria. The entire cost, $3,708,000 will be allocated to irrigation, and is to be repaid by these districts. Repayment probably will begin several years after completion of the system.

ANNUAL OPERATION AND MAINTENANCE EXPENSE

The total annual operation and maintenance expenses including reserve for future replacements of the Cachuma Dam and Reservoir and the complementary conveyance units are estimated by the Bureau at $80,000, of which $40,000 is for the dam and reservoir, $5,000 for Tecolote Tunnel, and $35,000 for the Goleta-South Coast Conduit. The operation and maintenance expenses including reserve for future replacements for the Goleta and Carpinteria lateral distribution system are estimated by the Bureau at $70,000 annually.

COST OF CACHUMA WATER TO THE DISTRICTS

The cost of water to be delivered by the Cachuma reservoir is as follows:

Municipal Water. The City of Santa Barbara and municipal areas in the Water Districts of Goleta, Montecito, Summerland and Carpinteria will pay a maximum of $35 per acre-foot. (A municipal water area is defined as one which has a contiguous area of 300 acres or more, averaging at least one water consumer service connection per acre. This was the approximate number of connections per acre, in the City of Santa Barbara, at the time the Master Contract was drafted).

Irrigation Water. Santa Ynez River Water Conservation District will pay a maximum of $10 per acre-foot; Goleta, Montecito, Summerland and Carpinteria will pay a maximum of $25 per acre-foot for agricultural water.

Basis. The foregoing figures are based on water-marketing studies made by the Bureau of Reclamation and the County Water Agency, and are in accord with the payment capacity and willingness of the water users to pay for such service. The figures compare favorably with the existing cost of irrigation and domestic water.

COST OF CACHUMA WATER TO THE CONSUMER

Municipal. Many factors enter into an estimate of consumer rates for Cachuma water. The City will buy Cachuma water at a maximum of 8c per 100 cubic feet ($35 per acre-foot), but the rates the Water Department will charge the consumer will be partly dependent upon the cost of

needed improvements to the City's water system; further, under the general heading of operation and maintenance, for which a margin must be allowed, there are always a number of fluctuating expenses which are difficult for the Water Department to determine in advance.

On the other hand, Water Department officials estimate that water from all sources is now (1949) costing the City about 15c per 100 cubic feet ($65 per acre-foot), or nearly twice the cost of Cachuma water. This is partially due to the heavy drilling and operation expenses of the City wells, which will be unnecessary when Cachuma water is available.

From the foregoing, the feasible conclusion is that by comparison, the present cost, as against the lower cost of Cachuma water, should leave an ample differential to enable the City to set up consumer rates approximating those in effect before the 1948 increase.

Agricultural. Cachuma water will be sold at a maximum of $25 per acre-foot to agricultural users in the coastal area. Ranchers in the Goleta and Carpinteria Valleys have calculated that the price of Cachuma agricultural water compares favorably with the present cost of water from their own deep-level wells. Too, from an economic viewpoint, they take into consideration the certainty of an ample supply from the Cachuma Project, as against the uncertain future presented by the constantly decreasing and insufficient supply from many of their wells.

FILLING CACHUMA RESERVOIR

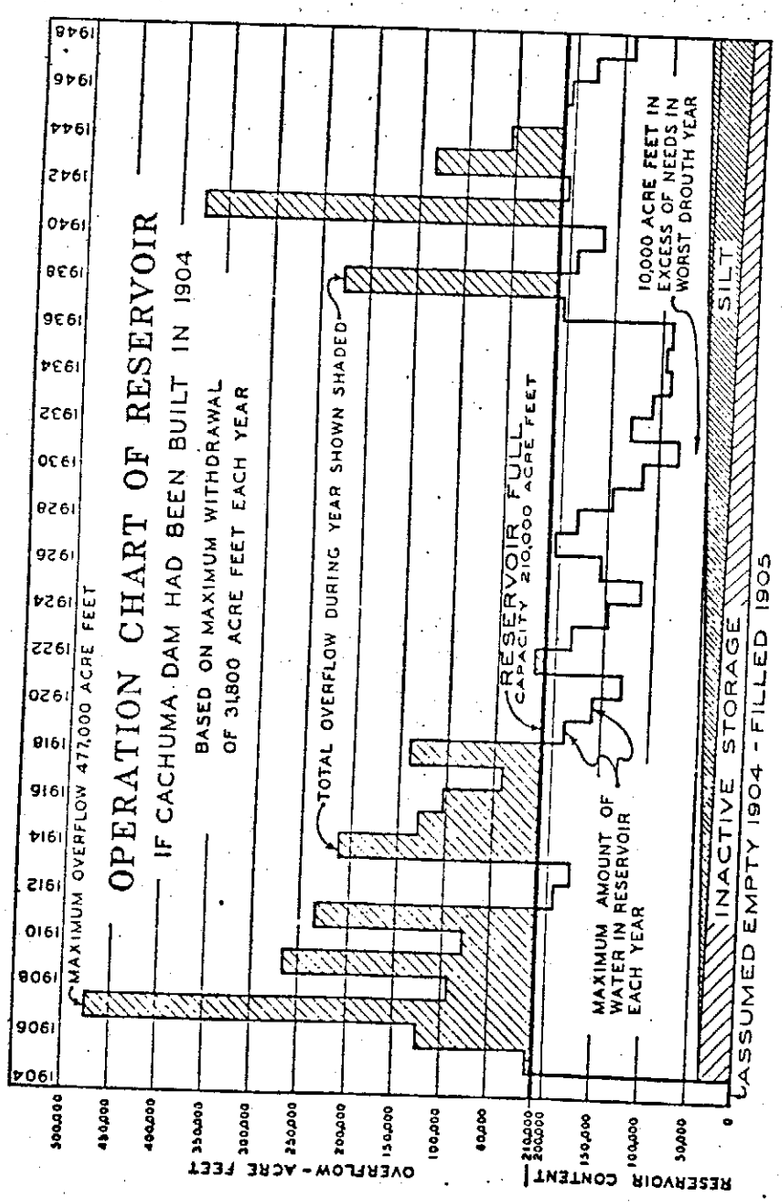
The Cachuma Reservoir area has an average annual precipitation of 19 inches, a drainage area of 421 square miles, and an average annual run-off of 72,600 acre-feet.

On the basis of these figures, water engineers are agreed that the filling of Cachuma Reservoir may be possible in as little as three average rainfall seasons, or two above-average seasons. Over the period 1904 to 1948, had Cachuma dam been built, it would have overflowed 17 times. (Diagram next page). When Gibraltar Reservoir was built it filled to capacity in the second rainfall season which was only slightly above average.

Measurements at San Lucas Bridge, which is a short distance below the Cachuma damsite, show that in the so-called "dry cycle" the flood waters passing under the Bridge may vary from no perceptible flow to 82,000 or more acre-feet annually. The "wet cycle" flood waters range anywhere from 10,000 acre-feet to 475,000 acre-feet. In 50 years, the average annual flow past San Lucas Bridge was 96,844 acre-feet.

CONSTRUCTION BY BID

The Dam, Tunnel and Conduit, including the distribution system for Goleta and Carpinteria will be let by private contract on bid, but will be financed through the Bureau of Reclamation.



Safety of Construction. Rigid state requirements assure that modern dams, reservoirs and tunnels be constructed to withstand earthquakes as far as human ingenuity can make them so. The Cachuma dam site has been subjected to extensive test drillings and geological investigations by competent authorities. The Bureau of Reclamation makes detailed investigations of its dam sites to be sure the foundation and fill materials are safe, has never designed a dam which has failed, and is satisfied that modern construction skill assures the safety of Cachuma.

FINANCING AND REPAYMENT

Financing. The total estimated cost of the Cachuma Project is $34,189,000,* all of which will be financed by the Federal Government. (Included in this sum, the cost of the Goleta-Carpinteria lateral distribution system, estimated at $3,708,000, will be repaid by these two Districts.) Congress has already made available an initial appropriation of $1,000,000 for construction of Tecolote Tunnel, and further appropriations will be requested as necessary.

Repayment. Through their contracts with the County Water Agency, the City of Santa Barbara and the various Water Districts have agreed on the amounts[1] and rates[2] of the water they will purchase. Financial analyses indicate that the anticipated revenues from the sale of water for municipal and irrigation purposes are sufficient to meet the operation and maintenance costs, and the fixed charges of the Project, on the basis of *no interest* on capital investment, and repayment of capital cost in about 50 annual payments. Furthermore, should the use of water during the first 40 years prove to be greater than the assured minimums, which authorities believe to be quite likely, the cost could be retired in less than 50 years.

Inasmuch as the Cachuma Project is not to be financed by a bond issue, it will not be necessary to levy usual property taxes for bond retirement or for interest. The Project will be principally repaid through the sale of water. However, there will be a County-wide tax based on benefits to the entire county.[3]

COST ALLOCATION AND PAYMENT

Basis of Allocation and Payment. As the immediate need for the Cachuma Project is to remedy the critical water shortage affecting the City of Santa Barbara and the adjacent south coast irrigation area, the Project will be constructed and operated solely for the purpose of providing

*Bureau of Reclamation tentative cost estimates, February, 1949
[1] p. 53
[2] p. 36
[3] p. 23

water service for the area. Thus, in the opinion of the Bureau, there were no flood control or other government contributions possible and therefore the full capital costs of the Project should be repaid to the Government. The water would be allocated to the various districts upon a basis reflecting the value of water to the users.

After considering various generally accepted methods applicable to Cachuma, it was concluded by the Bureau of Reclamation that the most realistic cost allocation should be based on the water use method. This method involves payments for use of the project on a water service basis. These payments are in turn based upon water commitments of the member units as agreed upon in the initial 40-year contract period. Water service rates to the Districts will not exceed $35 per acre-foot for municipal water and $25 per acre-foot for irrigation water delivered along the Goleta-south coast conduit, and $10 for water released at Cachuma Dam into Santa Ynez River for irrigation use in the Santa Ynez Valley. These rates include operation and maintenance expenses of the works and a reserve for future replacements.

Allocation. The entire cost of the lateral distribution systems for Goleta and Carpinteria County Water Districts, estimated at $3,708,000 would be allocated to irrigation and *would be repaid directly to the U. S. by those Districts*, with payments to commence several years after completion of the systems. The balance of the estimated capital investment is $30,481,000, and since the water commitments are only for the initial 40-year contract period, revenues received during this period are used in establishing the allocation of this amount to irrigation and municipal water.

On this basis, about 43.7% of total minimum revenues that would accrue from Project operations during the initial 40-year contract period would be contributed from *municipal water*, 55.4% from *south coast irrigation*, and 0.9% from *Santa Ynez irrigation.*

Applying these percentages to the revenues necessary to retire the estimated capital investment of $30,481,000, the allocation to *municipal* water service would be about $13,320,000; the allocation to irrigation water service in the *south coast area* would be about $16,887,000; and the allocation to irrigation water service in the Santa Ynez and Lompoc Valleys would be about $274,000.

Retirement of Capital Costs. On the basis of this cost allocation with interest-free money for the entire authorized Cachuma Project, assuming that the rate of water delivery reached in the 36th year of present commitments will be forthcoming, it is estimated that the water sales will produce revenues sufficient to pay the annual operation and maintenance expenses, and retire the estimated capital investment of $30,481,000 in about 50 years. At the end of the 40-year contract period,

about $21,336,700 (70%) of total capital cost will be retired, leaving a balance of about $9,144,300 (30%) for the following ten years.

The actual retirement period of the capital costs of the Cachuma Project will depend on the final cost of the Project, and the rapidity with which the water revenues repay this cost. As Bureau studies indicate that the use of water may be greater than the minimum water commitments used in this analysis, it is expected that in spite of the possibility of increased constructions costs, the capital investment of the Cachuma Project should be retired in 50 years or less.

AGRICULTURAL AND LAND USE

Farm Units. Most of the farm land on the South Coast is owner-operated, while about one-half of the land in the Santa Ynez Watershed is operated by tenant farmers. The typical farm size for the south coast area is 10 acres or less, and the majority of all holdings in this area are less than 30 acres. There are only four holdings which are larger than 160 acres.

In the Santa Ynez watershed the average size of ownership is considerably larger, with only 30 out of 229 holdings less than 25 acres, and with 52 holdings in cropland greater than 160 acres.

Products. Most of the area in the Carpinteria and Goleta valleys along the south coast is irrigated, being mainly used for lemons, walnuts and vegetables. The terraces, and lower foothills area are mainly dry farmed to lima beans and tomatoes, with some lemons and avocados under irrigation. In the Santa Ynez Valley the main crops are beans, vegetables, seeds, alfalfa and sugar beets.

Livestock Operations. In the Santa Ynez Valley, livestock production, chiefly beef cattle, is one of the main industries and is the largest revenue producing industry. A considerable portion of the dairy products for the City of Santa Barbara comes from the Santa Ynez Valley.

New Agricultural Enterprises. There are a number of possibilities and trends toward the development of new agricultural enterprises. The raising of cut flowers was begun in quantity in 1946, and the first annual crop report from 32 acres showed a gross return of $68,621. By 1947, these figures were 189 acres and $290,250, and in 1948 there was another increase to 223 acres and a value of $490,579. With the forecast of bigger acreages being planted to cut flowers when more water is available, this income is expected to become increasingly important.

Strawberries are also a relatively new crop and are in the lead from the standpoint of dollars per acre. From the 208 acres of strawberries in the County last year, a gross income of $1,231,332 was realized.

1948 AGRICULTURAL CROP REPORT

Santa Barbara County's 747,798 acres of farm and range land turned out agricultural wealth totalling $53,358,399 in 1948. Reflecting the sensational growth in this wealth, the gross farm income 10 years ago was $17,644,605.

The following is a summary of the 1948 crop report for Santa Barbara County issued by the Agricultural Commissioner. A complete tabulation of this report may be found in the *News-Press* of Sunday, April 10, 1949.

SUMMARY

	Santa Barbara County 1948 Acreage	1948 * F.O.B. Value
Fruit and Nut Crops	13,055	$ 7,727,209
Animal Industry	610,000	17,260,115
Field Crops	89,561	10,732,692
Vegetable Crops	35,182	17,638,383
Total	747,798	$53,358,399

** This is not the income to the farmer, but the gross valuation of products, including cost of production, harvesting, grading and packing.*

Total Number Farms, 1945 Census	1,381
Total Value Agricultural Products	$53,538,399
Total Population (1940 Census—70,555)	
Total Population Present Estimate	89,415
Total assessed Valuation Property, including real estate, improvements, personal property and utilities	$168,405,674

COASTAL AREA CROP RETURNS

(Based on 1948 figures furnished by the Agricultural Commissioner)

		Gross Returns	Gross Per Acre
Irrigated acreage	12,326	$8,879,051	720
Non-irrigated acreage	4,777	844,046	177
Total	17,103	$9,723,097	

Part of the lands now irrigated, but with an inadequate water supply would eventually go out of irrigated crop production with a material loss of capital investment and returns which would seriously affect the economy of the area. When a new water supply is made available, expansion of irrigated acreage is anticipated, and the crop pattern will probably change to the raising of the more valuable crops, bringing increased returns and greater spending power.

BENEFITS

Irrigation. For purposes of this report the following irrigation benefits are the net direct benefits as estimated by the Bureau of Reclamation, based on a 1939-1944 price level. However, at 1948 price levels gross returns on principal crops have increased some 37% in the coastal area, and proportionately the same in the Santa Ynez and Lompoc Valleys, indicating that the Bureau estimates are conservative.

About 8,000 non-irrigated acres in the south coast area will probably develop quite rapidly within the initial 25 years of Project operations. The Bureau estimates that the net benefit that would accrue to the land because of the new water supply would be about $159 per acre-foot. On lands for residential use, the benefits are taken as equal to benefits from use on presently dry land, estimated at $159 per acre-foot. The benefits from application of supplemental water to lands in the south coast area now irrigated but with a deficient supply are also estimated at $159 per acre-foot.

In the Santa Ynez River Water Conservation District at present about 5,600 acres of irrigable lands are not irrigated. If these presently dry lands were irrigated, crops would follow the same pattern as on presently irrigated lands. With a duty of water estimated at one and one-half acre-feet per acre, the benefit would be approximately $50 per acre-foot.

Total Benefits to Lands. As justified to Congress, under full Project development with a dependable annual water supply of 33,000 acre-feet and based on minimum water allocations to the Water Districts, the total benefits at $159 per acre-foot, from 19,200 acre-feet furnished the South Coast area would be $3,053,000 each year, and at $50 per acre-foot from 500 acre-feet furnished the Santa Ynez River Water Conservation District would be $25,000.

Municipal Water Benefits. The Bureau of Reclamation states that the benefits that would accrue to the Cachuma Project from providing domestic, municipal and industrial water service to the urban areas are difficult to determine. The severity of the situation which would prevail in these prosperous areas with their ever-growing population and industry,

if the present water shortage continued, cannot be overemphasized, and the situation grows increasingly critical each year.

A study by the Bureau of the City of Santa Barbara water rates, receipts and expenses, indicated that the City could reasonably pay a maximum rate of about $35 per acre-foot for domestic water. Therefore, in evaluating the benefits from domestic water the Bureau of Reclamation considered that the benefits from the water should be in the same proportion as the amount which the County Water Agency is willing to pay for the various services. Therefore, based on the cost and benefit from irrigation water, domestic water at $35 per acre-foot would have a benefit of about $223, or a total of $2,342,000 annually for the supply which would be made available under the full Project development.

Recreational Benefits. The National Park Service has estimated that if suitable facilities are provided the recreational benefits attributable to the reservoir would total $99,000 annually, not including benefits from fishing in the reservoir, estimated by the Fish and Wildlife Service at $10.000 annually.

Indirect Benefits. In addition to the direct benefits, numerous indirect benefits would accrue to the local area, to the State, and to the Nation. The increased farm production will support additional activity in processing and packing agricultural products, transportation and trade. Farming opportunities as well as opportunities for non-farm business and service enterprises will be greatly increased. More people of means who are looking for a place to retire will be attracted to the area. Such indirect benefits would probably be as great as the direct benefits.

In connection with the proposed new campus of the University of California at Goleta. Dr. Robert Gordon Sproul, University President, recently stated that full development of their program would depend in a large measure on the assurance of an adequate water supply. He added:

> A water supply is certainly vital to development of a campus where we'll house at least 3,000 students and from 1,200 to 2,000 additional personnel.

On May 28, 1949, the plan for development of the campus was virtually assured by the approval of the University Board of Regents of the War Assets Administration deed to the Golcta mesa.

Flood Control Benefits. The Bureau states that even with full use of Cachuma Reservoir for conservation, a substantial measure of flood protection will result along the Santa Ynez River. At this time, no estimate has been made of the portion of the annual flood damages ($150,000 estimated by the Corps of Engineers) that would be prevented by the operation of the reservoir for conservation and, therefore, no flood control benefits are claimed for the project. It is recognized that Cachuma Dam will make substantial reductions of peak flood flows.

TOTAL DIRECT BENEFITS. Without any incidental flood control, recreation, or indirect benefits, the total direct benefits from the authorized Cachuma Project as calculated by the Bureau of Reclamation are estimated at $5,350,000 annually. These benefits are based on full use of the Project water supply and would be proportionately less during the growth period of the service areas when less water is used.

RECOMMENDED RECREATIONAL DEVELOPMENT

(By the National Park Service)

The National Park Service is charged with the appraisal of recreational features of Bureau of Reclamation projects, and assists in planning such features, but recommends that their development, administration and maintenance be conducted by the County.

Cooperative study and planning is in process by the County Board of Forestry, Santa Barbara County Planning Commission, U. S. Forest Service, and water authorities interested in the Project. Priorities of development will be worked out, extensive field surveys made, and a master plan prepared.

With the great influx of people into the State it is believed that all reservoirs should be utilized to their maximum, not only as a means of storing waters for irrigation, domestic use and flood control, but also as a means of meeting the ever-increasing need for recreation. All authorities are therefore in accord that recreational facilities in connection with Cachuma should be developed to include:

Trout fishing	Picnic areas	Concessioner's site
Boating	Organized camp groups	Swimming pool
Campgrounds	Summer homes	Parking areas

Trout Fishing. The construction of Cachuma Dam will remove from availability a portion of the spawning grounds in the Santa Ynez River system. Since the dam's height will make unlikely the construction of a functional fishway over it, maintenance of the steelhead run must be attempted in that portion of the river below the dam.

Subsequent to Project construction there will remain about 11 miles of good spawning stream between the dam and the town of Solvang, and some miles of possible spawning grounds between Solvang and the mouth of Salsipuedes Creek. Some spawning can be expected to occur in tributary streams below Cachuma Dam during years when runoff is sufficiently large to result in stream flow during the period February through June.

Maintenance of a segment of the present runs of steelhead, when Cachuma Dam is constructed, will require water flows adequate to make the 33 miles of stream below the dam satisfactory spawning and nursery grounds. Flood and winter runoff below the dam will provide sufficient water in most years to enable steelhead to enter the river.

The most dependable reservoir volume in which production could be assured is that reserved for dead storage. On the basis of river basin evaluations, the fish production in the dead storage of Cachuma Reservoir (area 960 acres) would be worth about $10,000 annually.

Boat Facilities. Two floating docks and boat landing ramps are recommended by the National Park Service. The units could be under the control of the concessioner who could rent boats and fishing equipment.

Campgrounds. Two campgrounds are planned for family camping. It is estimated that one will be occupied 60 days per year, which would give 4,800 visitor days; the other is estimated to be occupied 45 days per year. with a total of 4,500 visitor days. An interesting island will lie approximately 1,500 feet to the northwest of the second campground, and pleasing shorelines will be visible in three directions.

Picnic Areas. Picnic area A is approximately 6,000 feet east of the dam site which at maximum pool elevation is an island presenting possibilities for a most interesting development. The area is pleasantly wooded, yet there are also ample spaces for recreation. Assuming that the area will be used 1.5 days per week, 26 weeks per year, it will furnish 7,800 visitor days annually.

Picnic area B will lie between Highway 150 and maximum pool elevation 768 feet only a short distance west of the take-off of Tecolote Tunnel. Area B should be equipped to accommodate not over 100 picnickers. On the same basis as area A, this area will furnish 3,900 visitor days per year.

Organized Camp Groups. Upper Tequepis Canyon already is the location of one well-established organized camp group. This canyon affords the most shade and the best water supply found around the reservoir, and

the area is large enough to support two more organized camp groups. Assuming that each camp has facilities for 150 persons and is occupied for 45 days, the annual visitor days would be 13,500.

Summer Homes. Summer home areas along the Santa Ynez River are already in evidence. The most desirable area to be allocated to summer home development lies along the south shore of the reservoir about ¾ mile southwest of its upper island. There is a distance of about ¾ of a mile along the reservoir side of the highway that would permit the building of approximately 40 summer homes.

Concessioner's Site. Concessioner facilities could furnish food, soft drinks, fishing tackle and boat facilities to reservoir patrons. This area is centrally located.

Swimming Pool. It appears that since this reservoir water will be used for domestic water supply, swimming will not be permitted. Assuming that this is the case, a small earth dam may be built below the main dam site. With a small amount of excavation a suitable swimming pool may be formed.

Parking Area. In order that people travelling on State Highway 150 may stop for a view of the dam. it is recommended that an adjacent parking area be built.

LAND ACQUISITION

The National Park Service recommends that lands be acquired in excess of the actual needs for reservoir purposes. There are a number of justifications for land acquisition, mainly that in certain areas, once the reservoir is established the failure to purchase this land would immediately result in a pollution problem for the reservoir. The area along Tequepis Creek, for instance, would become attractive to individuals interested in introducing commercial recreational activities that would be harmful to the cleanliness of the reservoir, and to the supervision of the recreational program in general.

BENEFITS

The National Park Service has estimated that if suitable facilities are provided, the recreational benefits from use of picnic areas, camp grounds, summer cabins, and group camps, attributable to the reservoir, would total $99,000 annually, not including benefits from fishing in the reservoir, estimated by the Fish and Wildlife Service at $10,000 annually. These benefits would accrue directly to the County if it elects to develop the recreational potentialities of the reservoir.

COST AND REVENUE

The National Park Service study estimates an annual use of the recreational assets of the lake by 12,000 persons. The development of the recreational features is estimated to cost the County aproximately $130,000. Annual maintenance costs are estimated at $12,000, and revenue at $18,000.

APPENDICES

WATER SUPPLY AND REQUIREMENTS

THE CITY OF SANTA BARBARA

Supply. The total dependable annual supply from Gibraltar Reservoir, Mission Tunnel, Cold Spring Tunnel and 300 acre-feet diverted from Jameson Lake is presently 4,410 acre-feet.

The City wells have no firm annual yield and are an emergency supplemental source only. When put into operation during critical water shortages the continuous overpumping, in some instances, seriously lowers the water table. Experiences with wells in nearby areas indicate that some City wells may follow the same trend to the point where they become inoperable.

It is to be noted that Gibraltar Dam and Reservoir was designed in 1913 *for a population of 20,000*, and when it was completed in 1920, the population of Santa Barbara had already reached that limit. Through the years, silting had reduced the capacity by one-half, and as an intermediate measure only, the Dam was raised in 1948 thus restoring the original capacity; but it now had to serve a population of *more than double* that of 1920. Thus, in years of inadequate rainfall there is no safe margin of yield as demonstrated in 1947-48, when water rationing was in effect. On the other hand, Cachuma Reservoir, nearly 15 times as large, is planned to provide a safe margin of yield through wet or dry cycles for an estimated period of 60 to 80 years, and for a population of about 100,000.

Per-Capita Use. Records on the use of municipal water indicate that the per-capita consumption averages 140 gallons per day.

Requirements. Because of increased industrial demand and the growing desire for better lawns and more gardens it is believed by the Bureau of Reclamation that a per-capita demand of 150 gallons per day will be reached as soon as water is made available from Cachuma Dam. Using this figure with the estimated future growth in population,[1] water requirements for the City of Santa Barbara would increase from the present average annual use of around 5,900 acre-feet to approximately 16,600 acre-feet in 1990.

The present allotment agreed to by the City of Santa Barbara for Cachuma water is for a minimum of 3,300 acre-feet per year for the first period, and for 10,300 acre-feet beginning in the 36th year of the Project operation.[2]

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[1] p. 59
[2] Table, p. 54

ESTIMATED WATER REQUIREMENTS FOR CITY OF SANTA BARBARA

Bureau of Reclamation figures
on basis of 150 gallons per-capita per day

Year	Estimated Population	Estimated Water Requirements Gallons Per Day	Acre-feet Per day	Acre-feet Per year
1950	46,672	7,000,800	21.48	7,842
55	52,963	7,944,450	24.38	8,899
1960	59,254	8,888,100	27.28	9,956
65	65,681	9,852,150	30.24	11,036
1970	72,108	10,816,200	33.19	12,116
75	78,772	11,815,800	36.26	13,235
1980	85,435	12,815,250	39.33	14,355
85	91,925	13,788,750	42.32	15,445
1990	98,748	14,812,200	45.46	16,592

MONTECITO

Supply. Water for the Montecito County Water District (organized in 1921) is now largely obtained from local wells, Doulton Tunnel and diversions from Jameson Lake. The present dependable annual water supply from Jameson Lake and the Tunnel is estimated at 1,800 acre-feet, of which 300 acre-feet are diverted to the City of Santa Barbara. The ground water supply pumped from private wells is about 1,000 acre-feet. thus, the total dependable supply is about 2,500 acre-feet for municipal and domestic purposes, and for the irrigation of about 2,325 acres.

Requirements. With the irrigated lands and irrigable lands not now irrigated, a total of 4.994 acres will eventually need water. With an estimated safe yield of 2,500 acre-feet available from present sources (annual requirements now in excess of the safe yield) some 2,500 acre-feet will eventually be required from the Project. This District has requested an initial quantity of 500 acre-feet, with a minimum of 2,900 acre-feet in the 36th year of the Cachuma Project operation.

Water rationing went into effect in February, 1948, because of constantly increasing water diversions from drought-depleted storage in Jameson Lake, and this rationing is still in effect. (The 1948-49 season is the third year that run-off has been insufficient to fill Jameson Lake.)

GOLETA

Supply. The Goleta County Water District, organized in 1944, comprises some 22,720 acres of land. Rainfall percolates into the ground and

stream beds, entering the underground reservoir which is the major source of water supply, both for irrigation and domestic use. The water is obtained by pumping some 250 irrigation wells ranging from 100 to over 600 feet in depth.

The present use of water is about 7,000 acre-feet per annum with an estimated safe yield of 3,100 acre-feet. The consequent overdraft has seriously lowered the water table,* and in some instances the encroachment of salt water has been noted.

Requirements. The District contains some 15,580 acres on which water might eventually be used. The present request from the District is for an initial quantity of 3,300 acre-feet with a minimum of 11,600 acre-feet in the 36th year of the Project.

Water conservation was of immediate concern to every resident in the Goleta area in 1948, and the water table had shown a drop of 20 feet or more over the preceding twelve months. One old-time resident reported that wells with a water level at six feet some 30 years ago, are today 80 feet lower.

CARPINTERIA

The Carpinteria County Water District, organized in 1940, comprises a narrow strip of land containing 8,680 acres, of which some 5,600 acres are irrigable. Rainfall percolates through the ground and stream beds into an underground reservoir which is the major source of supply both for irrigation and domestic use.

The water is obtained from some 120 wells ranging from 40 to 80 feet in depth below sea level, and the safe annual ground water yield (in years of average rainfall only) is estimated to be 1,700 acre-feet. With about 3,700 acre-feet annually being pumped, the ground water supply is being diminished about 2,000 acre-feet per year. The situation here is comparable to that of Goleta, with a serious shortage and lowering of the water table,* and wells in some instances being contaminated with salt water.

Requirements. To fulfill the eventual requirements of this area some 3,900 acre-feet of water will need to be furnished by the Cachuma Project. The present request from the District is for an initial quantity of 1,000 acre-feet, with a minimum of 3,500 acre-feet in the 36th year of the Project.

SUMMERLAND

Supply. The Summerland County Water District, organized in 1948, contains 757 acres. About 460 acres are irrigable and some 35 acres are being irrigated from ground water which is not dependable for any further expansion. A private water company supplies the irrigation and domestic needs, and although the recent drilling of new wells has aided the critical shortage, this situation will not be properly remedied until an additional source of water is furnished.

* Table of well measurements, p. 62

Requirements. It is estimated that water will eventually be required for 460 acres, or about 500 acre-feet per annum. The present request from the Cachuma Project is for an initial quantity of 100 acre-feet, with a minimum of 400 acre-feet in the 36th year.

An acute water shortage developed in 1947 and 1948, and strict rationing was in effect. Oil-coated water had to be pumped and delivered because there was not sufficient water to flush the oil off the surface. Consumption is steadily rising because of the construction of new homes, but further developments are greatly hampered by lack of sufficient water.

SANTA YNEZ

Supply. The water supply in the Santa Ynez River Water Conservation District, both for domestic and irrigation use is obtained by pumping from the gravel beds underlying the entire valley floor. With a total of some 19,500 irrigable acres, at present some 14,000 acres are being irrigated. using a yearly duty of water at approximately one and one-half acre-feet per acre. The supply of water has proven to be limited, and if more of the bottom lands come under irrigation it will be possible to supplement the existing supply with releases from Cachuma Reservoir, above those required by prior water rights.

Requirements. The present request from the District is for 500 acre-feet per annum with an optional maximum of 3,300 acre-feet in any year.

THE MASTER CONTRACT

A brief analysis of the main features

The Master Contract is between the Federal Government which will finance and supervise the construction of the Cachuma Project, and the Santa Barbara County Water Agency which must agree to pay for the water furnished. It becomes binding on the United States when signed by the Regional Director of the Bureau of Reclamation, and upon execution by the Agency. However, it will not bind the Agency unless within one year of the execution of the Master Contract the City of Santa Barbara, Goleta, Carpinteria, and either Montecito or Santa Ynez sign subsidiary contracts with the Agency. Provision is also made for Summerland to execute a member unit contract if it so desires.

Subsidiary Contracts. These will dovetail into the master contract and will be drawn between the County Water Agency and the City of Santa Barbara and the various districts, who will agree to pay the Agency for water furnished to them. These are the contracts which will be placed before the voters for approval at special elections.

Those to receive water under contract are: The City of Santa Barbara; the Goleta, Montecito, Summerland and Carpinteria County Water Districts, and the Santa Ynez River Water Conservation District.

Period of Contract. The proposed Master Contract is for a period of 40 years beginning in the year in which the initial delivery of water occurs. At the end of the 40 years it is estimated that 70% of the capital cost will have been retired, and a new contract for water service must be negotiated. This second period is expected to retire the balance of the capital cost in 10 years or less, according to the amount of water used.

Title to the Project. At the end of the two contract periods mentioned above, in order to obtain title to the Project when the construction cost is repaid, under present laws authorization by Congress is necessary.

Water Prices. Santa Ynez irrigation water: not to exceed $10.00 per acre-foot. South Coast irrigation water: not to exceed $25.00 per acre-foot. Municipal water: not to exceed $35.00 per acre-foot.

Advance Payment. Payment for water is required in advance of delivery, and the contract provides the usual conditions for cutting off service in case of failure to pay.

Assessment in Case of Default. The County Water Agency has the right under law and in the contract to make assessments in a district that has failed to pay its past due bills. The Government has the right to terminate the contract if it so desires, with respect to an individual district if it is in default two or more years; but if default is caused by court proceedngs restraining payment, the contract cannot be terminated.

No district is liable for the defaults of any other district, and in case of default other districts would not be required to agree to purchase additional water to make up the difference in total delivery.

Periods and Amounts of Delivery. Eight periods for delivery of water to the South Coast area are set up under the terms of the contract. The "interim period" will commence with initial delivery date of water and extend through May 14 of the fourth year after the year in which delivery starts. During the interim period, the City and each district buys as much or as little water as it desires.

The next 35 years are divided into seven 5-year periods in which the districts agree to purchase specified amounts of irrigation or municipal water.

These amounts range from 3,300 acre-feet a year in the first period, to 10,300 acre-feet a year in the seventh period for Santa Barbara; 3,300 acre-feet to 11,600 acre-feet for Goleta; 100 acre-feet to 400 acre-feet for Summerland; 500 acre-feet to 2,900 acre-feet for Montecito; 1,000 acre-feet to 3,500 acre-feet for Carpinteria.

Santa Ynez Portion. Santa Ynez agrees under the contract to buy 500 acre-feet each year during the 35 years, and has the option to buy up to 2,800 acre-feet additional each year. Santa Ynez water will be released at the dam's downstream outlet, but water for the other areas will be released through Tecolote Tunnel and the distribution systems.

SUMMARY OF MINIMUM ANNUAL WATER COMMITMENTS

South Coast Water Districts
Annual quantities in acre-feet

5-yr. period	Santa Barbara	Montecito	Summerland	Carpinteria	Goleta	Total	Santa Ynez	Total
Interim	Purchases are optional with member units							
1	3,300	500	100	1,000	3,300	8,200	500	8,700
2	4,500	1,000	200	1,500	4,700	11,900	500	12,400
3	5,600	1,500	300	2,000	6,100	15,500	500	16,000
4	6,800	1,900	300	2,400	7,400	18,800	500	19,300
5	7,900	2,400	400	2,900	8,800	22,400	500	22,900
6	9,100	2,800	400	3,300	10,200	25,800	500	26,300
7	10,300	2,900	400	3,500	11,600	28,700	500	29,200
Total 35 yrs.	237,500	65,000	10,500	83,000	260,500	656,500	17,500	674,000

Excess Water. If excess water (any available water at Cachuma over and above the amounts member units are required to take under their contracts) is available during any year, the Agency may purchase it if desired. The United States cannot sell any excess Cachuma water to anyone without offering it first to the Agency; nor can it sell cheaper to an outsider than to the Agency. The United States can only sell to an outsider for a one year period, and then only subject to Water Agency rights.

Water Rights. The United States Government specifically recognizes all existing water rights in the territory of the program, whether fully developed or not.

No Interest Component. The contract provides "that neither the rates for irrigation water nor municipal water shall include an interest component."

Water Shortage. The Government will not be held to liability in case of water shortage; water deliveries will be cut proportionately, and overpayments made by the Agency in advance will either be refunded or credited to the Agency.

160-acre Limitation Clause. A private owner of a large tract of land may receive water from the Project for at least 160 acres, and the remainder of the property may be irrigated by other systems. (There are only two properties in the South Coast area which may be affected.)

No water will be supplied to "excess land" unless the owners comply with certain sections of the master contract. "Excess land" means that

part of the irrigable land in excess of 160 acres held in the private beneficial ownership of any single person; or in excess of 320 acres held in the ownership of both husband and wife. If the excess land law is repealed, this provision of the contract automatically expires.

Benefit of New Amendments. If the Federal laws are amended, the United States agrees to amend the Master Contract to give the Agency and member units the benefit of any more advantageous terms.

Validity Suit. Promptly after the execution and delivery of the Master Contract, the County Water Agency must file a suit in the State courts to establish its validity.

ELECTIONS

Necessary Steps

1. The Master Contract between the United States Government and the Santa Barbara County Water Agency must be executed by the Department of the Interior and the County Water Agency, but it is not binding on the Agency except as provided.[1] (The contract was approved by the Department of the Interior. May 10, 1949, and by the County Water Agency, June 6, 1949.)

2. The proposed contracts between the Santa Barbara County Water Agency and the individual districts (member units) must also be approved as to form by their respective Boards of Directors. Those proposing to participate are: The City of Santa Barbara; Goleta, Montecito, Summerland and Carpinteria County Water Districts, and the Santa Ynez River Water Conservation District.

Elections to be Called. When these subsidiary contracts are so approved, elections will be called in the City of Santa Barbara and the various Districts.[2] The ballot will ask a "yes" or "no" vote on whether each specific District shall contract with the Santa Barbara County Water Agency to buy the requested minimum amounts of water at the rates agreed upon. If a District has voted affirmatively, then it will execute the subsidiary contract with the Agency. If within one year of the execution of the Master Contract sufficient subsidiary contracts have been executed to provide for the furnishing of 8,100 acre-feet of water during the first period of the Master Contract, then all contracts will be binding, otherwise they are of no force nor effect.

Pending Elections No Money Will Be Spent. In numerous statements made during the past year, T. A. Twitchell, Chairman of the Santa Barbara County Water Agency, as well as Bureau officials, has repeatedly confirmed the fact that no money will be spent on any part of the construction of the Cachuma Project until the elections on the water purchase contracts have been held.

[1] p. 76
[2] p. 31

WATERSHED PROTECTION

An investigation of the Department of Agriculture, reported on to Congress in March, 1944, recommended a program for the intensification of fire control and the improvement of cover on forest lands in the Santa Ynez watershed. Through this program there will be a material reduction in the rates of erosion and sediment contribution of these lands, protecting and prolonging the useful life of Gibraltar Reservoir and the proposed Cachuma Reservoir. The report advises that the program awaits completion of reservoir plans for the watershed.

Recommendations. The program calls for increased forest-fire control and reseeding of burns as they occur; structural measures on the tributary channels, supported by land-use measures in areas drained by channels on the north side of the Santa Ynez River. The total Federal cost of this program is estimated at about $425,300 for installation and $22,500 annually for operation and maintenance. State or local governments are expected to provide part of the installation and maintenance costs. Farmers will also supply an amount annually as the increased cost to them of operating their lands with the measures in effect and of maintaining structural measures.

Benefits. It is estimated that average annual flood and sediment reduction benefits, with Cachuma Reservoir constructed and with the enlargement of Gibraltar Reservoir, would amount to approximately $42,150.

In addition to flood control benefits this program will provide benefits in the form of reduced fire-suppression costs of $19,600 annually and in the form of increased farm income of $86,600 annually. Total average annual benefits will thus be $148,400. This is exclusive of indirect benefits, and of unevaluated benefits from the reduction of flood damages on the main stream. The average annual cost of the program is estimated at approximately $58,600. The average annual Federal cost is approximately $37,500.

WELLS AND TUNNELS

The underground water which has been gathering in this area for countless centuries has been tapped so heavily in a comparatively short period that the withdrawal is far greater than nature's ability to replenish it. Thus, the water that is obtained from wells, whether vertical, horizontal or slanted, is in the aggregate limited.

How much water can be obtained from wells may be gauged by their present performance and by the amount of water developed by our existing tunnels which are in themselves great wells, for they tap underground sources.

The Mission Tunnel, for example, is 19,500 feet long and five feet by seven in section. It passes directly through the Matilija formation, the best underground water source in this area. When first completed in 1920, the tunnel yielded about 5,000,000 gallons daily. For many years this stabilized at 1,500,000 gallons. Latest measurements show that this tunnel develops 600,000 gallons a day—only a fraction as compared with our peak summertime need of 11,000,000. The reason for the greater yield when Mission Tunnel was first built was because it tapped underground water which had been stored through the ages. The yield not only has diminished considerably but has the same fluctuating characteristics as any other well, which in the last analysis is reflected by the annual rainfall.

The Doulton Tunnel, which transports water from the Juncal Dam to Montecito is 11,394 feet long and seven by eight feet. It yields about 640 acre-feet (554,000 gallons per day) on its own account, whereas it originally yielded about ten times that amount. During the winter of 1947-48, less than one acre-foot per day came out of it.

The Cold Spring Tunnel does not transport water from any reservoir or dam, but is merely a huge horizontal well, a mile deep. Originally it developed about 290 acre-feet per year, but like the others has diminished in output with time. The City, which has the right to half its output, is now getting about 80,000 gallons per day from it, (less than 100 acre-feet per year).

DISTILLATION OF SEA WATER

In the February, 1949, issue of *Engineering and Science Monthly* published by the California Institute of Technology, William W. Aultman gives a comprehensive review of methods for producing fresh water from salt water. The following is a digest of the more important aspects, as presented by Mr. Aultman.

Economic Infeasibility. When cost is not a consideration it must be admitted that the reclamation of sea water is a possibility. But when consideration is given to methods of producing domestic, industrial or agricultural water, cost is a primary factor. A study of some of the methods which have been suggested for producing fresh water from sea water clearly indicates their economic infeasibility.

By Distillation? The method which presently appears to be the lowest in cost is distillation by multiple-effect evaporation in compression distillation. Assuming that a production of 192 gallons of water is obtained from each gallon of fuel (which can be done), what would such water cost?

To produce 1,000,000 gallons of distilled water (one-fifth of a normal day's supply for the City of Santa Barbara), from sea water, by this method, would require 5,208 gallons of Diesel oil, or an equivalent amount of mechanical energy. At the lowest quotation presently obtainable for Diesel fuel, the cost would be $495.00 per million gallons, or $161.00 per acre-foot *for fuel only.* Labor to operate and maintain the stills is estimated to cost from $40.00 to $200.00 per acre-foot, depending on the

size of the distillation unit. Allowing for pumping the sea water and other charges, the total cost would probably be $400 to $500 per acre-foot delivered. (More than 11 times the cost of municipal water from Cachuma Reservoir.)

Other Known Methods? The development of organic anion and cation exchangers has made possible the complete demineralization of water. Assuming what is believed to be a fair average operating efficiency, the cost of regenerating chemicals required to demineralize sea water at existing chemical prices in Southern California would be about $8,000 per acre-foot. This is for chemicals only, and includes nothing for opertion, maintenance, depreciation or interest on the investment.

There is also the electrolytic process. Studies made by the inventor, Robert E. Briggs, an Industrial Chemist, show that for *power alone* it would cost $293 per acre-foot of water produced.

By Atomic Power? Dr. L. A. DuBridge answers this question quite adequately in his article on "The Future of Atomic Energy," in the November, 1947, issue of *Engineering and Science.* He states: "I am inclined to believe that 30 to 50 years will elapse before uranium can possibly become a *major* source of power, comparable, say, to present production of electrical energy . . . it is hard to see how uranium power can be very cheap. . . . The sober fact is that uranium 235, while it may be concentrated, is neither an *abundant* nor a *cheap* source of power.

Conclusion. "From an engineering standpoint there is no question that fresh water can be and is being produced from sea water. But within the foreseeable future there appears to be no possibility that it will be economically feasible to turn to the ocean as a source of domestic, agricultural or industrial water."

POPULATION OF SANTA BARBARA BY U. S. CENSUS AND AS CALCULATED* BY THE BUREAU OF RECLAMATION

Year	Population	Numerical Increase	Percentage Increase
1870	2,889		
1880	3,460	571	19.7
1890	5,864	2,404	69.5
1900	6,587	723	12.3
1910	11,659	5,072	77.0
1920	19,441	7,782	66.7
1930	33,613	14,172	72.9
1940	34,958	1,345	4.0
1950*	46,672	11,714	33.5
1960*	59,254	12,582	26.9
1970*	72,108	12,854	21.7
1980*	85,435	13,327	18.5
1990*	98,748	13,313	15.6

GIBRALTAR RESERVOIR
RATE OF SILTING DETERMINED BY PERIODICAL MEASUREMENTS

Period	Sediment deposited in reservoir in acre-feet	Reservoir capacity at end of period in acre-feet
Original capacity		14,500
1920-31	1,786	12,714
1931-34	2,030	10,684
1934-36	410	10,274
1936-38	982	9,292
1938-40	189	9,103
1940-44	1,330	7,773
1944-47	173	7,600
1948 Raising of dam restores original capacity		14,500

ANNUAL PRECIPITATION IN SANTA BARBARA

Record as published by U. S. Weather Bureau
Seasonal rainfall ending June 30
Approximate average 18 inches
(Indicating theory of "Wet" and "Dry" cycles)

Year		Inches
1868		25.22
1869		15.77
1870		10.27
1871	7 years	8.91
1872	13.36 av.	14.94
1873	DRY	10.52
1874		14.44
1875		18.71
1876		23.07
1877		4.49
1878		29.51
1879		13.59
1880		25.64
1881		15.23
1882	15 years	14.27
1883	19.97 av.	13.41
1884	WET	34.47
1885		13.08
1886		24.24
1887		12.99
1888		21.71
1889		21.58
1890		32.37
1891		17.36
1892		10.76
1893		26.97
1894		7.02
1895		16.34
1896		13.37
1897	14 years	18.50
1898	14.44 av.	4.99
1899	DRY	12.37
1900		12.66
1901		15.40
1902		14.21
1903		20.74
1904		11.58
1905		29.64
1906		22.70
1907		27.72
1908		19.21
1909		36.29
1910		19.62
1911	14 years	31.94
1912	24.21 av.	16.35
1913	WET	12.59
1914		31.52
1915		21.25
1916		25.88
1917		22.56
1918		21.63
1919		14.46
1920		14.68
1921		14.31
1922		19.22
1923		17.24
1924		6.36
1925		12.26
1926	16 years	16.87
1927	14.91 av.	22.63
1928	DRY	13.54
1929		14.54
1930		13.71
1931		14.55
1932		22.13
1933		8.66
1934		13.43
1935		21.20
1936		17.17
1937		25.51
1938		26.10
1939	10 years	13.40
1940	21.90 av.	14.94
1941	WET	45.21
1942		12.96
1943		24.57
1944		17.97
1945		15.23
1946	12.05 av.	11.39
1947		13.35
1948	DRY	9.34
1949		10.95

SANTA BARBARA PER CAPITA CONSUMPTION IN GALLONS PER DAY—1921-48

Total Supply includes 1,120 acre-feet from Mission Tunnel and 290 acre-feet from Cold Spring Tunnel, added to Diversions from Gibraltar Reservoir and Diversions from Montecito to Santa Barbara.

Year	Population	Gibraltar Diversion Acre-Feet	Montecito Diversion Acre-Feet	Total Supply Acre-Feet	Consumptive Use Gallons Per Day Total	Per Capita
1920	19,441	1,989		3,399	3,034,422	
21		2,114		3,524	3,146,015	
22						
23						
24		4,029		5,439	4,855,611	
25		3,547		4,957	4,425,311	
26		3,592		5,002	4,465,484	
27		3,784		5,194	4,636,890	
28		3,863		5,273	4,707,416	
29		4,365		5,781	5,160,928	
30	33,613	4,067	15	5,492	4,902,926	146
31		3,279	102	4,791	4,277,116	
32		3,123	255	4,793	4,278,901	
33		3,393	300	5,103	4,555,651	
34		3,547	300	5,257	4,693,133	
35		3,412	300	5,122	4,572,613	
36		3,916	300	5,626	5,022,554	
37		3,252	300	4,962	4,429,774	
38		2,880	300	4,590	4,097,675	
39		3,702	300	5,412	4,831,507	
40	34,958	4,165	300	5,875	5,244,846	150
41		2,274	300	3,984	3,556,675	
42		3,491	300	5,201	4,643,139	
43		3,157	300	4,867	4,344,978	
44		3,734	300	5,444	4,851,163	
45		4,366	300	5,776	5,334,194	
46	38,311*	4,193	300	5,903	5,269,972	138
47	40,700*	4,708	300	6,418	5,729,603	141
48	42,000*	1,986	300	4,801**	4,285,905	102
					Average	135***

* Estimated
** Including 1,105 Acre-Feet from wells
*** Without water rationing in 1948 the rate of consumption probably would have exceeded that of 1947. On this basis, the daily per capita use might have been 142 gallons, considered by the City Water Department to be more nearly correct.

WELL MEASUREMENTS
(STANDING LEVELS)

5 Wells in Carpinteria[1]

Well No.	Depth to Water May 1943	Depth to Water May 1949	Drop in 6 Years	Elev. Well	Relation to Sea Level 1943	1949
1.	95.40	172.16	76.76	129.20	+33.80	−42.96
2.	21.13	75.62	54.49	——	——	——
3.	107.15	187.17	80.02	142.00	+34.85	−45.17
4.	64.20	111.54	47.34	——	——	——
5.	108.00	133.86	25.86	112.50	+ 4.50	−21.36

5 Wells in Goleta[2]

Well No.	Depth to Water May 1945	Depth to Water May 1949	Drop in 4 Years	Elev. Well	Relation to Sea Level 1945	1949
1.	64.8	106.8	42.0	88.5	+23.7	−18.3
2.	55.5	78.4	22.9	56.9	+ 1.4	−21.5
3.	66.8	88.8	22.0	79.9	+13.1	− 8.9
4.	17.4	37.0	19.6	10.5	− 6.9	−26.5
5.	95.9	130.4	34.5	121.6	+25.7	− 8.8

5 Wells in Carpinteria[2]

Well No.	Depth to Water May 1945	Depth to Water May 1949	Drop in 4 Years	Elev. Well	Relation to Sea Level 1945	1949
1.	90.9	114.0	23.1	106.0	+15.1	− 8.0
2.	67.8	113.9	46.1	127.0	+59.2	−13.1
3.	103.0	151.1	48.1	127.0	+24.0	−24.1
4.	28.0	48.9	20.9	17.0	−11.0	−31.9
5.	21.2	54.4	33.2	32.0	+10.8	−22.4

1 Well in Goleta[2]

1.	100.1	177.3	77.2	285.3	+185.2	+108.0

Records from:
[1] Carpinteria County Water District
[2] U.S. Geological Survey
[3] County Water Agency

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and the County Water Districts of Goleta, Montecito and Carpinteria.

The 80th Congress made an appropriation for the construction and the continuation of construction of the Cachuma unit, as set forth in an Act of Congress designated as Public Law 841, 80th Congress, Chapter 754, 2d Session, H. R. 6705. On Page 17 of the Act is found the only mention of the Cachuma project, which is as follows:

> "Construction: For construction and continuation of construction of the following projects in not to exceed the following amounts, all to be reimbursable (except as otherwise provided by law) under the reclamation law, to remain available until expended for carrying out projects (including the construction of transmission lines) previously or herein authorized by Congress:
>
> "Santa Barbara County project, California, Cachuma Unit, $1,000,000, and in addition thereto the Commissioner of Reclamation is authorized to enter into contracts in an amount not in excess of $1,600,000;"

The report of the House of Representatives Committee on appropriations submitted in connection with the Interior Department Appropriation Bill, 1949, contains the following comments about the Santa Barbara County project: Page 25:

> "Santa Barbara County project, California, Cachuma unit.--The committee considered an estimate of $3,000,000 for construction of this project, which it is estimated will cost a total of $32,210,000. The project has been authorized under the Reclamation Project Act of 1939 by means of a report by the Secretary of the Interior dated December, 1947. No funds have been appropriated for construction of the project. The bill contains $1,000,000, together with a contract authorization of $1,500,000, for beginning construction of the project. Funds and authorization in the bill are allowed for the purpose of starting work on construction of the Tecolote Tunnel at the earliest possible date, $900,000 of the direct appropriation being provided specifically for this phase of the project and not exceeding $50,000 for the purchase of rights-of-way in this connection. The committee has restricted

work to construction of the tunnel, as this part of the project will require at least 2½ years to complete. Also, previous experience with construction of tunnels in the Santa Ynez Mountains has shown that they yield considerable quantities of water, particularly during construction. This is particularly important, as there is a shortage of water and it is planned to put all such water to use as rapidly as it can be made available. The location of the tunnel has not been designated by the committee. The allowance of funds is made with the understanding that additional appropriations will be contingent upon the holding of an election on the proposal, at which the people in the area interested in the question will have an opportunity to express their position for or against the project."

We are informed that prior to the authorization of the project the United States Government, through the Bureau of Reclamation, has obtained a permit to appropriate waters of the Santa Ynez River for the uses of the Cachuma unit of the Santa Barbara County project. We are further informed that the Santa Ynez Water Conservation District has likewise obtained an appropriation permit for waters of the Santa Ynez River.

No permits issued applications only

Prior to any consideration of the detailed terms of the draft of the contract submitted by Mr. Parma, it was deemed advisable that the City of Santa Barbara and the Coastal County Water Districts consider the consequences to the present and future water rights of these entities in the Santa Ynez River as a result of the developments above reported. This consideration is to be directed primarily to the question as to whether the rights of Santa Barbara and Montecito to their existing and future diversions of water from the Santa Ynez River would be jeopardized by the execution by them of member unit contracts incorporating the provisions of the Agency contract. There must also be considered the further question of the